



BILTMORE AVENUE AND MCDOWELL STREET

# CORRIDOR STUDY

ADOPTED BY CITY COUNCIL  
DECEMBER 14, 2021



# BILTMORE AVENUE AND MCDOWELL STREET CORRIDOR STUDY

FINAL REPORT  
DECEMBER 2021

## Table of Contents

<b>Executive Summary</b>	<b>1</b>
<b>Introduction</b>	<b>3</b>
Study Background	3
Study Timeline and Approach	4
<b>Public Engagement</b>	<b>6</b>
COVID-19 Impacts and Virtual Public Engagement	6
Public and Stakeholder Outreach Overview	6
Community Workshops	7
Online Survey Results	7
Survey Round One	7
Survey Round Two	13
Stakeholder Interviews	13
<b>Considering Equity in Transportation Planning</b>	<b>14</b>
<b>Bicycle and Pedestrian Deficiencies</b>	<b>16</b>
<b>Transit User Experience: Access to Bus Stops</b>	<b>17</b>
<b>Future Mobility Deficiencies</b>	<b>17</b>
<b>Safety</b>	<b>22</b>
<b>Recommendations</b>	<b>23</b>
Three Pillars	23
Menu of Options for Implementation	23
Keep Biltmore Moving	27
Intersection Improvements Already Programmed and/or Recommended Separately from Rebalanced Scenario	29
Intersection Improvements Recommended for Implementation in Conjunction with Rebalanced	

Biltmore, Rebalanced McDowell, or Combined Rebalanced Scenario . . . . .	29
Biltmore Avenue and Southside Avenue/Charlotte Street (Rdwy-09) . . . . .	29
Biltmore Avenue and Meadow Road/Bryson Street (Rdwy-08A) . . . . .	29
McDowell Street and Short McDowell Street/St. Dunstons Road (Rdwy-11) . . . . .	30
Potential Intersection Improvements not Included as part of Future Year Rebalanced Biltmore, Rebalanced McDowell and Combined Rebalanced Scenario, Recommended for Further study . . . . .	36
Implement Emergency Vehicle Preemption for Emergency Responders, Evaluate Potential Technology Platforms (Rdwy-14) . . . . .	36
Hendersonville Rd and Vanderbilt Rd/All Souls Crescent (Rdwy-03) . . . . .	36
Asheland Avenue and Hilliard Avenue (Rdwy-06) . . . . .	37
Biltmore Avenue and Meadow Road/Bryson Street: Partial Quadrant Intersection (Rdwy-08B) . . . . .	37
Connect the Neighborhoods . . . . .	38
All Scenario Recommendations . . . . .	38
<b>Bike the Biltmore . . . . .</b>	<b>43</b>
All Scenarios Recommendations . . . . .	43
Rebalanced Biltmore (Alternative A) Specific Recommendations . . . . .	46
Rebalanced McDowell (Alternative B) Specific Recommendations . . . . .	48
Recommendations for Further Study . . . . .	51
<b>Transit Improvements . . . . .</b>	<b>52</b>
<b>Railroad Coordination . . . . .</b>	<b>55</b>
<b>Special Events and Transportation Demand Management Strategies . . . . .</b>	<b>55</b>
<b>Implementation Plan and Table of Recommendations . . . . .</b>	<b>57</b>
Implement under Any Scenario or as Stand-Alone Projects. . . . .	57
Implement as Part of Rebalanced Biltmore Avenue Scenario (Alternative A) . . . . .	66
Implement as Part of Rebalanced McDowell Street Scenario (Alternative B) . . . . .	68
Implement as Part of Combined Rebalanced Scenario (Alternative C) . . . . .	69
Potential Funding Sources . . . . .	70

# Acknowledgments

The City of Asheville's elected and appointed officials, staff members, and consultants provided knowledge, assistance, and insight throughout the process of developing this Corridor Study. The contributions and efforts of the following are appreciated and helped to make the Biltmore Avenue and McDowell Street Corridor Study possible:

## Steering Committee

### Core Project Team

**Dan Baechtold**, City of Asheville Transportation Dept  
**Stacy Merten**, City of Asheville Planning and Urban Design  
**Brendan Merrithew**, NCDOT Division 13  
**Daniel Sellers**, NCDOT Transportation Planning Division  
**Nick Kroncke**, FBRMPO  
**Tristan Winkler**, FBRMPO  
**Vaidila Satvika**, Planning and Urban Design

### All Members

**Amanda Rigsby**, Asheville City Schools  
**Barb Mee**, City of Asheville Transportation Dept  
**Ben Mitchell**, Biltmore Village Merchants Association  
**Charlie Pond**, Gravitas, LLC  
**Dana Frankel**, City of Asheville Planning and Urban Design  
**David Hazzard**, City of Asheville Planning and Urban Design  
**Eunice Lovi**, ART (Asheville Rides Transit)  
**Garrett Shreffler**, Mission Health  
**Herb Arnold**, DoubleTree by Hilton Asheville  
**Jamie Judd**, Buncombe County Emergency Services  
**Janet Barlow**, Asheville Bike Ped Task Force  
**Jerry Young**, Biltmore Estate  
**Jessica Morriss**, City of Asheville Transportation Dept  
**Jim Muth**, Asheville Buncombe Hotel Association  
**Martin Gosnell**, Mission Health  
**Matt Cable**, Buncombe County Community Development Division  
**Mike Sule**, Asheville on Bikes

*Also thank you to the business and neighborhood associations who participated including the South Slope Business Association, Kenilworth Neighborhood Association, Southside Neighborhood Association and South French Broad Neighborhood Association.*



Prepared by



**Nikki Reid**, City of Asheville Community and Economic Development Dept

**Pat Kappes**, Explore Asheville

**Paul D'Angelo**, City of Asheville Community and Economic Development Dept

**Paulette McGaha**, DoubleTree by Hilton Asheville

**Peyton O'Conner**, Buncombe County Recreation Services

**Sam Powers**, City of Asheville Community and Economic Development Dept

**Stephanie Dahl**, City of Asheville Community and Economic Development Dept

**Sue Tripp**, Asheville City Schools

**Till Dohse**, Asheville Bike Ped Task Force

**Tim Rosebrock**, Biltmore Estates

**Todd Okolichany**, City of Asheville Planning and Urban Design

**Walt Dove**, Asheville City Schools





## Executive Summary

The Biltmore Avenue and McDowell Street Corridor Study set out to explore how feasible it would be to improve bicycling, pedestrian and transit user environment along those these two key north-south corridors in Asheville by reallocating some of the travel lanes away from vehicular travel lanes use. Biltmore Avenue and McDowell Street are major north-south roadway corridors that connect downtown Asheville and Biltmore Village, while also serving as important gateways to Mission Hospital, Asheville High School, Asheville-Buncombe Technical Community College, and other key regional destinations. Biltmore Avenue and McDowell Street are NCDOT-maintained roadways, with McDowell Street carrying the US 25 designation through the study area. The study identified existing congestion and roadway user delay issues that are present and are expected to get worse by the year 2045, especially at the southern end of the corridor and in Biltmore Village.

The planning study has identified several intersections upgrades, bicycle and pedestrian improvements and additional follow-up studies that could be implemented as stand-alone projects, in addition to or separately from consideration for travel lane reallocation along Biltmore Avenue and McDowell Street. For the purposes of this study report, “reallocation” and “rebalancing” and are both used to describe taking away one a vehicular travel lane to devote that space to bicycle and pedestrian infrastructure or streetscape improvements. This converts the typical 4-lane section to an imbalanced cross-section with two travel lanes in one direction and one lane in the other direction. Roadway widening was considered for short segments and for intersection improvements.

For both Biltmore Avenue and Asheland Avenue, the study finds that it would be feasible to reallocate travel lane width north of Southside Avenue up to Hilliard Avenue to free up space for improved bicycling and pedestrian conditions.

For travel lane reallocation paired with improvements to the bicycle and pedestrian realm through the core part of the corridor, the study presents the following options which all have their advantages and disadvantages:

- » Reallocating one travel lane from Biltmore Avenue (Alternative A) from Caledonia Road to Southside Avenue
- » Reallocating one travel lane from McDowell Street (Alternative B) from Lodge Street to Southside Avenue
- » Reallocating one travel lane from Biltmore Avenue and one travel lane from McDowell Street (Alternative C), the most challenging to implement



All three of the lane reallocation scenarios would require additional intersection improvements to ensure that traveler delay is maintained at manageable levels by 2045.

Even with the improvements proposed, the study recognizes that the level of service for drivers, bicyclists and pedestrians will be substandard in places and additional follow-up studies would be required to explore elements that are more challenging to implement or require additional consideration and study (such as a possibility of a partial quadrant intersection at Biltmore Avenue and Meadow Road and a potential greenway bridge across the Swannanoa River Road parallel to Hendersonville Road bridge.) Given the limited roadway network, challenging topography, cultural and historic resources and the river and railroad crossings, there are factors that are difficult to overcome to create a complete network of streets fully accommodating of all users.

Through a combination of incremental approach and partial lane reallocation on one of the corridors, the City could advance its vision of creating a more walkable and bikeable north-south connection between the Downtown and Biltmore village.



# Introduction

## Study Background

Biltmore Avenue and McDowell Street are major north-south roadway corridors that connect downtown Asheville and Biltmore Village--two very walkable areas with a variety of land uses and destinations. The Asheville in Motion Mobility Plan (2016) identified the desire to improve bicycle and pedestrian facilities on Biltmore Avenue. In 2016, the NCDOT Congestion Management unit conducted a scan of options for improving the corridors, including a potential “unbalanced couplet” solution that reallocated some through travel lanes from vehicular traffic to dedicate more room for bicycling and pedestrian infrastructure. An unbalanced couplet would mean that both Biltmore Avenue and McDowell Street would continue to operate as two-way streets, but one direction (i.e. northbound) would receive priority on one street and the opposite direction (i.e. southbound) would receive priority on the other street in terms of number of travel lanes and signal timing. A more detailed corridor study was identified as a next step to determine a feasible way to improve multi-modal transportation along Biltmore Avenue and the Ashland/McDowell corridor while ensuring adequate mobility for vehicular traffic and preserving access to Mission Hospital, Asheville-Buncombe Tech, Asheville High School and other key regional destinations. The City of Asheville applied for grant funding through the French Broad River Metropolitan Planning Organization (FBRMPO) to undertake the study. The current report is a summary of recommendations developed as part of the study process during the June 2020-June 2021 timeframe.

**All design sketches or cost estimates are planning-level and conceptual in nature; a follow-up design study is expected for any identified project.**



## Study Timeline and Approach

The study took place over the course of a thirteen-month period, from June 2020 through June 2021. The Study team worked closely with the Project Team throughout the study via monthly meetings, with Asheville City staff, FBRMPO staff, NCDOT Transportation Planning Branch, and NCDOT Division 13 staff represented on the Project Team.

The study's Steering Committee held six meetings throughout the study duration and included representatives from the following agencies and interest groups:

- » City of Asheville Transportation Department
- » City of Asheville Planning and Urban Design
- » City of Asheville Community and Economic Development Department
- » Asheville Bike Ped Task Force
- » French Broad River Metropolitan Planning Organization (FBRMPO)
- » NCDOT Transportation Planning Branch
- » NCDOT Division 13
- » Buncombe County Emergency Services
- » Buncombe County-Mountain Mobility
- » Buncombe County Recreation Services
- » Asheville Buncombe Technical Community College
- » Mission Health-Facility Planning, Design and Construction / Facility Services
- » Asheville City Schools
- » Asheville Visitors Bureau (Explore Asheville)
- » Asheville Lodging Association
- » Biltmore Village Merchants Association
- » South Slope Business Association
- » Kenilworth Neighborhood Association
- » Asheville on Bikes
- » Southside Neighborhood Association
- » Biltmore Farms Hotels
- » Biltmore Estate

The study approach included holding a series of stakeholder interviews early in the process to identify key issues and trends, as well as collecting a variety of data in support of existing conditions report. StreetLight origin-destination data were analyzed for travel patterns to support follow-up traffic modeling and travel lane reallocation decisions. StreetLight is a private provider of origin-destination data, aggregated for ease of use in transportation analysis. The Existing Conditions report was released in November 2020, and the first public input meeting was held on November 12th, 2020.

The study team reviewed the growth rates from the FBRMPO's regional Travel Demand Model, forecasted future travel along the corridor, and initiated more detailed traffic modeling in the December 2020-January 2021 timeframe. At the same time, the Market Analysis report was prepared and shared with the Steering Committee to review the observed land use and development trends for the area. Draft recommendations were developed in February-March 2021 and presented during the second public meeting on March 30th, 2021. The draft final report was prepared in May 2021 to share the study findings with the City's relevant committees. Figure 1 below illustrates some of the key steps in the study process.

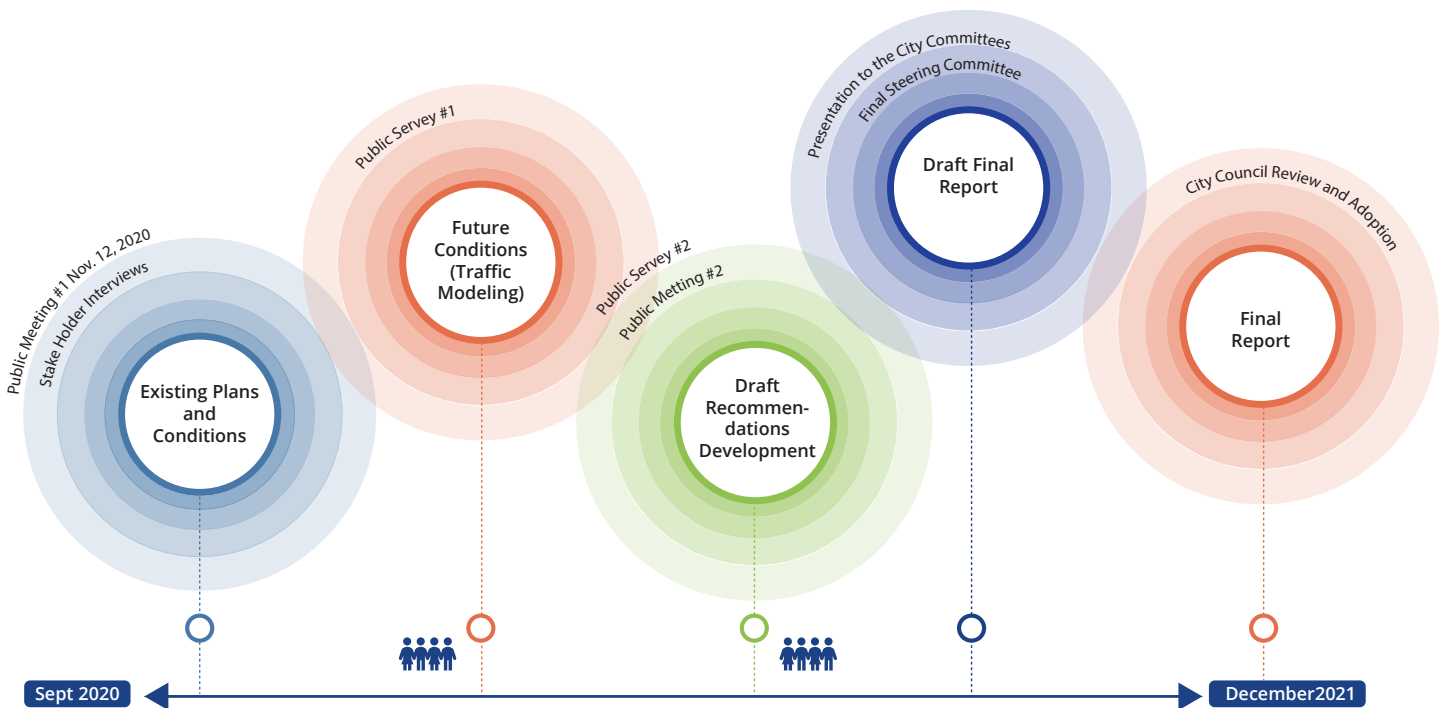


Figure 1 Study Elements and Timeline

## Public Engagement

### COVID-19 Impacts and Virtual Public Engagement

During the spring, summer, and fall of 2020 and the spring of 2021, the COVID-19 pandemic and resulting social distancing measures meant a significant change to public gathering protocols and acceptable public outreach strategies. While in-person public outreach meetings were initially planned for the Biltmore Avenue and McDowell Street Corridor Study, those plans had to be updated as the state of North Carolina implemented partial shut-down followed by social distancing measures. North Carolina moved into Safer at Home Phase 3 as of September 30, 2020. Wearing masks was still required in most situations and distancing of 6 feet was strongly encouraged. A Modified Safer at Home order was implemented in December 2020 through February 2021. The outdoor face covering requirement was removed as of April 28, 2021. As of early May 4, 2021, North Carolina had 974,319 reported COVID-19 cases and 12,691 COVID-19 related deaths, underscoring the importance of continued social distancing<sup>1</sup>. Under those circumstances, typical in-person public meetings were not feasible. Instead, the study team and City of Asheville staff adjusted the public engagement strategy to be based on virtual webinar meetings and a robust web presence.



### Public and Stakeholder Outreach Overview

Public and stakeholder engagement was a critical component in developing recommendations for the corridor study. The following elements helped the study team connect with a variety of stakeholders and members of the public:

- » A Steering Committee was formed for the corridor study, including representatives from the City and county governments, the regional transit agency, city schools, medical centers, tourism and hospitality organizations, neighborhood associations and bicycle/pedestrian advocacy groups. Six Steering Committee meetings were held between September 2020 and May 2021.
- » Stakeholder interviews were conducted to ensure that the perspective of various community groups and agencies were captured in the study recommendations.
- » Two virtual community workshops were held during the planning process, the first one held on November 12th, 2020 and the second held on March 30th, 2021.
- » The draft study report was posted for public review from May 20 to June 24, 2021.
- » After review by several City committees, the study was presented for the City Council consideration on November 9, 2021.

The City Council adopted the study recommendations during its meeting on December 14, 2021.

<sup>1</sup> John Hopkins Coronavirus Resource Center. Data retrieved May 4, 2021 from: <https://coronavirus.jhu.edu/region/us/north-carolina>

## Community Workshops

Two community workshops and two public surveys were conducted during the study duration to solicit public feedback. The community workshops were held in a virtual (webinar) format due to the COVID-19 social distancing measures. The community workshop (webinar) dates were as follows:

- » November 12th, 2020 at 5:30 PM
- » March 30th, 2021 at 5:30 PM

Approximately 20 people participated in the first community workshop on November 12th, 2020. Participants were provided with an overview of the study process and existing conditions findings and were encouraged to fill out the online survey. Participants were able to ask questions during the live Q&A portion of the webinar. A recording of the community workshop presentation was posted on the City of Asheville's website.

During the public meeting on March 30th, approximately 30 attendees were present, including the study team presenters. A recording of the presentation and the survey link were posted to the City of Asheville Corridor Studies website, <https://www.ashevillenc.gov/departments/transportation/current-projects/corridor-studies/>

## Online Survey Results

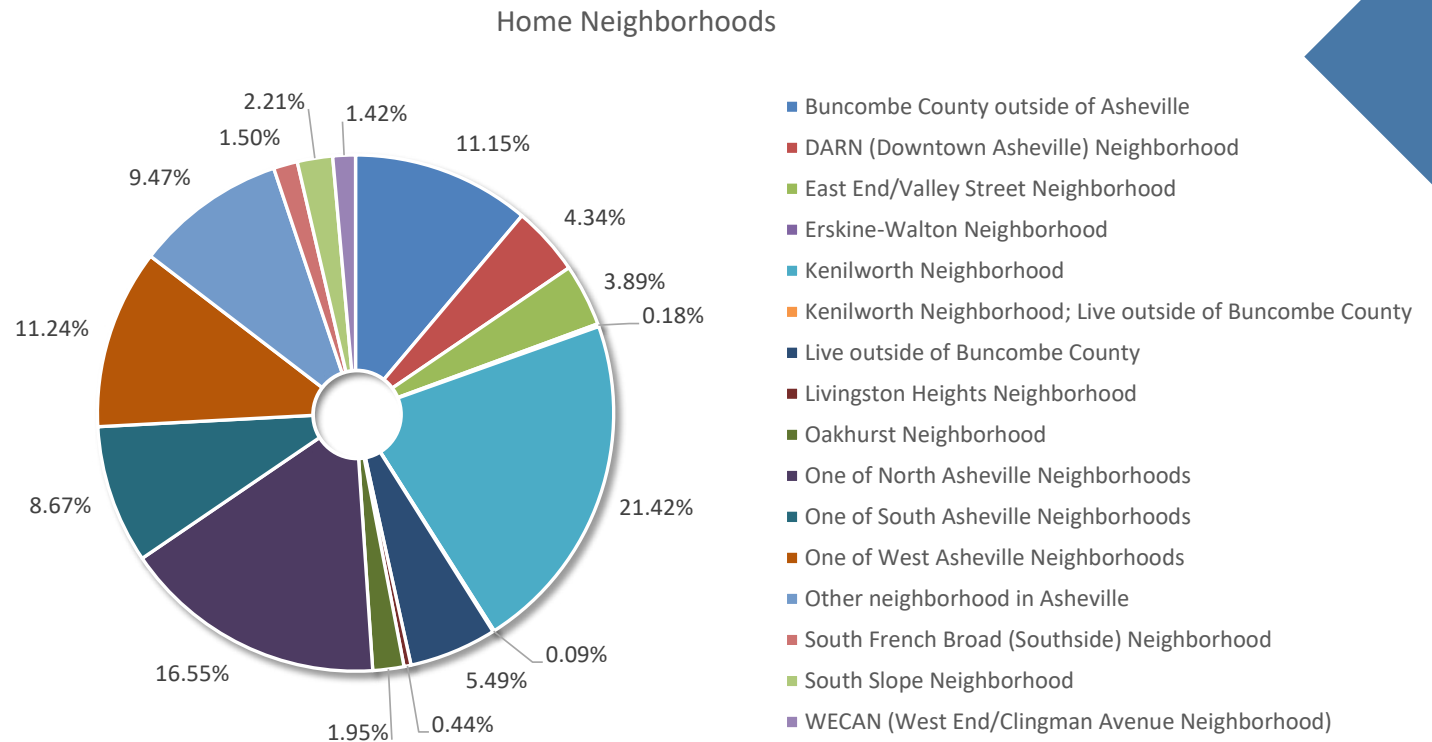
Two Biltmore Avenue and McDowell Street Corridor Study surveys were administered during the study process.

### Survey Round One

The first community input survey was administered as an online survey hosted on the City of Asheville's website. Survey respondents were able to respond through the web or on a mobile device. The survey was viewed nearly 2,000 times, with 1,140 survey participants. Participants were asked to identify their home neighborhoods and to identify their top three transportation issues along the Biltmore Avenue and McDowell Street corridors.

Roughly 60% of survey respondents were residents of the Kenilworth neighborhood (21%), a north Asheville neighborhood (17%), a west Asheville neighborhood (11%), or Buncombe County neighborhood outside of Asheville (11%). Figure 2 illustrates a breakdown of all responses.

Figure 2 – Home Neighborhoods of Survey Respondents

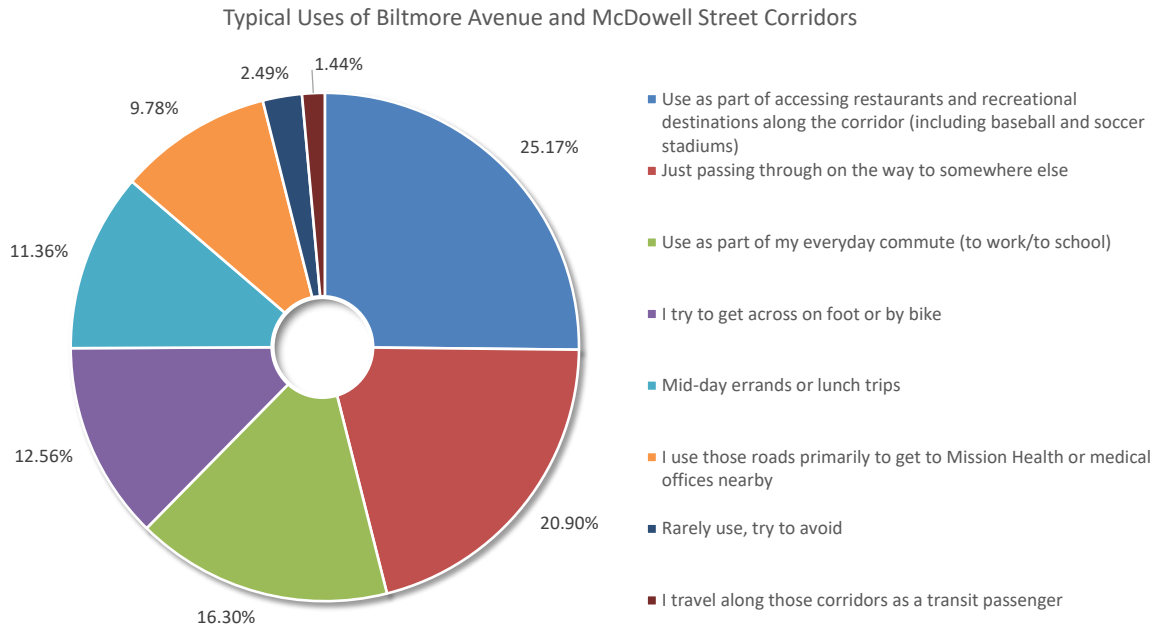


Respondents were asked how they typically use the Biltmore Avenue and McDowell Street corridors prior to the COVID-19 pandemic. Respondents indicated the following top three uses:

- » Use as part of accessing restaurants and recreational destinations along the corridor (25%)
- » Just passing through on the way to somewhere else (21%)
- » Use as part of their everyday commute (16%)
- » Other uses are illustrated in Figure 3 below.



Figure 3 –Typical Uses of Biltmore Avenue and McDowell Street Corridors



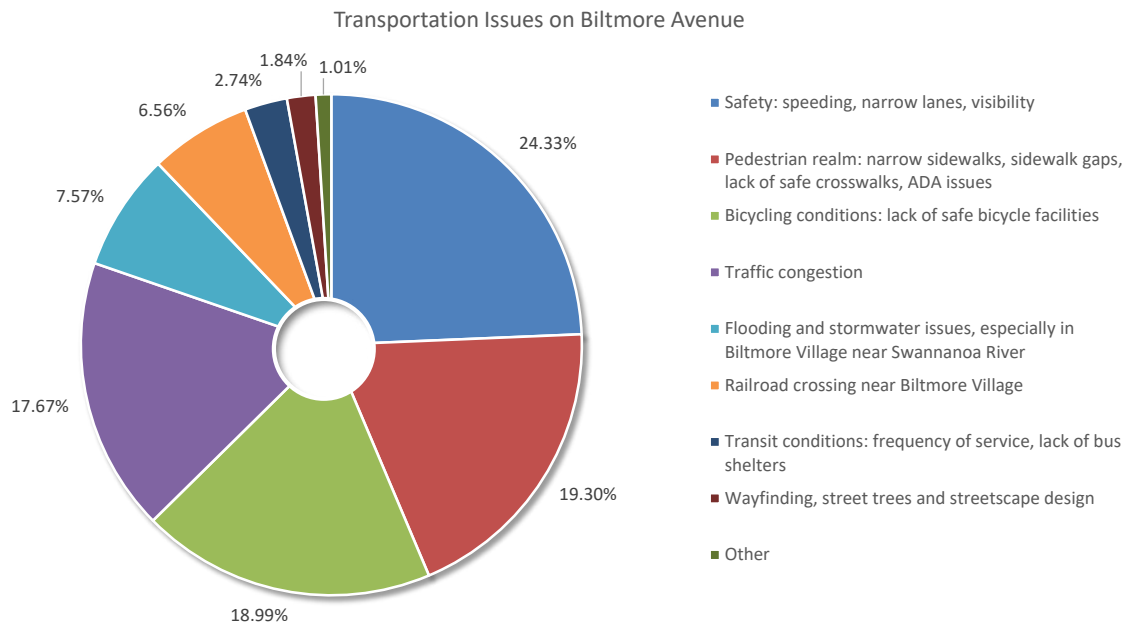
When participants were asked about their top transportation issues for Biltmore Avenue and their top transportation issues for McDowell Street corridors, the same issues took the top three spots:

1. Safety: speeding, narrow lanes, visibility
2. Pedestrian realm: narrow sidewalks, sidewalk gaps, lack of safe crosswalks, ADA issues
3. Bicycling conditions: lack of safe bicycle facilities



Other transportation issues on Biltmore Avenue and McDowell Street are illustrated in Figures 4 and 5 below.

Figure 4 – Transportation Issues on Biltmore Avenue



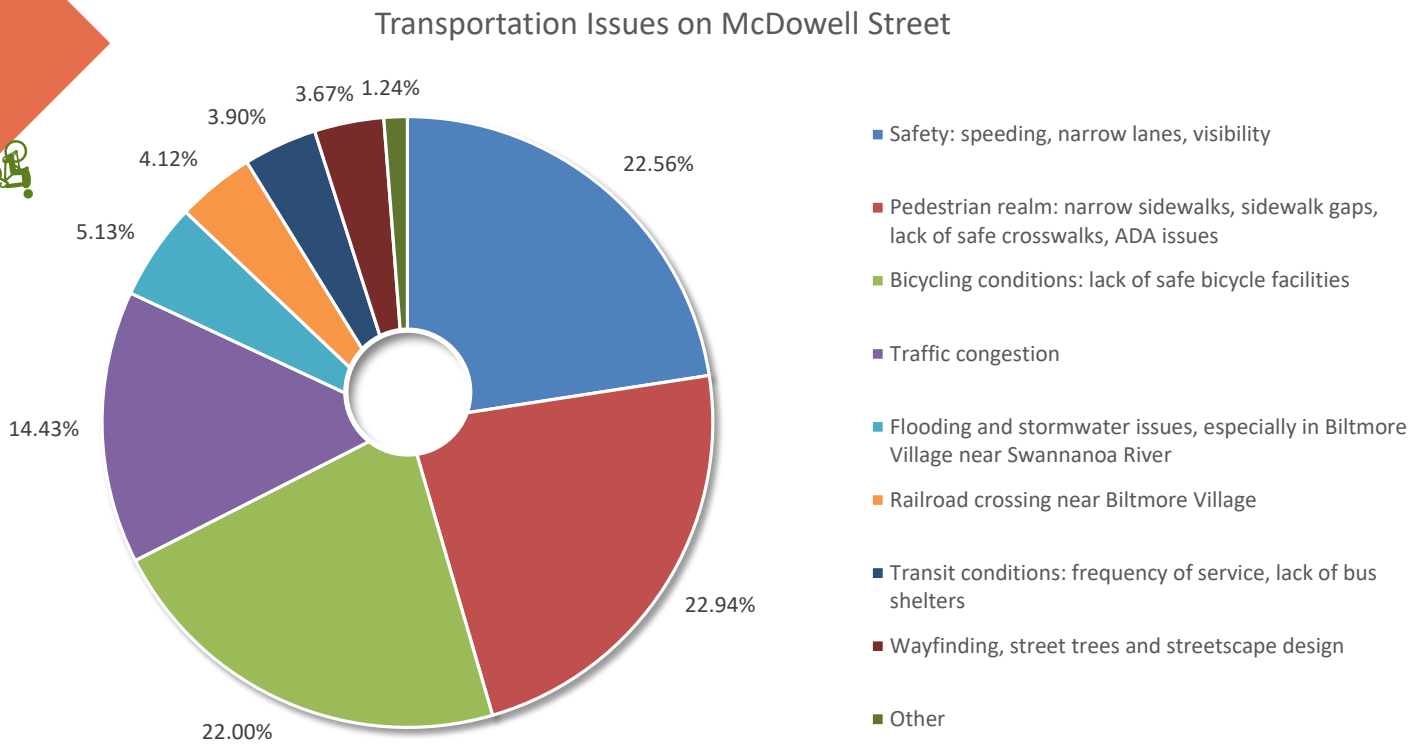
Some additional comments about transportation issues on Biltmore Avenue included:

- » Congestion in Biltmore Village
- » Too many entrances to Mission Hospital causes confusion
- » Not enough turning lanes
- » Poor pavement marking
- » Signal usage and timing could be improved





Figure 5– Transportation Issues on McDowell Street



Some additional comments about transportation issues on McDowell Street included:

- » Congestion in Biltmore Village
- » Traffic light timing
- » Lack of turning lanes
- » Asheville High School
- » High speeds on streets and intersections
- » Lack of mixed-use residential
- » Storm drains
- » Need for improved pavement markings

Respondents were asked to come up with a phrase or a couple of words that came to mind when they thought about the Biltmore Avenue and McDowell Street corridor today (downtown to Biltmore Village). Responses highlighted a concern regarding unsafe conditions for all modes of transportation along the study corridors. Vehicular congestion, narrow lanes, and multiple user interactions were common issues. Active transportation mode users (i.e. walking and bicycling) also saw the corridor as unsafe due to traffic volume and speeds and narrow lanes. The desire for improved bicycle lanes and sidewalks were common themes among active transportation users of the study corridor. A word cloud of common themes is below in Figure 6.





## Survey Round Two

The second public survey was open from March 30th through May 5th, 2021. This second survey was set up in Microsoft Forms format, and it received 27 responses. Participants were asked to weigh in on the draft recommendations. Figure 8 illustrates the reported support for the study’s overall draft recommendations.

Support of Draft Biltmore Avenue Recommendations (Number of Responses)

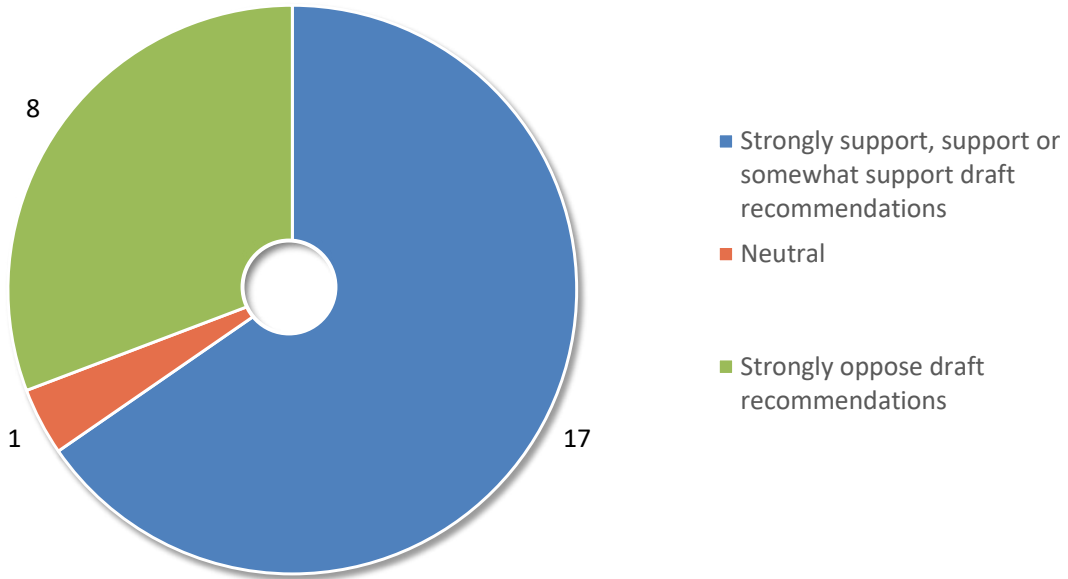


Figure 8: Survey #2 Support for Draft Recommendations (by Number of Responses Received)

Additional information regarding the Survey Round Two responses is available in the Appendices.



## Stakeholder Interviews

As part of the study, the project team conducted a series of interviews with stakeholders to solicit feedback about the current conditions of the corridors, how they use the corridors, and what improvements they would like to see in the future. Between September and November 2020, the project team interviewed the following stakeholders:

- » Asheville-Buncombe Technical Community College (A-B Tech)
- » Asheville City Schools Transportation Department
- » City of Asheville Parks & Recreation
- » City of Asheville Public Works
- » Downtown Asheville
- » Biltmore Merchants Association
- » Mission Health
- » South French Broad-Hilliard to Choctaw Neighborhood

Full stakeholder interviews are available in the Appendix.

## Considering Equity in Transportation Planning

Equity has become an important lens through which the implications of policies and planning decisions can be evaluated. The Environmental Defense Fund defines equity as follows: achieving fairness and balance in access to environmental resources (e.g., green space, safe neighborhoods, healthy homes, healthy fisheries), in bearing environmental burdens (e.g., pollution in air, water and on land), and in participating in environmental decision-making<sup>2</sup>. Todd Littman notes that equity can be difficult to define in the transportation planning context, and suggests that equity can look differently depending on whether the goal is to achieve horizontal equity or vertical equity with respect to income and ability<sup>3</sup> (see Table 1 below).

**Table 1: Typical Equity Goals, by Type of Equity Considered. Source: Todd Littman, 2021<sup>4</sup>.**

Horizontal Equity	Vertical with Respect to Income	Vertical with Respect to Ability and Need
All groups receive comparable shares of public investment and resources	Affordable modes are favored over expensive modes	Universal design (transport system accommodates people with disabilities and other special needs)
External costs are minimized and compensated	Low-income residents can access basic services and abilities	Basic accessibility (disadvantaged groups can access basic services and activities)
All groups are effectively involved in decision-making	Low-income travelers receive price discounts or exemptions	Special policies and programs support and protect disadvantaged groups (women, youths, minorities, etc.)

*The table reflects various equity goals that can be used to evaluate specific transport policies and projects.*

As part of enabling equitable access to resources, educational opportunities, and jobs, the local corridor context should be considered with respect to existing population and jobs. As referenced in the Market Analysis Report (see Appendix B), affordable housing remains a significant issue in Asheville and Buncombe County.

A large portion of the City of Asheville workers work in low-wage occupations such as retail, hospitality, and health care fields. As highlighted in the Existing Conditions Report (see Appendix A), 20 percent of the study area population had incomes below the poverty level based on the 2014-2018 American Community

<sup>2</sup> The Environmental Defense Fund. Equity and Environmental Justice. Retrieved from <https://www.edf.org/about/equity-and-environmental-justice-edf>

<sup>3</sup> Littman Todd (2021). Evaluating Transportation Equity: Guidance for Incorporating Distributional Impacts in Transportation Planning. Victoria Transport Policy Institute. Retrieved from <https://www.vtpi.org/equity.pdf>

<sup>4</sup> Ibid.

Survey (ACS) data, as compared with 13 percent for the City of Asheville overall. Owning and maintaining a vehicle can add significant expenses for a household living on a limited budget. The American Automobile Association estimated the average costs of owning and operating a vehicle at \$9651 in 2020<sup>5</sup>. 18.9 percent of the study area households had zero vehicles available based on the 2014-2018 ACS data, as compared with 7.7 percent for the City of Asheville overall (see Appendix A).

The Center for Neighborhood Technology calculates the combined burden of housing and transportation costs as the H+T Index which incorporates transportation costs in addition to housing expenses, to illustrate how location-efficient places can be more affordable and more livable. When comparing the housing costs alone versus combined housing and transportation costs for a moderate-income household making approximately \$35,760 per year, some of the neighborhoods along the Biltmore Avenue and McDowell Corridor show up as comparatively affordable based on the cost of housing alone (i.e. Livingston Heights, WECAN)-see Figure 9 below. However when combining housing and transportation costs, a much smaller subset of neighborhoods can be considered affordable based on combined housing and transportation costs of less than 45%.

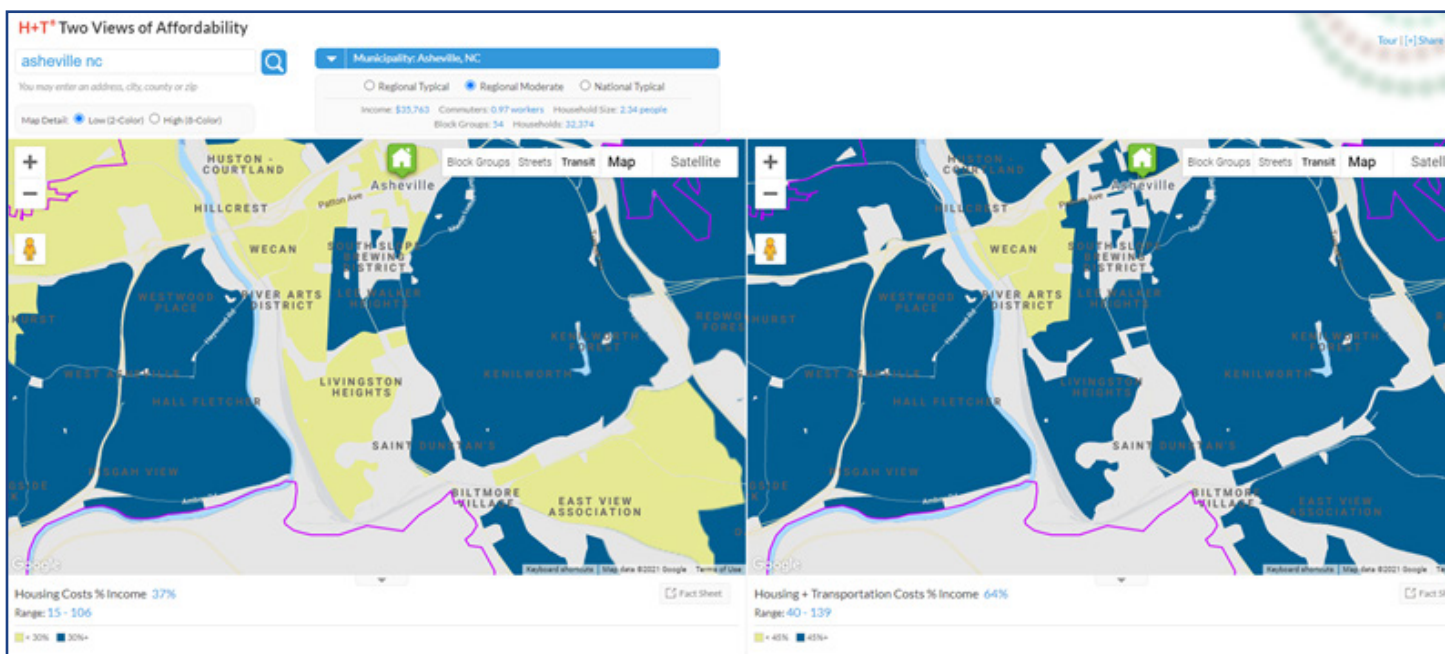


Figure 9: Housing and Transportation Costs Affordability Maps

Source: Center for Neighborhood Technology. H& T Affordability Index Maps. <https://htaindex.cnt.org/compare-affordability/>

Transportation improvements that enable residents to get around without a vehicle or with fewer vehicles per household are likely to result in more equitable outcomes with respect to income and transportation cost burdens born by low-income and moderate-income households. And upgrading the pedestrian realm to ensure ADA-accessible facilities along the corridor would also make the results more equitable with respect to transportation options for individuals with mobility limitations, families with young children, and seniors.

<sup>5</sup> American Automobile Association (2020). "Your Driving Costs 2020". Retrieved from <https://newsroom.aaa.com/wp-content/uploads/2020/12/Your-Driving-Costs-2020-Fact-Sheet-FINAL-12-9-20-2.pdf>



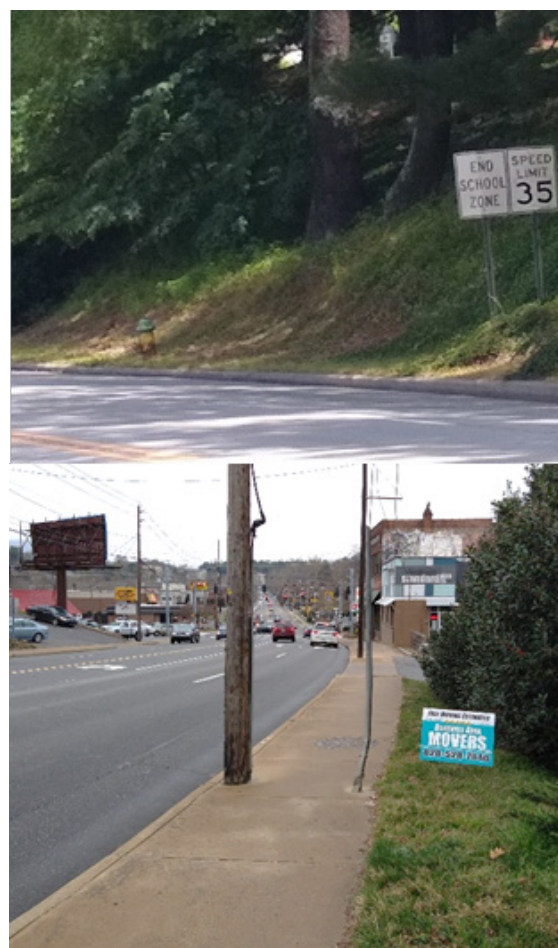
## Bicycle and Pedestrian Deficiencies

An extensive review of the study area’s existing and planned land use, topography, non-motorized network (e.g. sidewalks and bicycle lanes), crashes, and travel patterns served to identify bicycle and pedestrian deficiencies. The Existing Conditions report, included in the Appendix, details how and where the study team recorded facility gaps, demand for crossings, opportunities for enhancements and upgrades, previous improvement ideas, and many other corridor features. These findings informed the study team’s engagement with the community on the development of recommendations.

The corridor’s existing bicycle and pedestrian facilities do not provide a connected and comfortable experience for users of all ages and abilities. Pedestrian facilities are inadequate for several reasons: sidewalk gaps; curb cuts that are not up to the Americans with Disabilities Act (ADA) design standards; utility poles obstructing sidewalks in places; driveway cuts that are frequent and interrupt flat pedestrian sidewalk paths; and long sidewalk stretches without a green buffer zone or furnishing strip where pedestrians must walk next to fast moving vehicles. Also, there are multiple areas where the distance between signalized marked pedestrian crossings—in areas where pedestrian activity is observed or anticipated—is a quarter of a mile or greater.

While there are existing bicycle facilities along and perpendicular to sections of the corridor, overall bicycle route connectivity and comfort are lacking. North-south bicycle mobility between downtown Asheville and Biltmore Village is challenging due to the lack of bicycle lanes or separated bicycle facilities south of Southside Avenue on either corridor. Connecting greenways are planned to cross Biltmore Avenue and McDowell Street (at Phifer Street/Southside Avenue and at Meadow Road/Swannanoa River Road), but no greenways are present along Biltmore Avenue and McDowell Street. The Swannanoa bridge crossing at Hendersonville Road and the tunnel along McDowell Street are two “pinch points” that, as currently designed, limit continuous pedestrian and bicycle movements to key corridor destinations.

The review of existing bicycle and pedestrian facilities, conditions, and the study area’s travel patterns also revealed the potential for increasing walking, bicycling, and transit trips. As detailed in the Existing Condition’s analysis of localized travel patterns, there is strong demand for short trips between Downtown/South Slope, Mission Hospital, and Biltmore Village; these are largely short distance and slow moving automobile trips that are ripe for replacement by walking or bicycling through improved facilities.



Examples of gaps and issues in existing pedestrian network: sidewalk gaps on McDowell Street (top) and pedestrian walking path too narrow on Biltmore Avenue due to utility poles (bottom)



## Transit User Experience: Access to Bus Stops

The corridor's existing transit user experience is likely to be closely linked to pedestrian facilities and availability of safe pedestrian crossings in proximity to bus stops. Many bus stops along the corridor are located near a mid-block crossing location or an unsignalized intersection (for example, bus stops on Biltmore Avenue at Caledonia Road and Roebling Circle). Improving pedestrian access with improved sidewalks and crossings including upgraded mid-block crosswalks is expected to contribute to an improved transit user experience. Additionally, vehicular congestion and delay have an impact on bus operations. Ensuring that roadway user delay is kept at manageable levels is expected to help with bus on-time performance.



Example of existing bus stop along Biltmore Avenue at Roebling Circle

## Future Mobility Deficiencies

One of the primary methods for identifying mobility issues was a series of analyses looking at the area's transportation performance during future year conditions. The study utilized two widely recognized tools, a regional travel demand model and a specialized macro-simulation software, to forecast future vehicle operations and test improvements. Both tools allowed the project team to evaluate how the area's roadways and corridors were performing in the present (pre-COVID 19 pandemic conditions) and in the year 2045 without and without roadway modifications. The project team--in consultation with the City, FBRMPO, and NCDOT--decided to use pre-COVID travel volumes and assume a recovery and return to existing travel patterns and levels.<sup>6</sup> These results help guide the recommended improvements, connections, and changes recommended later in this report.

The FBRMPO is the regional planning agency for the study area, and it uses a regional travel demand model to forecast travel and support the development of transportation improvements.<sup>7</sup> The model incorporates adopted land use forecasts (i.e. levels of employment, population, and visitors) and planned projects to estimate travel levels, congestion, and travel times, among other features. The study team first replicated the FBRMPO's model results for the base year of 2015 and future year of 2045, and it also calculated the vehicle volume growth rates for the study area's roadways. These initial results helped identify those roadways and intersections with vehicle volumes approaching or exceeding roadway capacity (referred to as congested) during the peak morning (6-9 AM) and evening (4-7 PM) travel periods.

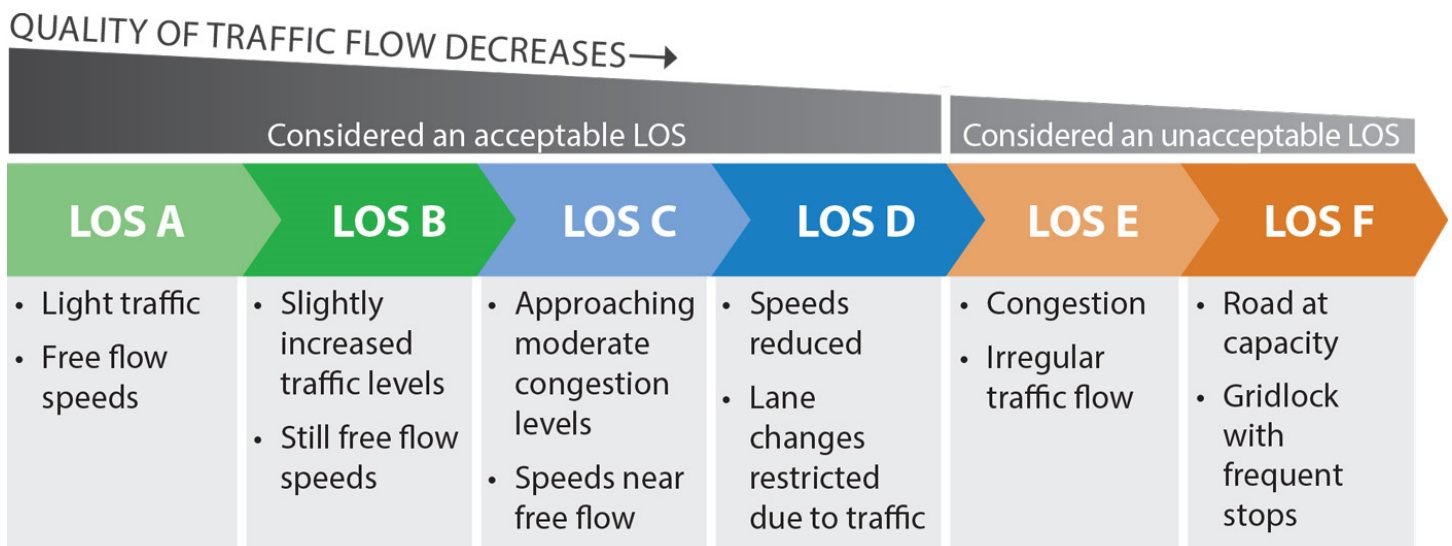
Next, the study team used the macro-simulation software SYNCHRO to replicate and test the study area's roadway conditions. This tool utilizes a specially coded version of the existing and planned roadway networks

<sup>6</sup> As of April 2021, vehicular travel volumes in the region had returned to pre-COVID 19 levels

<sup>7</sup> More information on FBRMPO model and the future year forecast assumptions are available at <http://frenchbroadrivermpo.org/mtp/>

to evaluate roadway performance at a more precise level than the FBRMPO regional model; these results include delay per vehicle, queueing lengths, turning vehicle volumes, and vehicular level of service (LOS) for segments and intersections.

Vehicular level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.” Vehicular Level of Service (LOS) is rated based on letter grades “A” through “F” with A representing free-flow conditions and “F” representing stop-and-go or gridlock conditions (see Figure 10). While Level of Service “A” might minimize the delay experienced by an individual motorist, it is unlikely to be realistic in developed urban environments during peak periods. Level of Service “D” is generally considered to indicate “practical capacity” of a roadway, or the capacity at which the general public begins to express dissatisfaction.



**Figure 10: Level of Service Illustration**

The study team assessed the operational performance of the area’s roadways and intersections using historical and recent traffic counts and traffic signal phasing and traffic controls (i.e. signal and stop signs) to create a 2020 baseline or base year. Traffic conditions for 2020 (assuming pre-COVID-19 conditions) were analyzed, with results during the PM peak displayed in Figure 11 below. Several intersections were already experiencing a significant delay during the baseline conditions, including the following:

- » Hendersonville Road at All Souls Crescent and Vanderbilt Road (LOS F)
- » All Souls Crescent at Lodge Street/McDowell Street (LOS E)
- » Hendersonville Road/Biltmore Avenue at Swannanoa River Road (LOS F)
- » Biltmore Avenue at Meadow Road/Bryson Street (LOS E)
- » Biltmore Avenue at Caledonia Road (LOS E)





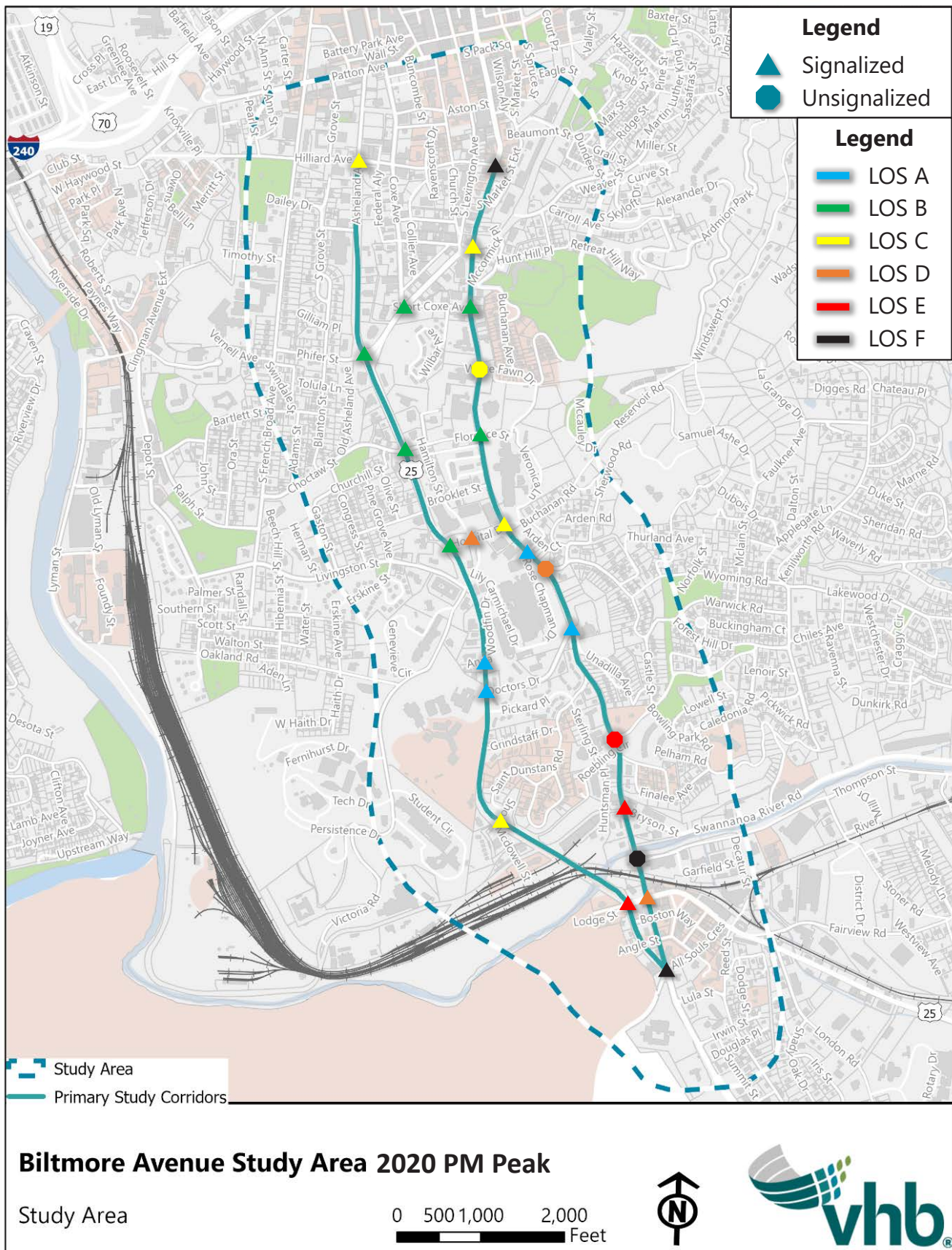


Figure 11: Level of Service at Study Area Key Intersections, PM Peak, 2020 Baseline Conditions



Next, the study team calculated vehicle volumes for the future year of 2045 by growing the 2020 volumes with the forecasted growth rates from the FBRMPO model. After confirming these rates with the project team, the volumes were then used to simulate the corridor's performance assuming no changes to the roadway such as widening for more travel lanes (referred to as "Future Year No-Build"). Small background improvements were included as part of the "Future Year No-Build" scenario, such as adding a signal at Biltmore Avenue and White Fawn Drive and re-timing Hilliard Avenue at Biltmore Avenue for improved operations.

After reviewing the projected travel volumes out to 2045, the study team found that multiple intersections along both Biltmore Avenue and McDowell Street were experiencing significant congestion and driver delay by 2045, resulting in a poor level of service (LOS F) before any potential lane reallocation or other improvements (Figure 12). Level of service of E and F are expected by 2045 in Biltmore Village (Lodge Street and McDowell Street, Lodge Street and Hendersonville Road and at Hendersonville Road and All Souls Crescent/Vanderbilt Road) as well as at Biltmore Avenue and Meadow Road and at Asheland Avenue and Hilliard Avenue. In addition, stop-controlled intersections along Biltmore Avenue (Forest Drive, Caledonia Road and Thompson Street) are expected to experience LOS F under the "Future Year No Build" conditions by 2045. Hilliard Avenue at Asheland Avenue is also expected to experience LOS F in 2045 under the "Future Year No Build" conditions.

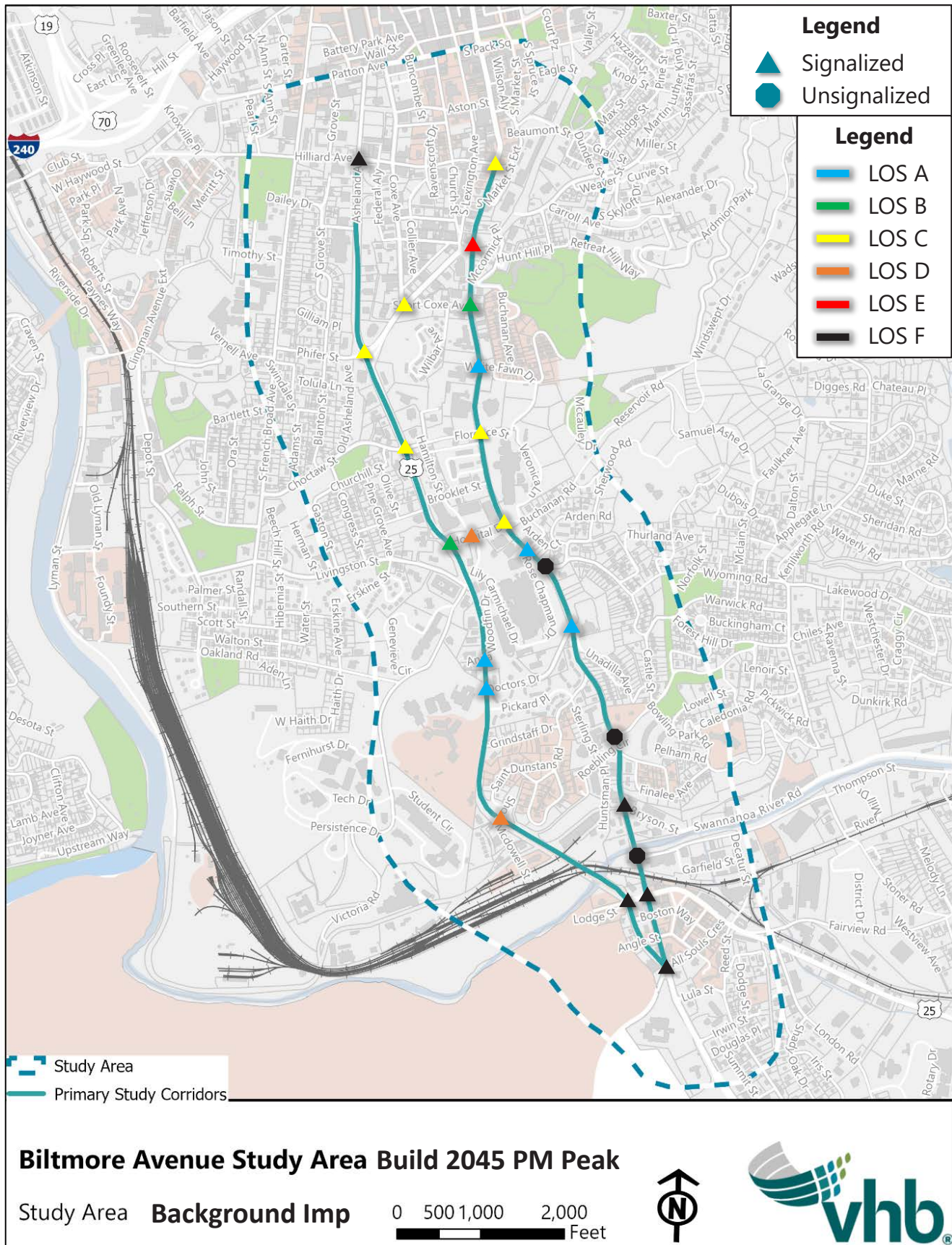


Figure 12: Level of Service at Study Area Key Intersections, PM Peak, 2045 Conditions with Some Background Improvements

## Safety

As summarized in Existing Conditions Report (see Appendix A), crash data indicate that there are significant safety concerns along the corridor. This was confirmed through public and stakeholder feedback during the study process. Biltmore Avenue has vehicular crash rates exceeding the statewide crash rates. McDowell Street, while also experiencing a high level of vehicular crashes, does not exceed the statewide average crash rates. Pedestrian safety is a significant concern, as evidenced by pedestrian crash history along Biltmore Avenue and McDowell Street. In particular, there is a documented prevalence of pedestrian crashes on Biltmore Avenue near Hospital Drive and on Biltmore Avenue near Short Coxe Avenue. Tragically, a pedestrian fatality was reported on Biltmore Avenue at Short Coxe Avenue in 2014-this intersection is expected to be updated with an enhanced pedestrian crossing as part of the Greenway Connector project. For McDowell Street, pedestrian crashes resulting in a severe or minor injury appear to cluster in the area near the Asheville High School. There is also a history of bicycle crashes along McDowell Street and Biltmore Avenue. There are likely fewer bicycle crashes than could be expected because many bicycle users would not feel comfortable even attempting to bike the corridor in its current conditions. These barriers included a lack of separated facilities for all users, gaps in facilities, few enhanced crossings, and general safety concerns with vehicle traffic. If these safety concerns were addressed, pedestrian, bicycle, and transit activity along and across the corridor would be expected to increase.

It is likely that with expected redevelopment along the corridor and based on expected future traffic volume growth, safety issues will become even more critical. The number of destinations and conflicts will increase, and without intervention, the number of crashes will, as well. Of particular concern is the possibility that serious crashes involving pedestrians and bicycles are likely to become more frequent.

Recommendations centered around the pedestrian, bicycle and roadway improvements are all expected to contribute to reduced conflicts between various roadway users and better safety outcomes for Biltmore Avenue and McDowell Street corridors.

In addition to identified recommendations, coordination and collaboration with regional agency partners will be essential to achieve desired safety outcomes. As an example, NCDOT has adopted the NC Vision Zero approach, which is a state-wide program focused on eliminate roadway deaths and injuries using data-driven prevention strategies.

## Recommendations

### Three Pillars

This study's recommendations are centered around three key themes, or pillars, that emerged from the stakeholder engagement process, existing conditions review, and project analysis. These three pillars are:



**Connect the Neighborhoods:** Focus on pedestrian connectivity and safety and ensuring that east-west connections across Biltmore Avenue and McDowell Street are safe and inviting for people on foot. This will require minimal and targeted corridor widenings to close sidewalk gaps, update signalized crossings, and support midblock crossings.



**Bike the Biltmore:** Focus on adding high quality bicycle facilities for people of all ages and abilities, especially along Biltmore Avenue and McDowell Street corridors with some shorter connecting links on connecting corridors. Some targeted corridor widening will be required to accommodate sidepaths; however most improved bikeways are expected to be accommodated through existing travel lane width reallocation.



**Keep Biltmore Moving:** Focus on ensuring that traffic conditions are adequate in the future to allow drivers and transit easy access to the Mission Hospital campus and other key regional destinations, and an overall smooth travel experience. This includes adding some intersection improvements and short roadway widening sections.

### Menu of Options for Implementation

Based on the study area land use context, the cultural, topographic and natural resources constraints and the vision for the corridors identified in local and regional plans, major widening for McDowell Street and Hendersonville Road/Biltmore Avenue corridors was not considered to be the most desirable and effective investment to improve the multi-modal transportation conditions along the corridors.

Hendersonville Road/Biltmore Avenue and McDowell Street corridors are bookended by Biltmore Village Historic District and Downtown Asheville Historic District. Both of those areas include historic buildings, with businesses and residences located close to the street. In-between those two nodes, additional constraints exist due to topography, retaining walls, Mission Hospital buildings, St. Dunstan's Historic District, Asheville High School, and individual local historic landmarks. Other cultural and natural resources constraints that make significant widening difficult include the Swannanoa River Road and associated floodplain and crossing the railroad.

The French Broad River MPO Congestion Management Process (CMP), is the latest adopted regional plan outlining strategies for how the region will address congestion. The FBRMPO CMP recognizes Biltmore Avenue from Biltmore Village to I-240 in downtown Asheville as a "destination corridor". Destination corridors are those roadways located "in areas with greater connectivity which means those areas are likely- to be

more conducive to pedestrian travel, have more alternative low-stress routes for bicyclists, and are likely to provide greater transit-user sheds”<sup>9</sup>. The FBRMPO CMP suggests that both McDowell Street and Biltmore Avenue corridors are located in parts of Buncombe County that are more supportive of walking trips and overall recommendations for those types of areas include promoting non-motorized travel, enhancing parking management strategies, transit signal prioritization, increased transit frequency, traffic calming, road diets, intersection improvements and closing gaps in the street network. For Biltmore Avenue from I-240 to Biltmore Village, the FBRMPO CMP makes the following specific recommendations:

- » Improve bicycle and pedestrian infrastructure
- » Access management
- » Intelligent Transportation System (ITS) technology
- » Intersection improvements

Asheville in Motion (AIM) Mobility Plan adopted in 2016 is the latest City of Asheville Comprehensive Transportation Plan. AIM calls for separated bike lanes on McDowell Street and bicycle lanes on Biltmore Avenue. Both Biltmore Avenue and McDowell Street are called out in the Asheville in Motion Plan as “city connectors” which “tend to be limited in width by the built environment that they serve.” AIM recommendations include a road diet for Biltmore Avenue down to a three-lane cross-section with the reallocated space to be dedicated to bicycle lanes.<sup>10</sup>

When taking into account the balance of conditions for various users of Biltmore Avenue and McDowell Street corridors, drivers might experience some delay but it is pedestrians and bicyclists have to face particularly challenging conditions along the study corridors, with bicyclist facilities currently being non-existent on the main corridors south of Southside Avenue. Transit users are also impacted by pedestrian access conditions on approach to and from bus stops.

After considering prior plans, the area context and the constraints imposed by existing buildings and land uses, the study team focused on three potential alternatives for travel lane reallocation in combination with bicycle and pedestrian improvements. Those alternatives were vetted with the Study Team and the Steering Committee feedback.

For the purposes of this study report, “rebalancing” is used as a term to describe reallocating existing roadway width away from vehicular travel lanes to support improved bicycling and walking facilities, similar to a “road diet” concept. Roadway widening was considered for short segments and for intersection improvements.

---

<sup>9</sup> FBRMPO (2018). Congestion Management Process. Retrieved from [http://frenchbroadrivermpo.org/wp-content/uploads/2019/08/DraftCMP\\_2018-1-1.pdf](http://frenchbroadrivermpo.org/wp-content/uploads/2019/08/DraftCMP_2018-1-1.pdf)

<sup>10</sup> City of Asheville (2016). Asheville in Motion Plan. Retrieved from <https://drive.google.com/file/d/1-CWm7GvxcCDu6UORlniaknhWFDHdloCy/view>

These three implementation options are as follows:

- » **Alternative A:** Biltmore Avenue Rebalanced Scenario would include reconfiguring lanes to one northbound and one southbound from Hilliard Avenue to Southside Avenue; between Southside Avenue and Hospital Drive updated lane configuration would include two southbound lanes and one northbound lane. Between Caledonia Road and Hospital Drive the proposed lane configuration under Rebalanced Biltmore Alternative would include two northbound and one southbound travel lane. This lane configuration, illustrated in Figure 13, is expected to support more reliable travel conditions for emergency responders on the way to Mission Hospital. Improvements to Biltmore Avenue could be paired with improvements to Asheland Avenue north of Southside Avenue, some key pedestrian crossing and gap closure improvements on McDowell Street, and Biltmore Village improvements at All Souls Crescent and Vanderbilt Road, and limited widening on Hendersonville Road south of All Souls Crescent to Lula Street.
  
- » **Alternative B:** McDowell Street Rebalanced Scenario would include reconfiguring lanes along Asheland Avenue to two northbound and one southbound from Hilliard Avenue to Southside Avenue; between Southside Avenue and Hospital Drive updated lane configuration would include two northbound lanes and one southbound lane. Between Lodge Street and Hospital Drive the proposed lane configuration would include two southbound and one northbound lane (see Figure 14). This alternative could also be paired with improvements to Biltmore Avenue north of Southside Avenue, signalized intersection at Biltmore Avenue and Caledonia Road, Biltmore Village improvements at All Souls Crescent and Vanderbilt Road, and limited widening on Hendersonville Road south of All Souls Crescent to Lula Street.

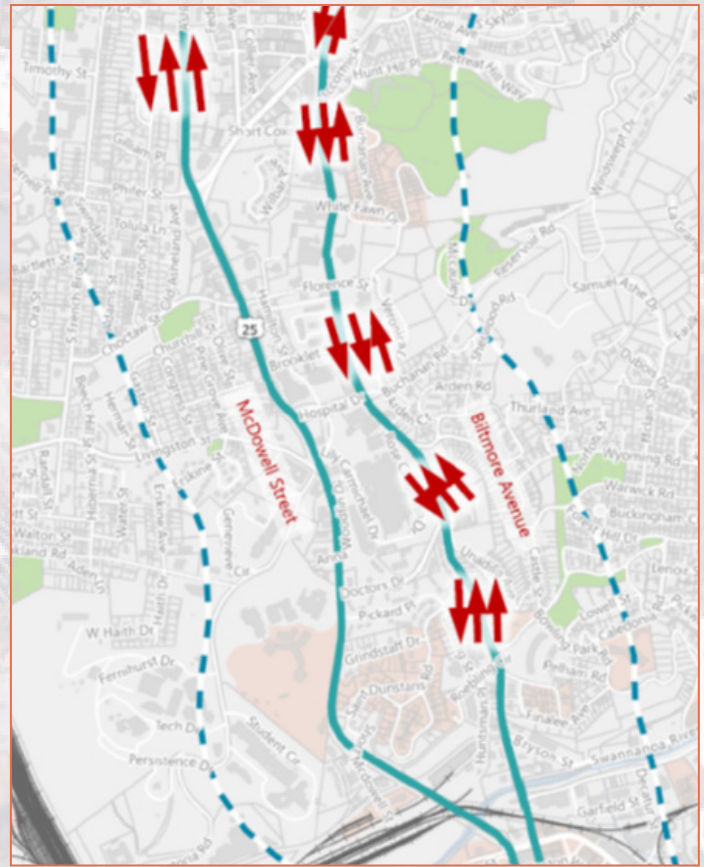


Figure 13 - Biltmore Avenue Rebalanced Scenario Proposed Travel Lane Configuration

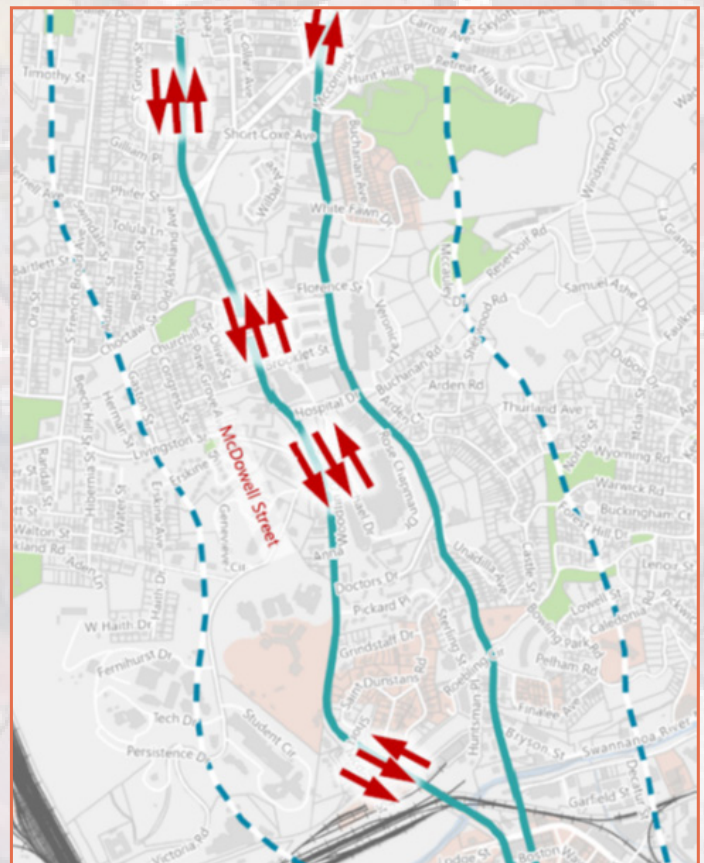


Figure 14 - McDowell Street Rebalanced Scenario Proposed Travel Lane Configuration

- » **Alternative C:** Combined Biltmore and McDowell Rebalanced Scenario, most difficult to implement and achieve a reasonable traffic flow experience along the corridor. This alternative would require the highest number of intersection improvements with associated right-of-way (ROW) impacts. Under the Combined Biltmore and McDowell Rebalanced Scenario, both Biltmore Avenue and McDowell Street would have a reduced lane configuration north of Southside Avenue: one lane in each direction on Biltmore Avenue and two lanes northbound, one southbound on Asheland Avenue north of Southside Avenue. Between Southside Avenue and Hospital Drive, Biltmore Avenue lane configuration would include two southbound and one northbound lane. Between Hospital Drive and Caledonia Road, Biltmore Avenue lane configuration would shift to two northbound lanes and one southbound lane. McDowell Street proposed lane configuration would include one southbound and two northbound lanes between Southside Avenue and Hospital Drive, and two southbound and one northbound lanes between Hospital Drive and Lodge Street. Figure 15 below illustrates the potential lane configuration under Alternative C. This alternative could also be paired with some key pedestrian crossing and gap closure improvements, Biltmore Village improvements at All Souls Crescent and Vanderbilt Road, and limited widening on Hendersonville Road south of All Souls Crescent to Lula Street.

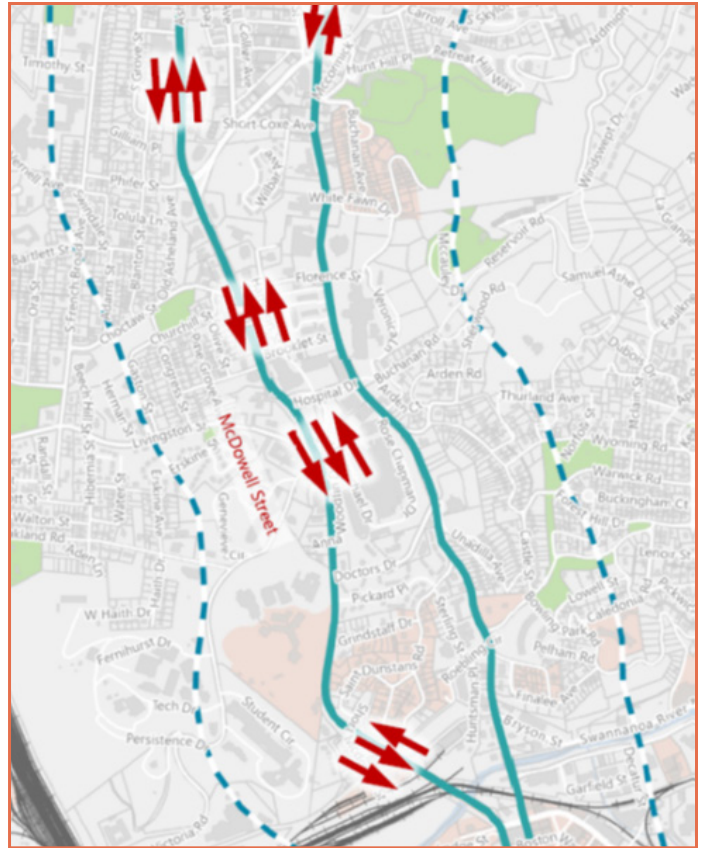


Figure 15 - Biltmore Avenue and McDowell Street Combined Rebalanced Scenario Proposed Travel Lane Configuration

As part of the menu of options for implementation, there are a number of projects identified that could be implementable as stand-alone projects. When considering the three rebalancing or road diet alternatives, Alternative C would require the highest number of intersection improvements and ROW impacts to ensure a relatively smooth traffic flow north of Meadow Road. Biltmore Village creates some additional traffic challenges, and no travel lane reallocations were proposed south of Lodge Street. For Biltmore Avenue/Hendersonville Road, the only lane reallocation south of Meadow Road was proposed narrowing of the travel lanes on Hendersonville Road/Biltmore Avenue bridge over the Swannanoa River to widen a sidewalk on one side to a sidepath for improved bicycle and pedestrian access.

There are significant challenges and tradeoffs associated with reallocating travel lanes towards active transportation modes due to the high volume of traffic along the corridor (Table 1). An estimated 53,000 vehicles per day are forecast at the Hendersonville Road and All Souls Crescent intersection by 2045. Reallocating travel lanes or lane widths along one of the two roadways could be more feasible, if paired with some intersection improvements. Implementing a combined lane reallocation scenario for both Biltmore Avenue and McDowell Street is likely to result in more significant impacts to traveler delay and would require the most intensive investment in intersection upgrades of the three alternatives considered.



Table 2 - Trade-offs Between Lane Rebalancing Scenarios

Factors to Consider	Alternative A: Biltmore Rebalanced Scenario	Alternative B: McDowell Rebalanced Scenario	Alternative C: Biltmore and McDowell Combined Rebalanced Scenario
<b>Land Use along the Corridor</b>	Greater variety and density of commercial destinations along Biltmore Avenue	Improved bicycle and pedestrian facilities in proximity to Asheville High School	Key regional destinations along both corridors (Mission Hospital, Asheville High School); residential neighborhoods along both
<b>Coordination with existing and planned bicycle and pedestrian facilities</b>	Biltmore Avenue would provide a more direct connection to planned greenways along Meadow Road and Swannanoa River; challenging to provide a stand-alone bicycle facility along Swannanoa River Bridge without a separate greenway bridge	Alternative B would facilitate sidewalk gap closure along McDowell in addition to a high-quality bicycle facility (sidepath); lane reallocation could be continued south to Lodge Street and connect all the way to Biltmore Village	Alternative C would provide an option to provide high-quality bicycle facilities on both corridors as well as sidewalk gap closure
<b>Traffic flow impacts and ROW impacts</b>	Could be implemented with lesser impacts north of Meadow Road; traffic could divert to McDowell; Biltmore at Meadow Rd intersection needs further study	Traffic could divert to Biltmore; multiple intersections need to be upgraded	Most difficult alternative in terms of traffic flow and ROW impacts; limited opportunities for traffic diversion (to I-240/outside of the direct corridor)

## Keep Biltmore Moving

Through projecting the existing travel volumes (before COVID-19) out to the year 2045, the study team found that a significant portion of intersections along both Biltmore Avenue and McDowell Street were anticipated to experience significant congestion and driver delay by 2045, resulting in a poor level of service (LOS F) before any potential lane reallocation. Level of service of “E” and “F” are also expected by 2045 in Biltmore Village (Lodge Street and McDowell Street, Lodge Street and Hendersonville Road and at Hendersonville Road and All Souls Crescent/Vanderbilt Road) as well as at Biltmore Avenue and Meadow Road and at Asheland Ave and Hilliard Avenue. In addition, stop-controlled intersections along Biltmore Avenue (Forest Hill Drive, Caledonia Road, and Thompson Street) are expected to experience a LOS F under the “No Build” conditions by 2045. See Figure 16 below for illustration of expected conditions.

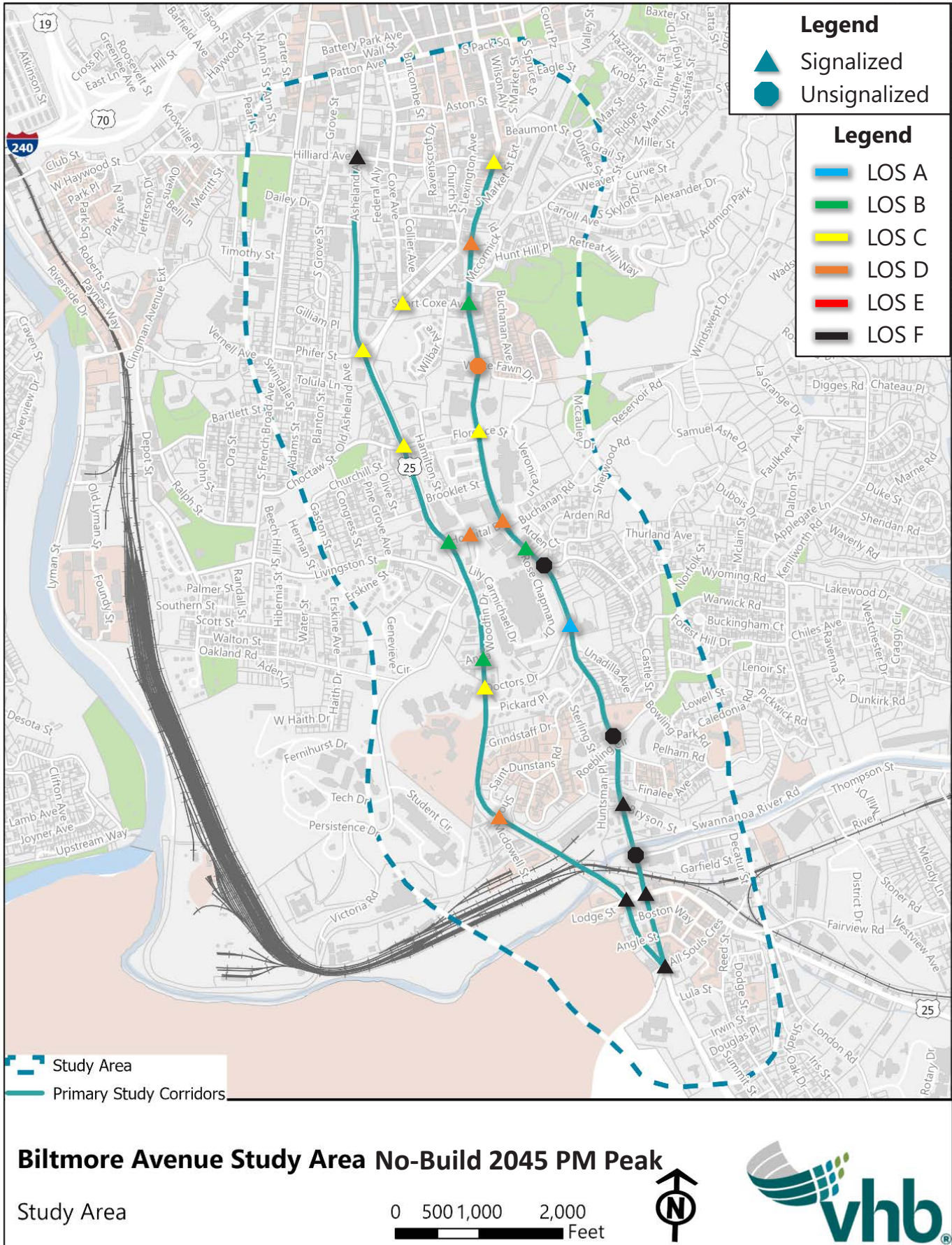


Figure 16 - Level of Service at Study Area Key Intersections, 2045 No Build Conditions, PM Peak

The study team identified opportunities to reallocate travel lanes along Biltmore Avenue north of Meadow Road and along McDowell Street north of Lodge Street in combination with intersection improvements to keep the traffic flow moving while also expanding space for improved bicycle and pedestrian facilities. This will require intersection updates at several key locations with associated ROW impacts.

### Intersection Improvements Already Programmed and/or Recommended Separately from Rebalanced Scenario

- » **Biltmore Avenue at White Fawn Drive** is programmed as a project in the STIP (HL-0014) for a conversion from a stop-controlled to a signal-controlled intersection
- » **Biltmore Avenue at Caledonia Road** is recommended for a conversion from a stop-controlled to a signal-controlled intersection to improve traffic flow as well as to enhance pedestrian and bicycle connectivity (Rdwy-04)
- » **Biltmore Avenue at Short Coxe Avenue** is recommended to be upgraded with improved pedestrian crossings as part of Greenway Connector (EB-5790) project implementation

### Intersection Improvements Recommended for Implementation in Conjunction with Rebalanced Biltmore, Rebalanced McDowell, or Combined Rebalanced Scenario

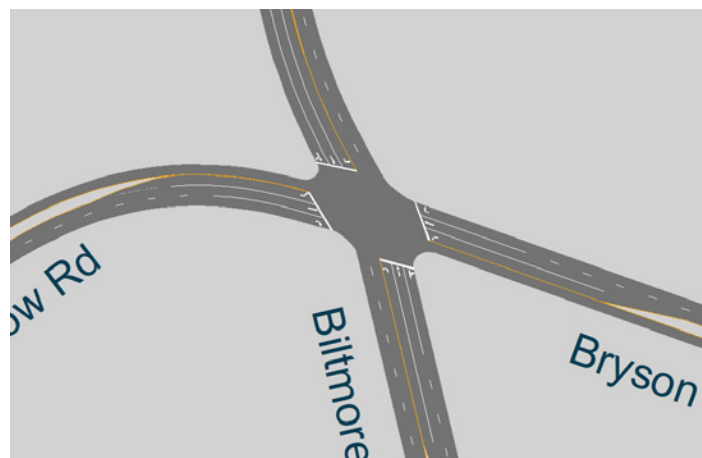
The study identified opportunities to improve intersections in combination with the Alternative A (Biltmore rebalanced scenario) and Alternative B (McDowell and Biltmore combined rebalanced scenario). The following intersection improvements have been identified for implementation as part of combined Biltmore Avenue and McDowell Street rebalanced scenarios and would require additional ROW impacts.

#### Biltmore Avenue and Southside Avenue/Charlotte Street (Rdwy-09)

This intersection is projected to operate at LOS E by the year 2045. To improve the LOS at the intersection, the inclusion of a shared eastbound through/right-turn lane is recommended. The shared lane will be in addition to the existing eastbound through lane. This would impact the island which splits the eastbound channelized right-turn from the main intersection. Additional ROW acquisitions may be needed to accommodate the second eastbound through/right-turn lane. A short segment of sidewalk gap closure along Southside Avenue (Ped-11) is recommended.

#### Biltmore Avenue and Meadow Road/Bryson Street (Rdwy-08A)

This intersection is projected to operate at LOS F by 2045. To improve the LOS at the intersection, the following approach was considered: add a dedicated eastbound right turn lane on Meadow Rd for drivers turning onto Biltmore Avenue; this would result in ROW impacts to the Citgo Gas Station. The potential intersection configuration is below; this intersection update was included as part of Biltmore Avenue Rebalanced scenario and Biltmore and McDowell combined rebalanced scenario (Figure 17). This modification brings the future year PM Peak LOS to LOS E from F; a more significant intersection improvement is recommended for further study (quadrant intersection, see project Rdwy-08B).



**Figure 17 - Biltmore Avenue at Meadow Road and Bryson Street Proposed Configuration with Eastbound Right Turn Lane Improvement (Rdwy-08A)**

### McDowell Street and Short McDowell Street/St. Dunstons Road (Rdwy-11)

To improve the eastbound approach traffic conditions under build conditions, an exclusive southbound right-turn lane is recommended along McDowell Street. It would require ROW acquisition extending from the intersection to approximately 250 feet north of the intersection. This would impact the building located in the northwest quadrant of the intersection and would include the removal of trees.

### McDowell Street and Hospital Drive (Rdwy-12)

To improve the northbound approach traffic conditions under the McDowell Street Rebalanced and Combined Rebalanced Scenarios, a shared northbound through/right-turn lane with approximately 250' of storage is recommended in addition to the continuous northbound through lane. The above-referenced build recommendation will fit within the current cross-section. However, with the inclusion of more robust multi-modal facilities (widening existing sidewalk to a sidepath and adding a sidewalk along eastern side of McDowell Street, Bike-17), additional ROW acquisitions may be needed to incorporate all corridor improvements. This would impact the building located in the southeast quadrant of the intersection and may include substantial construction costs due to the need for a retaining wall. The widening for a right turn lane is expected to start just north of the tunnel limit. The tunnel on McDowell Street and significant topography challenges limit the opportunities for a detour with a multi-use path alternate alignment.



### McDowell Street and Choctaw Street (Rdwy-10)

To improve westbound approach traffic conditions under build conditions, an exclusive westbound right-turn lane was recommended along Choctaw Street. It would require ROW acquisition extending from the intersection to, at a minimum, Frederick Street. This would impact the Planned Parenthood – Asheville Health Center located on the northeast corner of the intersection. Additional pedestrian facilities will also be recommended at the intersection and would be constructed in conjunction with the operational improvement (Ped-10). The pedestrian facilities will enhance network connectivity along McDowell Street.

### McDowell Street/Asheland Avenue and Phifer Street/Southside Avenue (Rdwy-13)

Based on the EB-5790 greenway connector project designs, the northbound right turn slip lane will be removed. To improve the operations at the intersection under build conditions, additional improvements (right turn lane) along the west leg could be incorporated into the network. This would impact the Hart Funeral Service location and would include the removal of trees if incorporated into the intersection design. Greenway connector/sidepath along the south side of Phifer Street and Southside Avenue would need to be incorporated in any updates at this intersection (in coordination with EB-5790).

Figures 18 and 19 illustrate the locations of intersection improvement projects and the resulting lane configuration under the Combined Rebalanced Scenario.

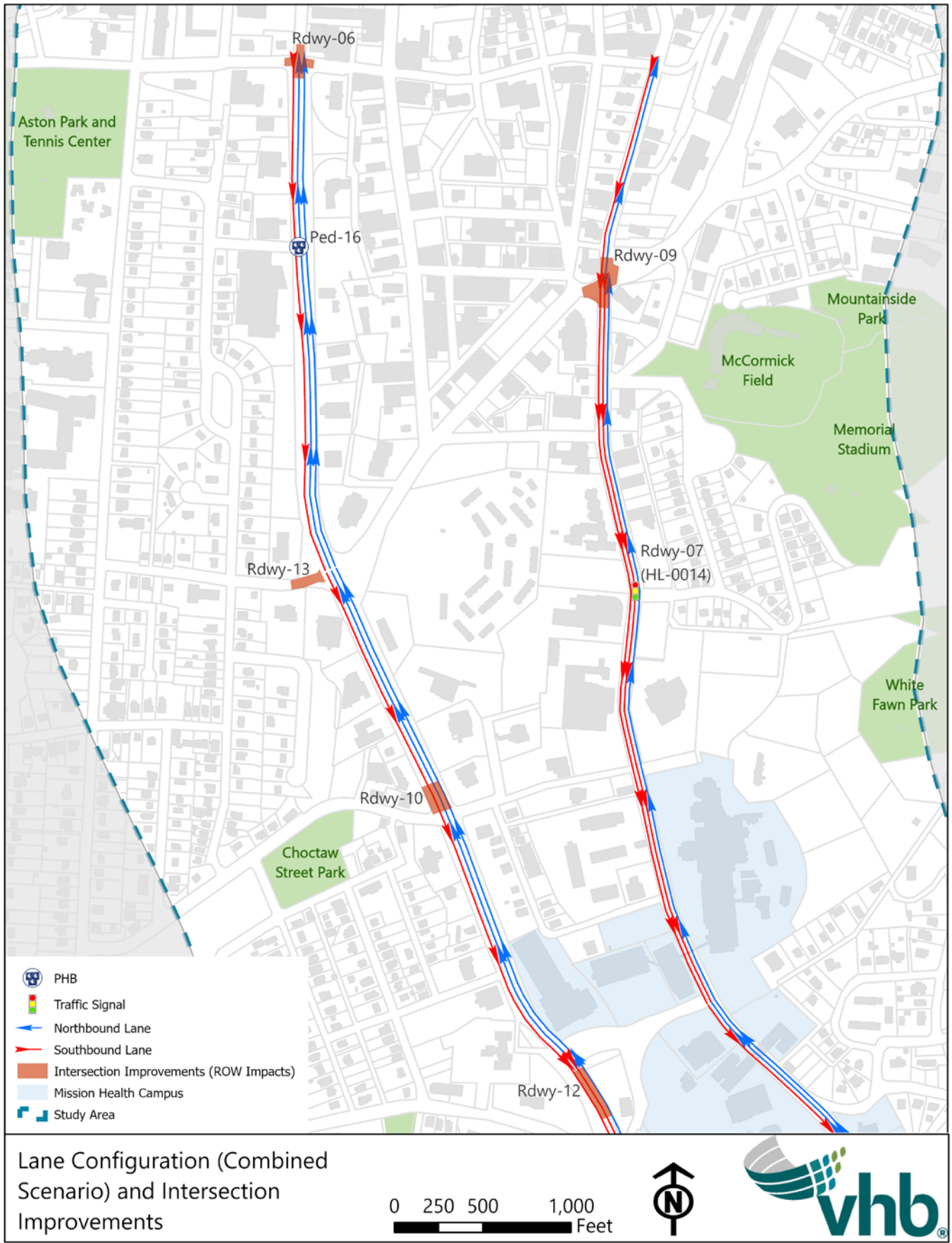


Figure 18 Future Lane Configuration and Intersection Improvement Projects, Illustrating Combined Rebalanced Scenario. Northern Portion of the Study Corridor.

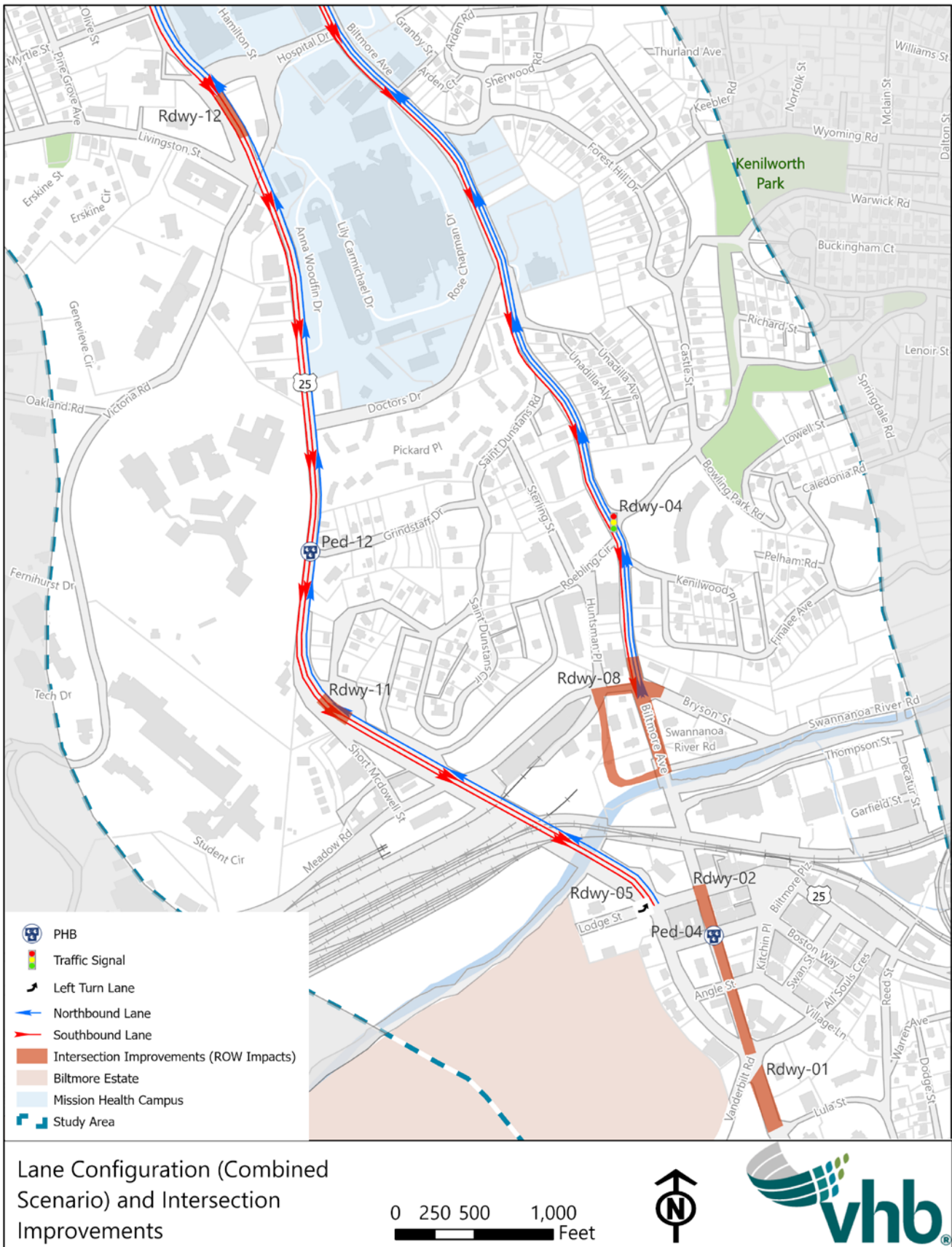
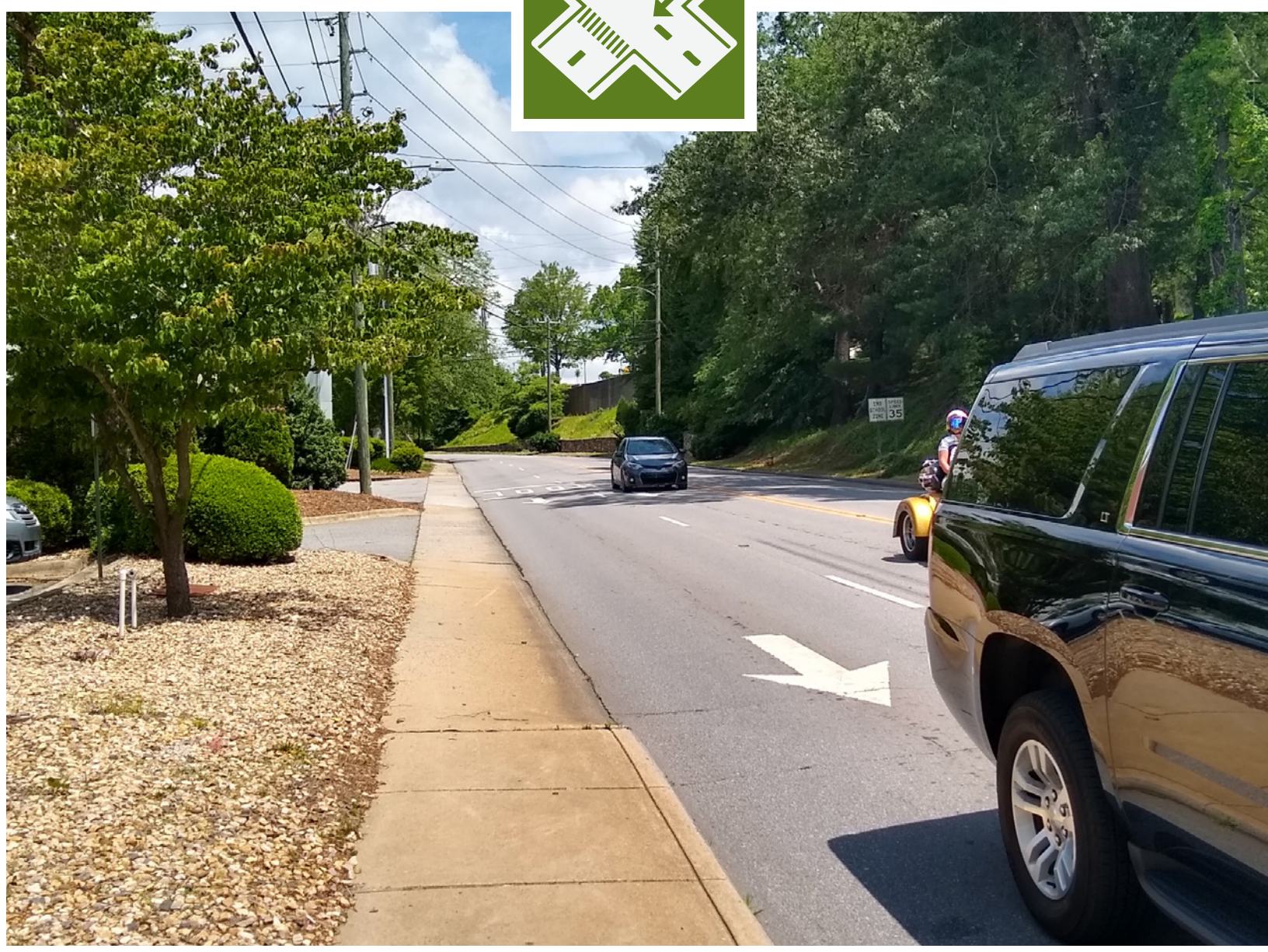


Figure 19 - Future Lane Configuration and Intersection Improvement Projects, Illustrating Combined Re-balanced Scenario. Southern Portion of the Study Corridor.

As a result of recommended intersection improvements listed above, the resulting traffic operations and level of service during PM Peak are projected to be improved by 2045 under the Combined Biltmore and McDowell rebalanced scenario (Alternative C). See Figure 20 for an illustration of improved conditions by 2045. Table 3 further summarizes the expected impacts on traveler delay by alternative considered. The metrics by alternative were calculated after accounting for recommended intersection improvements. When compared with No Build 2045 PM Peak Conditions, The Biltmore Rebalanced (Alternative A) would result in a slightly smaller per traveler delay of 15 seconds on Hendersonville Road/Biltmore Avenue corridor from All Souls Crescent to Hilliard Avenue in 2045 PM Conditions. McDowell Street would also perform better during PM Peak conditions by 2045 under the Biltmore Rebalanced (Alternative A) as compared with No Build 2045 scenario, with an average traveler along McDowell Street experiencing 39 seconds of delay rather as compared with 69 seconds of delay by 2045 under the No Build conditions.



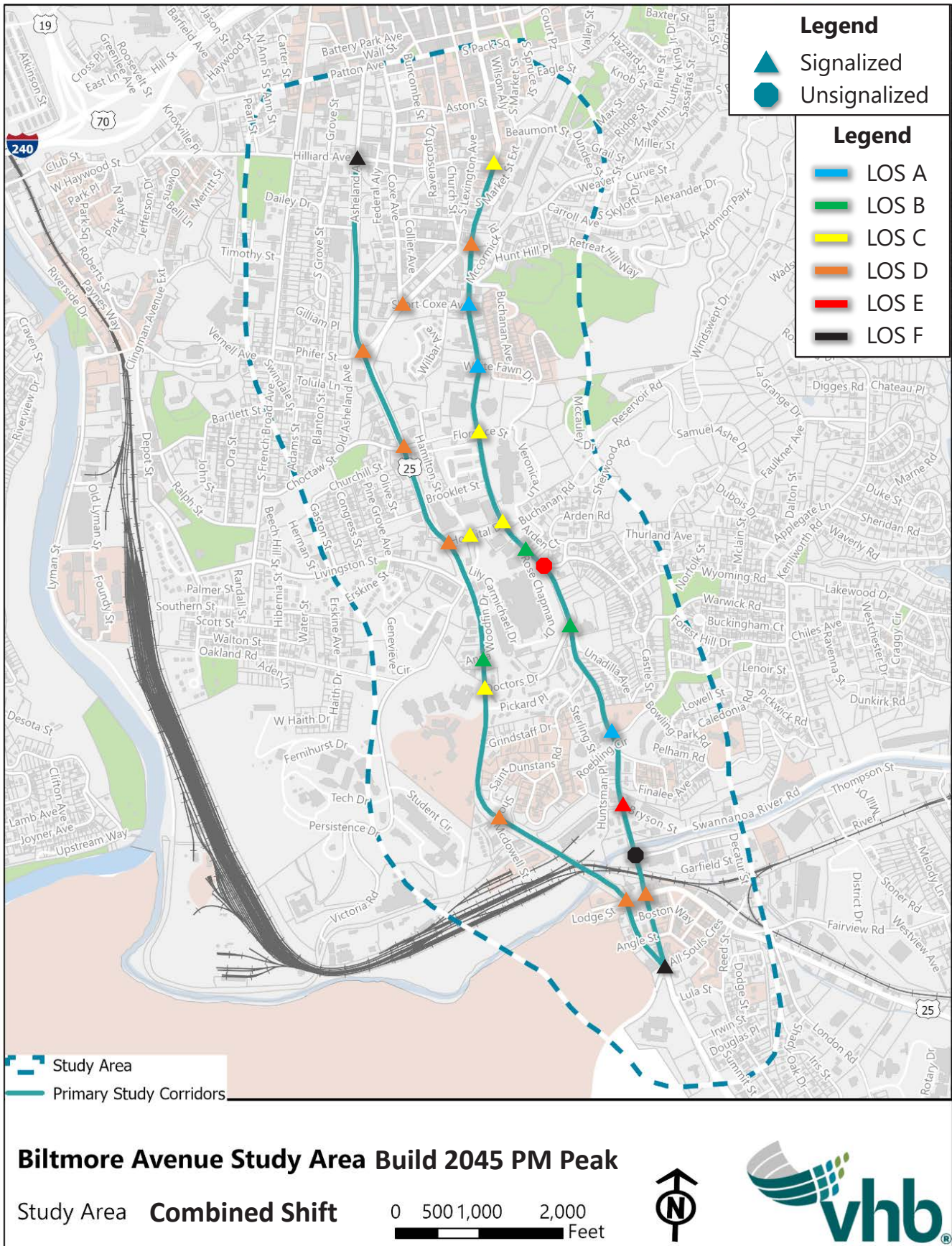


Figure 20 - Combined Rebalanced Biltmore and Rebalanced McDowell Scenario (Alternative C) Intersection Level of Service with Recommended Improvements, 2045 PM Peak



Table 3 Corridor Travel Metrics across Alternatives Modeled, PM Peak Conditions

Corridor Travel Metrics	Existing Conditions 2020 PM Peak		No Build Scenario, 2045 PM Peak		Biltmore Ave Rebalanced Scenario (Alternative A), 2045 PM Peak		McDowell Street Rebalanced Scenario (Alternative B), 2045 PM Peak		Biltmore Ave and McDowell St Combined Rebalanced Scenario (Alternative C) PM Peak	
	Hender- son-ville Road and Biltmore Avenue, PM Peak	McDowell Street, PM Peak	Hender- son-ville Road and Biltmore Avenue, PM Peak	McDowell Street, PM Peak	Hender- son-ville Road and Biltmore Avenue, PM Peak	McDowell Street, PM Peak	Hender- son-ville Road and Biltmore Avenue, PM Peak	McDowell Street, PM Peak	Hender- son-ville Road and Biltmore Avenue, PM Peak	McDowell Street, PM Peak
Total Delay per Vehicle (seconds)	13	28	23	69	15	39	16	60	16	41
Average Speed, mph	19	17	14	10	17	14	17	11	16	13
Total Delay, hours	55	125	143	458	72	345	112	358	88	240

Corridor modeled included Hendersonville Road/Biltmore Avenue from All Souls Crescent and Vanderbilt Road up to Hilliard Avenue and All Souls Crescent/McDowell Street from Hendersonville Road and Vanderbilt Road up to Hilliard Avenue.

## Potential Intersection Improvements not Included as part of Future Year Rebalanced Biltmore, Rebalanced McDowell and Combined Rebalanced Scenario, Recommended for Further study

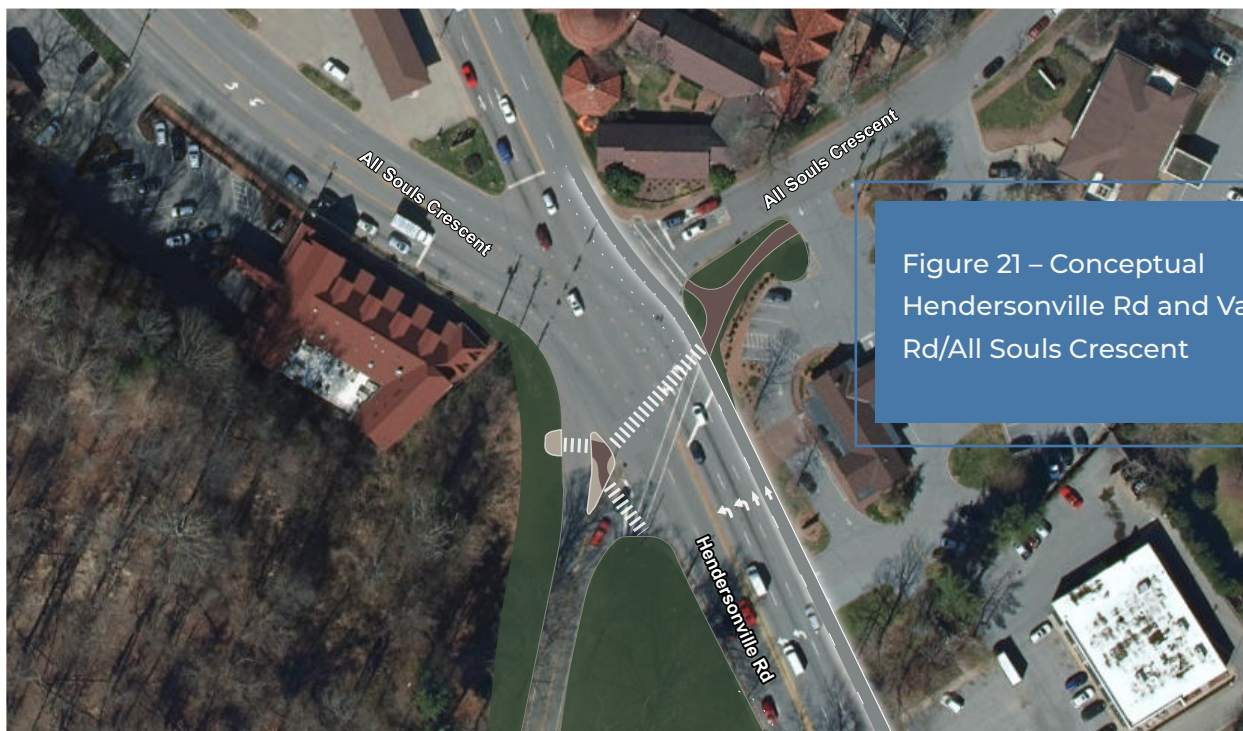
### Implement Emergency Vehicle Preemption for Emergency Responders, Evaluate Potential Technology Platforms (Rdwy-14)

A follow-up evaluation of technology alternatives is recommended to select the best option for emergency vehicle preemption along Biltmore Avenue/Hendersonville Road and McDowell Street/Asheland Avenue to ensure that first responders can reach the people and locations requiring assistance, and to transport patients to the emergency room in the most efficient way possible. 3M Opticom® equipment could be one potential option. A further evaluation is needed to ensure compatibility with existing and planned Traffic Operations and Intelligent Transportation Systems (ITS) infrastructure in Asheville.

### Hendersonville Rd and Vanderbilt Rd/All Souls Crescent (Rdwy-03)

This intersection is projected to operate at a LOS F by 2045. To improve the LOS at the intersection, Vanderbilt Road is proposed to be realigned to a new location south of the intersection (with conversion to right-in/right-out movement); this would impact the Double Tree by Hilton property parking lot. It would also impact Hendersonville Road by creating an additional connection to the roadway.

Additionally, a second northbound through lane was analyzed to improve operations at the intersection. The second northbound through lane is proposed from Lula Street to the All Souls Crescent intersection. The additional through lane would require ROW acquisition extending from All Souls Crescent to Lula Street. Those updates were not included as part of Biltmore Avenue rebalanced scenario, McDowell Street rebalanced scenario, and Biltmore and The McDowell combined rebalanced scenario (Figure 21)



### **Asheland Avenue and Hilliard Avenue (Rdwy-06)**

The intersection of Asheland Avenue and Hilliard Avenue is projected to operate at LOS F by 2045. In particular, westbound traffic along Hilliard Avenue is projected to expect 272 seconds delay per driver during PM peak based on SYNCHRO modeling. Northbound traffic would also face a significant delay. To improve the LOS at the intersection, additional improvements along Hilliard Avenue would be required. Additional left- and right-turn lanes would improve operations by removing those drivers attempting to turn at the intersection from the heavy through movement volume. This would allow the through moving vehicles to pass through the intersection more easily. This could impact the existing multi-modal facilities along Hilliard Avenue and/or have ROW impacts to existing businesses and parking lots along Hilliard Avenue. Updates to Hilliard Avenue at this intersection were not included as part of the Biltmore Avenue rebalanced scenario and Biltmore and the McDowell Combined rebalanced scenario. A follow-up study examining this intersection as part of an east-west connectivity across downtown is recommended.

### **Biltmore Avenue and Meadow Road/Bryson Street: Partial Quadrant Intersection (Rdwy-08B)**

This intersection is projected to operate at LOS F by 2045. With the addition of an eastbound right turn lane on Meadow Road, the intersection would be improved to LOS E by 2045. After further consideration for additional improvements, the study team recommends investigating a possible removal of Meadow Road eastbound through phase and eastbound right turn movement controlled by the signal, supplemented by adding quadrant roadway design. The quadrant would be located in the southwest quadrant of the intersection. This quadrant--in combination with Bryson Street and Swannanoa River Road would form a short segment of one-way paired streets. A LOS D is likely achievable with this configuration for 2045 PM Peak projected conditions. This would impact the businesses located in the southwest quadrant of the intersection including the Biltmore Iron and Metal, Asaka Japanese Cuisine and possibly the Asheville Area Habitat for Humanity building. Floodplain modeling and permitting could be an additional challenge to analyze further in design.

### **AB Tech to McDowell Street New Location Roadway Feasibility Study (Rdwy-15)**

The Asheville-Buncombe Technical Community College Campus Master Plan identified the potential for a new location roadway that would connect from the AB Tech campus over to McDowell Street near Short McDowell intersection. Limited options for access to the college campus and Asheville High School and emergency evacuation long waiting times were cited as concerns in stakeholder interviews conducted for this study. There are significant topography challenges in this area. A separate feasibility study is recommended to evaluate whether a new location roadway would be feasible between Victoria Road /AB Tech Campus and McDowell Street.



## Connect the Neighborhoods

Biltmore Avenue and McDowell Street, with their four and five-lane cross sections and thousands of vehicles per day, can act as barriers to residents and visitors traveling for work, tourism, errands, and other tasks without a vehicle. While the land uses immediately adjacent to the corridor are largely commercial and institutional, there are residential neighborhoods, parks, and recreation uses in proximity to the corridor. Residents within the study area—when compared to Asheville overall—have lower rates of vehicle ownership and higher rates of poverty, two factors that contribute to greater reliance on transit and non-motorized options (i.e. walking and biking) for reaching family, friends, and work.<sup>11</sup> There are multiple opportunities to improve the area’s transportation network connectivity, mobility, and safety for pedestrians.

The study team assessed the existing network of sidewalks, intersections, marked crosswalks, planned improvements, transit service, and land uses along the corridor to identify opportunities to connect the neighborhoods along and across Biltmore Avenue and Asheland Avenue/McDowell Street. This included a review of historical bicycle and pedestrian crashes, land uses, destinations that generate pedestrian trips (e.g. transit stops, grocery stores, schools, etc.), and distances between marked crossing locations with pedestrian-generating land uses where pedestrians may be expected to cross.

## All Scenario Recommendations

The accompanying recommendations have proven crash reductions benefits and can be implemented under any of the proposed improvement scenarios. Each project description includes a Project ID (i.e. Ped-00) and is shown in either Figure 13 or Figure 14 below.

- » **Biltmore Avenue at Caledonia Road Intersection (Rdwy-04)** - Convert the stop-controlled intersection to a signalized intersection with high visibility pedestrian crosswalk, pedestrian signal phase, and pedestrian signal heads. This new signalized intersection would provide a critical crossing location for pedestrians traveling east-west and allow the shifting of the improved bikeway on Biltmore Avenue away from the Meadow Road intersection to the lower vehicle volume and calmer Huntsman Place. Based on 2017 traffic counts at this intersection, the intersection meets the eight-hour, four-hour and peak hour warrants. See Appendix E for additional traffic count documentation.

<sup>11</sup> See the Existing Conditions report for more information

- » **Upgrade all Existing Signalized Intersections (Ped-02)** – Upgrade all signalized intersections to pedestrian signal heads with countdown timers and high visibility crosswalk markings to all legs of existing signalized intersections along Biltmore Avenue and McDowell Street. Specified locations include (north to south):
  - » **McDowell Street at Choctaw Street (Ped-14)** – This intersection provides east-west access to the Mission Hospital campus and adjacent neighborhoods and movement north-south.
  - » **McDowell Street at Phifer Avenue/Southside Avenue (Ped-15)** – This intersection provides a connection to the planned Nasty Branch greenway, sidepath along Southside Avenue, and the upgraded separated bicycle lanes along Asheland Avenue to the north (Bike-16).
- » **All Souls Crescent at Biltmore Estate Driveway/Lodge Street/McDowell Street Intersection Improvements (Ped-05)** – Mark all legs of the intersection with high visibility pedestrian crosswalks and add pedestrian signal heads. This intersection serves a variety of users, from residents, employees, and tourists accessing Biltmore Village’s amenities and destinations. Improvements would reduce confusion from the intersection’s numerous turning lanes.
- » Upgrade existing uncontrolled crossing locations (i.e. midblock crossings) and add new crossing locations to support east-west connectivity. Specified locations include (north to south):
  - » **Asheland Avenue at Morgan Avenue Crossing (Ped-16)** – Install an enhanced crossing near Morgan Avenue that includes a high visibility marked crosswalk and Pedestrian Hybrid Beacon (PHB), advance pavement markings, and signage to increase yielding to pedestrians at this new crossing location. The existing transit stop locations should be evaluated to align with the new crossing location. The new crossing location would reduce pedestrian distances between the intersections at Hilliard Avenue and Southside Avenue (currently 2,300’ apart) and provide east-west access to the new mixed-use development on Federal Alley.
  - » **McDowell Street near Grindstaff Drive Crossing (Ped-12)** - Upgrade the existing marked crosswalk on the four-lane undivided roadway near the Asheville High School to a high visibility marked crosswalk and Pedestrian Hybrid Beacon (PHB), advance pavement markings, and signage to increase yielding to pedestrians. A pedestrian refuge island may also be incorporated, but limited roadway widening and lane shifting would be required to accommodate. The improvement would improve pedestrian safety for those crossing to and from the school and accessing the neighborhoods.
  - » **Hendersonville Road at Boston Way in Biltmore Village Crossing (Ped-04)** – Upgrade the existing marked crosswalk on the four-lane undivided roadway to a high visibility marked crosswalk and Pedestrian Hybrid Beacon (PHB), advance pavement markings, and signage to increase yielding to pedestrians. The improvement would improve pedestrian safety for those crossing to places of employment and tourism.
- » Vanderbilt Road and All Souls Crescent/Hendersonville Road Crossing Improvement (Ped-03) – Realign the existing marked crossing across Hendersonville Road at Vanderbilt Road to the existing island on the southwest corner of the intersection, modify the island to include channels for pedestrian accessibility, add a marked crosswalk across the channelized right turn, and add warning signage. Moving the crosswalk to the “porkchop”

island significantly shortens pedestrian crossing distances, reduces risk to a right turning vehicle crash, and provides marginal improvements to the overall intersection's performance.

- » Close sidewalk gaps at the following locations, with ROW impacts expected due to the construction of new sidewalk facilities (projects north to south):
  - » **McDowell Avenue Sidewalk Infill South (Ped-07)** – Install infill sidewalk to close the existing gap along McDowell Street on the east side from Grindstaff Drive to approximately 443 McDowell Street. This would improve access between the high school and the St. Dunstan's neighborhood and complete the north-south pedestrian network. Infill sidewalk would likely be accompanied by retaining wall due to the topography.
  - » **McDowell Avenue Sidewalk Infill North (Ped-09)** – Install infill sidewalk to close the existing gap along McDowell Street on the east side from south of Choctaw Street to approximately 107 McDowell Street. This would support pedestrian movement north and south and access to the improved Choctaw Street sidewalk network described below (Ped-10).
  - » **Choctaw Street Sidewalk Infill (Ped-10)** – Install infill sidewalk to close the existing gaps along the north side of Choctaw Street from McDowell Street to 30 Choctaw Street driveway and the south side from 30 Choctaw Street driveway to Biltmore Avenue. This would support pedestrian movement east-west for residents and visitors between McDowell Street and Biltmore Avenue to destinations like the adjacent neighborhoods, medical offices, and Choctaw Street Park.
  - » **Southside Avenue Sidewalk Infill (Ped-11)** – Install infill sidewalk along Southside Avenue on the south side of the road from the intersection with Biltmore Avenue west (along the Asheville Gastroenterology Building) to close the pedestrian network gap and provide pedestrian connections.
- » ADA Sidewalk Upgrades. These corridor-wide improvements support connectivity for pedestrians of all ability levels.
  - » Address Signage and Utility Encroachments into Sidewalk (Ped-01A) – Incremental widening of sidewalks as needed to allow for sufficient width where utility poles and signage compromise the clear walking path. Implementation expected to include some bulb-outs around poles and coordination with scenario-specific lane rebalancing to shift utility poles out of sidewalk areas. Throughout the Biltmore Avenue and McDowell Street corridors, posted signs and utility poles reduce the usable width of the sidewalk for those on foot and especially those in mobility devices. ROW impacts are anticipated from this collection of improvements.
  - » Curb Cuts and Driveways Retrofit (Ped-01B) – Bring sidewalks and curb ramps to ADA compliance through modification of driveway aprons to reduce cross slope, retrofits of existing curb ramps, and installation of new curb ramps to connect recommended pedestrian and shared-use facilities.

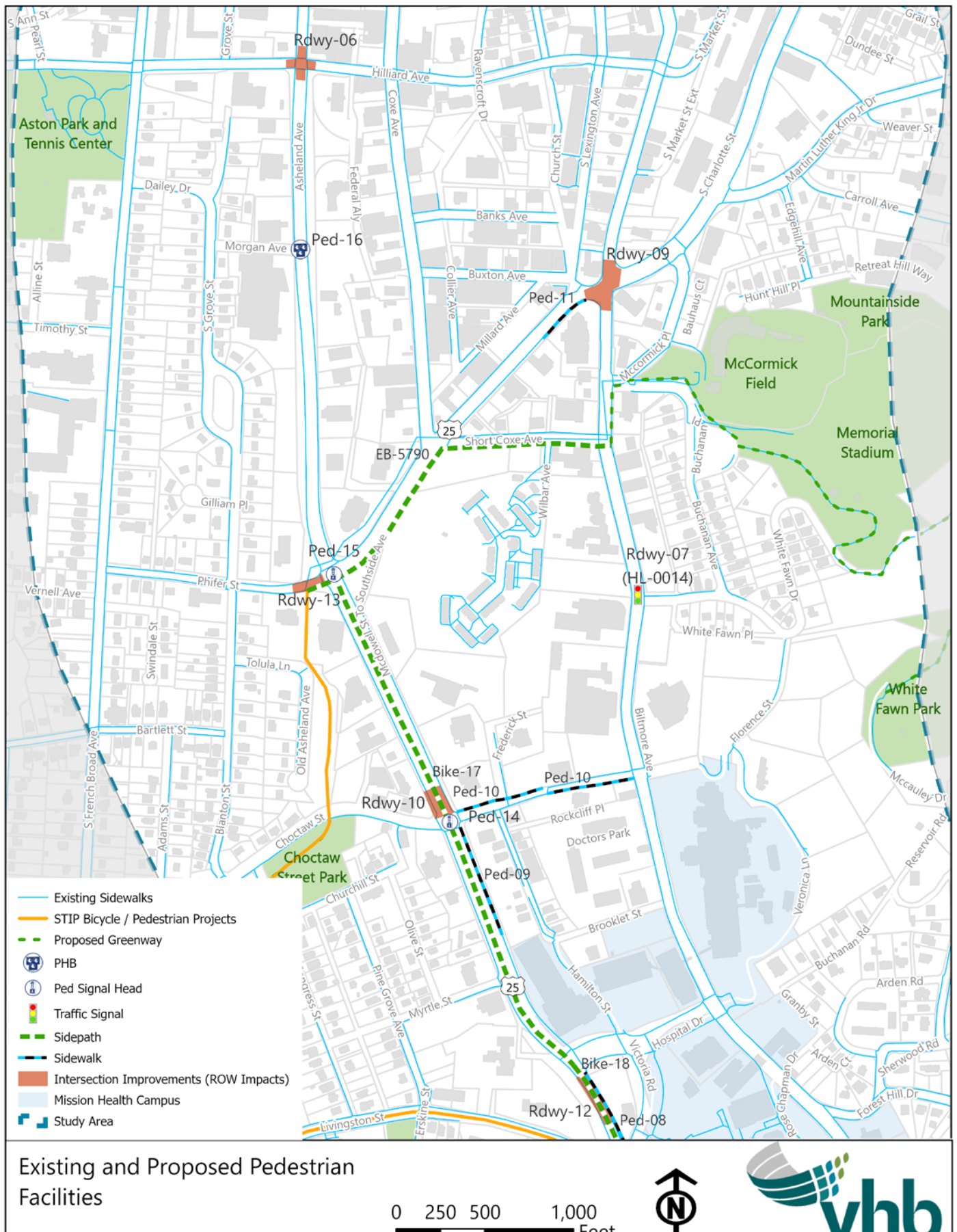


Figure 22 – Pedestrian Improvements, All Scenarios, Northern Section of the Study Corridor.

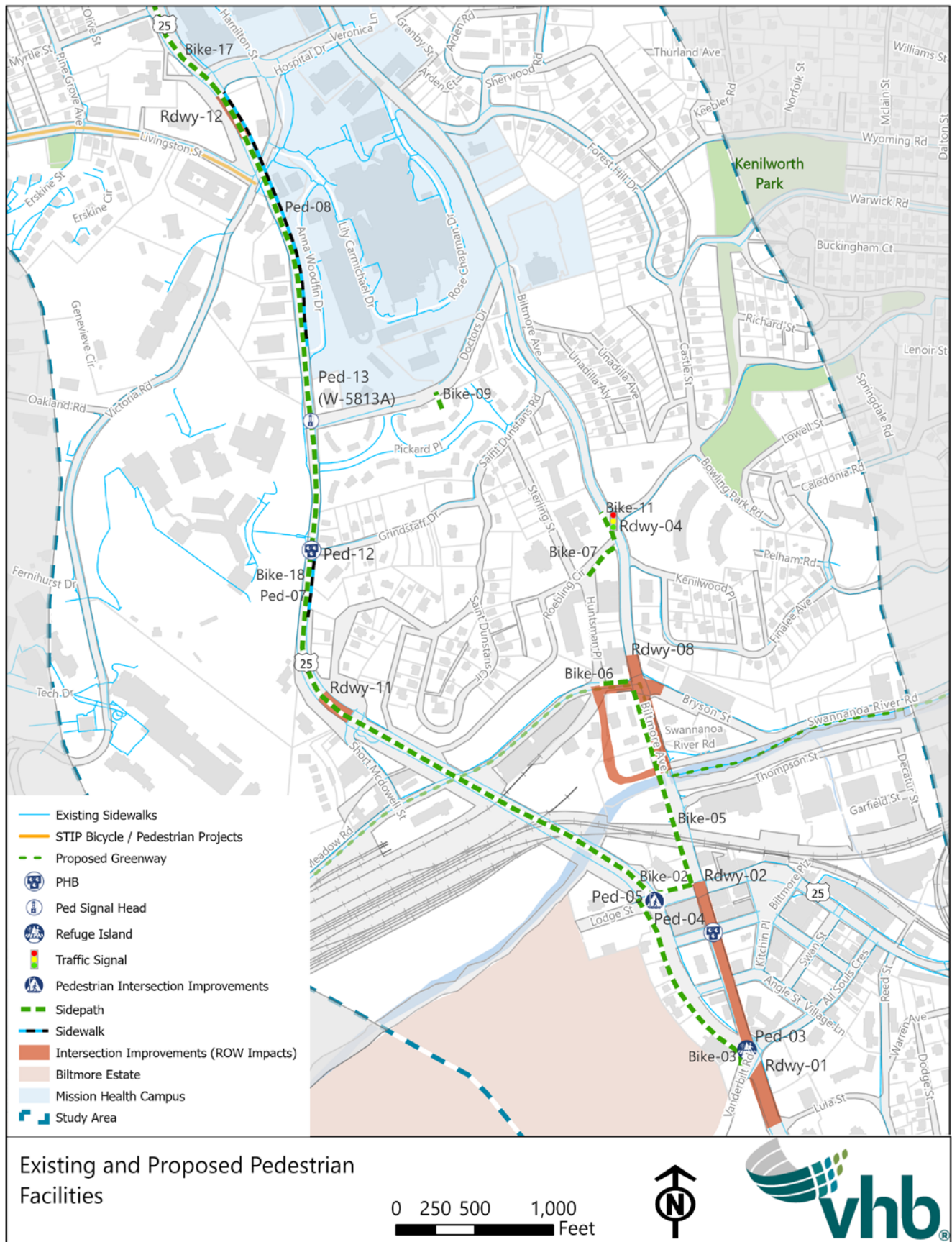


Figure 23 – Pedestrian Improvements, All Scenarios, Southern Section of the Study Corridor.



## Bike the Biltmore

Throughout the engagement process, community members and groups requested comfortable and low-stress bikeway facilities along and across the Biltmore Avenue and McDowell Street/Asheland Avenue corridors. The analysis of bicycle safety and existing facilities also lent support for improving the area's bikeways. The existing bicycle network consists of on-street lanes along Asheland Avenue and end at Southside Avenue; other sections of the corridors have "Share the Road" signage but no accompanying markings or facilities to support separation. As a result, bicycling up, down, and across the corridors is limited to a small subset of highly confident cyclists.

There are opportunities to provide high-quality bicycle facilities along Biltmore Avenue and McDowell Street/Asheland Avenue corridor that would support an all ages and abilities network. The key principles for the recommended improvements that allow individuals, families, and friends to "Bike the Biltmore" include safety, directness, continuity, and unbroken flow. The recommended improvements achieve these through separation from the higher speed and volume roadways, connected routes, and protected intersections that encourage continuous movement. While some of these improvements may be implemented regardless of roadway rebalancing scenarios, those that are scenario-specific are noted otherwise. Additionally, many of these improvements may be achieved without significant ROW implications when conducted in tandem with lane rebalancing. Finally, these recommendations support the pillar of Connect the Neighborhoods through providing north-south and east-west access and have marginal impacts on other vehicular LOS.

## All Scenarios Recommendations

Bicycle improvements that may be implemented under all scenarios include:

- » **Biltmore Avenue at Caledonia Road Intersection (Rdwy-04)** - Convert the stop-controlled intersection to a signalized intersection with high visibility pedestrian crosswalk, pedestrian signal phase, and pedestrian signal heads. This project, noted in Connect the Neighborhoods, also improves east-west bicycle connectivity in addition to improving driving conditions for drivers exiting the Kenilworth neighborhood.
- » **McDowell Street at Doctor's Drive Intersection (Ped-13)** - Install pedestrian signal heads. This would support east-west bicycle connectivity. The project is programmed in the State Transportation Improvement Program (STIP) as W-5813A.
- » **McDowell Street near Grindstaff Drive Crossing (Ped-12)** - Upgrade the existing marked crosswalk on the four-lane undivided roadway near the high school to a high visibility marked crosswalk and Pedestrian Hybrid Beacon (PHB), advance pavement markings, and signage to increase yielding to pedestrians. This would improve opportunities for bicyclist crossing McDowell Street to the school, interior neighborhoods, and Bicycle Boulevards (described as Bike-08 & Bike-09 below).
- » **North Biltmore Avenue Separated Bicycle Lanes from Southside Avenue to Hilliard Avenue (Bike-15)** - Implement one-way separated bicycle lane pair on Biltmore Avenue north of Southside Avenue. This would create a new facility on Biltmore Avenue. Space for the new bikeways would come from travel lane rebalancing and would support low-stress connections from the Downtown to the South Slope area. A transition section at the Hilliard Avenue intersection might be needed to accommodate a turn lane. Figure 24 illustrates an example

of a roadway cross section with one-way separated bicycle lanes. As another alternative, a regular bicycle lane in combination with on-street parking on one side could be considered on Biltmore Avenue between Southside Avenue and Hilliard Avenue. However, at traffic volumes around 10,000-11,000 Average Annual Daily Traffic (AADT) at current conditions, a regular bicycle lane would not fully address the required comfort level for bicyclists of all abilities based on the latest available guidance<sup>12</sup>.

**Figure 24 - Conceptual illustration of Potential Cross-Section along Biltmore Avenue from Southside Avenue to Hilliard Avenue**

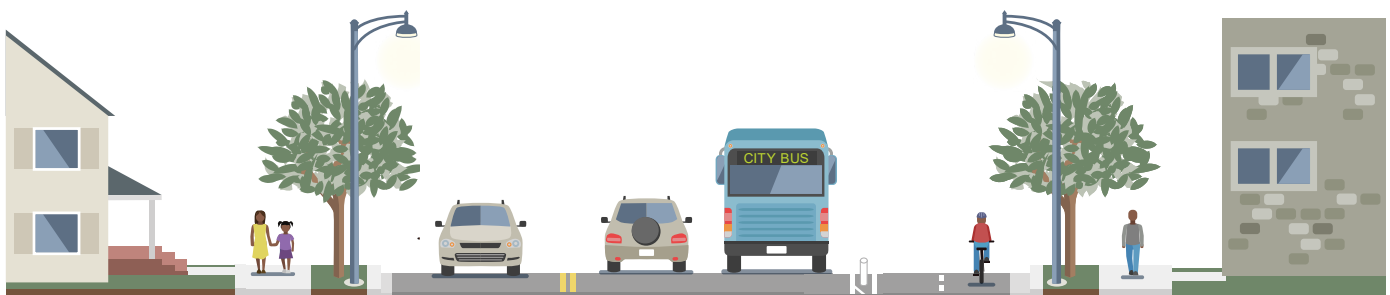


- » **Asheland Avenue Separated Bicycle Lanes from Southside Avenue to Hilliard Avenue (Bike-16)** - Implement one-way separated bicycle lane pair on Asheland Avenue north of Southside Avenue. This would upgrade the existing bikeway type on Asheland Avenue Space for the new bikeways would come from travel lane rebalancing and would support low-stress connections from the Downtown to the South Slope area. Reducing the number of travel lanes would also support pedestrian safety through this section and contribute to improved pedestrian crossing at Asheland Avenue and Morgan Avenue. Figure 25 below illustrates a possible future cross-section along Asheland Avenue with separated bicycle lanes.



Example of One-Way Separated Bicycle Lanes Pair, Charlotte, NC

**Figure 25- Conceptual illustration of Potential Cross-Section along Biltmore Avenue from Southside Avenue to Hilliard Avenue**



- » **Biltmore Avenue/Hendersonville Road Sidepath Upgrades (Bike-05)** - Widen existing sidewalk to a sidepath facility (minimum 8 feet wide, 10 to 12 feet preferred) along Biltmore Avenue/Hendersonville Road from Meadow Road to Lodge Street and along Lodge Street from Hendersonville Road to McDowell Street. The west side of the roadway along Biltmore Avenue/ Hendersonville Road reduces the number of driveway and roadway

<sup>12</sup> See FHWA, Bikeway Selection Guide, Figure 9: Preferred Bikeway Type for Urban, Urban Core, Suburban and Rural Town Contexts. [https://safety.fhwa.dot.gov/ped\\_bike/tools\\_solve/docs/fhwasa18077.pdf](https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf)

intersection conflicts. These improvements would both expand the pedestrian space and introduce separated shared-use facilities for bicyclists, providing direct access to key destinations. ROW impacts are anticipated to existing adjacent private parking lots, and coordination would be required with the railroad given the location of the westside gate arm. Any project encroaching on railroad ROW would require extensive coordination with the affected railroad and the NCDOT Rail Division.

Implementing this critical link in the north-south bikeway network would include the narrowing of the four travel lanes on the Swannanoa Bridge approximately 1' per lane. The lower posted speeds (20MPH) and congestion in this area are compatible with reduced lane widths. The reallocation space from narrowed travel lanes would be utilized to expand the existing westside bridge sidewalk to an approximate 10' shared-use facility with vertical separation such as a jersey barrier.

The study recognizes that a 10-foot sidepath on the bridge might not provide the full level of accommodation for both bicyclists and pedestrians desired through this section. A follow-up study is recommended for a separate greenway bridge across the Swannanoa River parallel to Biltmore Avenue/Hendersonville Road bridge. Significant floodplain concerns are present in the area and would make permitting a separate new greenway bridge difficult.

Finally, this recommendation acknowledges and anticipates connections with any of the three Swannanoa Greenway route alternatives identified in the 2019 Swannanoa Greenway Feasibility Study.<sup>13</sup> For the U-5832 option, the greenway would connect with the Bike-05 sidepath at the Meadow Road intersection; for the Thompson Street one-way conversion, Thompson Street would be signalized to support crossing, and; for the railbed alignment option, greenway users would have to dismount—if bicycling—and walk north or south to the Thompson Street or Lodge Street intersections to cross, respectively.

- » **St. Dunstons Bicycle Boulevards (Bike-08 & Bike-09)** - Implement signage and pavement markings to indicate a bicycle boulevard along the neighborhood low speed and volume roadways of Grindstaff Drive, Sterling Street, and Pickard Place. This bicycle boulevard would provide east-west access between McDowell Street and Biltmore Street and their respective improved bikeways (irrespective of rebalancing scenario). This would also include implementing targeted parking restrictions along Doctors Drive to ensure visibility of pedestrians and bicyclists and update of the existing stairs (private walkway) between Pickard Place near Beverly Condominiums complex and Doctors Drive to a multi-use path (Bike-09) to allow for public access by bicyclists and pedestrians.
  
- » **Protected Intersection Improvements (Bike-12)** - Implement protected intersections at locations where the separated bicycle lanes pass through a signalized intersection. This is a global recommendation for all locations along the corridor intended to reduce conflicts points at intersections between bikeway users and motorists. The type of protected intersection is dependent upon the available ROW and intersection geometrics (among other variables). This improvement supports a continuous, low stress, and unbroken flowing bikeway. When designing the protected intersections, the bicycle signal phase scheme (e.g. concurrent with permissive vehicle

---

<sup>13</sup> See the City of Asheville's website for more information on the Swannanoa Feasibility Study and route alternatives, <https://www.ashevillenc.gov/departments/transportation/current-projects/swannanoa-river-greenway-corridor/>

turns, concurrent with leading interval, concurrent protected, and protected bike phase) should be incorporated into the existing traffic signal phasing on a case-by-case basis to match the intended the outcomes (e.g. increase bicycle visibility to turning vehicles, support a green wave, etc.). Bicycle signal phasing effects were not included in the Future Year Build intersection LOS due to this uncertainty and may reduce anticipated vehicular LOS.

## Rebalanced Biltmore (Alternative A) Specific Recommendations

The following recommendations may be implemented as part of Alternative A, the Biltmore Avenue Rebalanced Scenario, that would provide space for a separated bikeway along Biltmore Avenue.

- » **Biltmore Avenue Two-Way Separated Bicycle Lane (Bike-12 & Bike-13)** – Install a two-way separated bicycle lane from Southside Avenue to Caledonia Road utilizing the lane width from the roadway rebalancing. To support continuity, the bikeway should remain on the same side of the roadway to the longest extent possible. Both the east and west side of Biltmore Avenue present challenges for siting the bikeway, however the east side has fewer curb cuts and is separate from Mission Hospital emergency access. See image below for an example of a two-way separated bicycle lane on a three-lane roadway cross section, and Figure 26 for a future cross-section along Biltmore Avenue from Hospital Drive to Southside Avenue with two-way separated bicycle lane.



Example of Two-Way Separated Bicycle Lane, 10th Street NW, Atlanta, GA

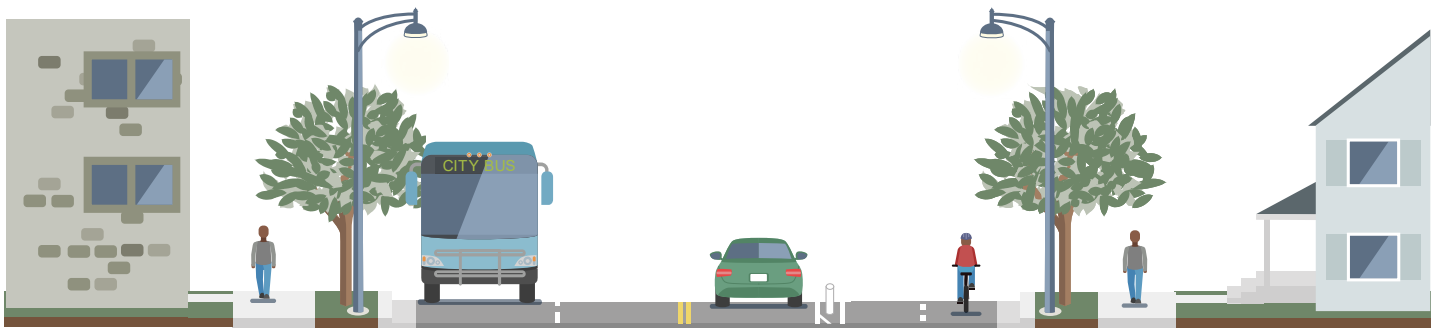


Figure 26 - Conceptual Illustration of Potential Cross-Section along Biltmore Avenue from Hospital Drive to Southside Avenue (Two-way Separated Bicycle Lane Shown on East Side)

- » **Roebling Circle Sidepath (Bike-11)** – Upgrade the existing sidewalk along Biltmore Avenue from Caledonia Road to Roebling Circle to a sidepath shared facility. This widened path would provide a connection at the newly signalized Caledonia Road intersection for bicyclists and pedestrians to cross the roadway and continue north-south or east-west through facilities like the St. Dunstons Bicycle Boulevard (Bike-08). See Figure 12 for a conceptual illustration of the sidepath connection.
- » **Huntsman Place Advisory Shoulder and Sidepath Connection (Bike-07)** – Install an advisory shoulder from the Roebling Circle Sidepath (Bike-11) along Huntsman Place to the Meadow Road sidepath (Bike-06). This improvement would create a low-stress bicycle connection with minimal route deviation from Caledonia Road to the Meadow Road intersection. While most of this facility is on City of Asheville roadway, it would necessitate a multi-use easement agreement with the private property across the rear of the parking lot.
- » **Meadow Road Sidepath (Bike-06)** – Install a sidepath from Huntsman Place to the Biltmore Avenue and Meadow Road intersection. This shared-use facility would connect the Huntsman Place advisory shoulder (Bike-07) to the Biltmore Avenue/Hendersonville Road sidepath upgrades (Bike-05). ROW impacts are anticipated from the construction of the sidepath segment along Meadow Road.
- » **Transit Shared Stops (Bike-10)** – Modify the existing transit stops that overlap with the two-way separated bicycle lanes (Bike-12 & Bike-13) to shared stops. The shared stop occurs where the bikeway rises and runs along the transit boarding area; this is due to the constrained roadway cross section. Bicyclists are permitted to ride through the boarding areas must yield to transit riders, and special attention must be made to the inclusion of tactile surfaces and barriers for users with visual impairments.<sup>14</sup>



Figure 27 - Conceptual illustration showing Bike-11, Sidepath link from Roebling Circle to Caledonia Road

<sup>14</sup> National Association of City Transportation Officials, "Transit Street Design Guide - Shared Cycle Track Stop," <https://nacto.org/publication/transit-street-design-guide/stations-stops/stop-configurations/shared-cycle-track-stop/>

## Rebalanced McDowell (Alternative B) Specific Recommendations

The following recommendations may be implemented as part of Rebalanced McDowell Scenario (Alternative B), that would provide space for a separated shared-use sidepath along McDowell Street.

- » **McDowell Street Sidepath Upgrade (Bike-17 & Bike-18)** – Widen the existing sidewalk on the westside of McDowell Street from Southside Avenue to Lodge Street to a sidepath. The improvement is segmented from Southside Avenue to Hospital Drive (Bike-17), and from Hospital Drive to Lodge Street (Bike-18). Initial review of the topography and destinations indicate the westside as the beginning preferred alignment.



Example of Sidepath, Carolina Beach, NC

This sidepath would support increased bicycle and pedestrian connectivity and comfort north-south, improve access to destinations like Asheville High School, AB Tech Campus, and Biltmore Village, and provide separation from the higher volume and speed roadway. The project should be paired with the sidewalk gap closure on the east side of the roadway (Ped-07, Ped-08, and Ped-09). The alternate side of the roadway could also be considered for the sidepath location. ROW impacts are anticipated. See image above for an example of a sidepath, and Figure 28 below for a future cross-section illustration.



Figure 28 - Conceptual illustration of Potential Cross-Section along McDowell Street from Lodge Street to Hospital Drive (Sidepath Shown on West Side)

- » **Biltmore Village Bicycle Gateway (Bike-19)** – Install bicycle parking, a micromobility station (e.g. e-bikeshare) and wayfinding on the northside of the railroad tracks at Hendersonville Road. This location would serve as a gateway for those on bicycle to dismount and lock their bicycles before entering Biltmore Village on foot given the lack of connected bicycle facilities. The project would likely necessitate coordination with private property owners to identify the most appropriate location.

Figures 29 and 30 below illustrate the locations of proposed bicycle improvements under a Combined Rebalanced Scenario (combination of improvements on Biltmore Avenue and McDowell Street).

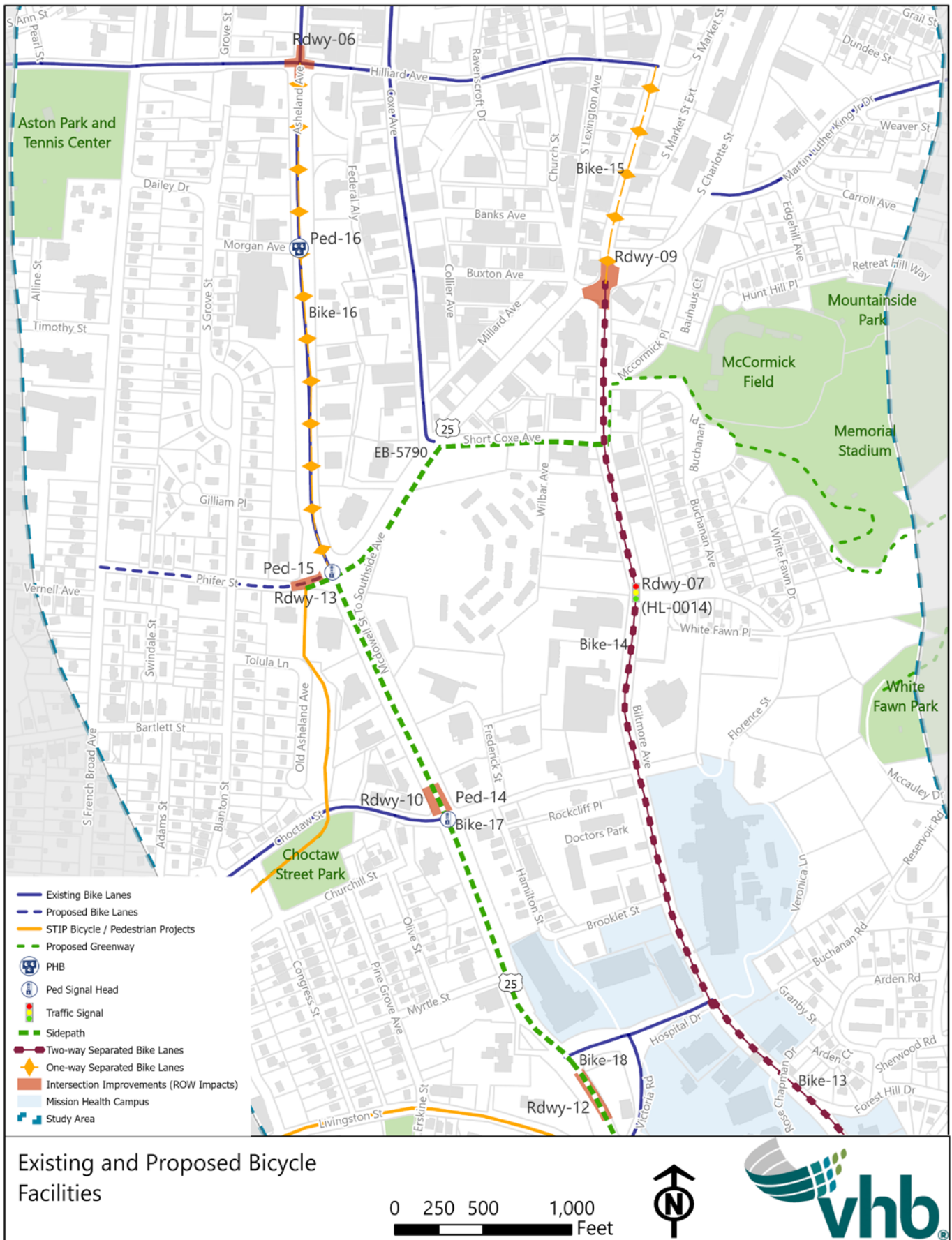


Figure 30 Existing Bicycle Facilities and Proposed Bicycle Improvements, Full Implementation under a Combined Scenario, Northern Portion of Study Corridor

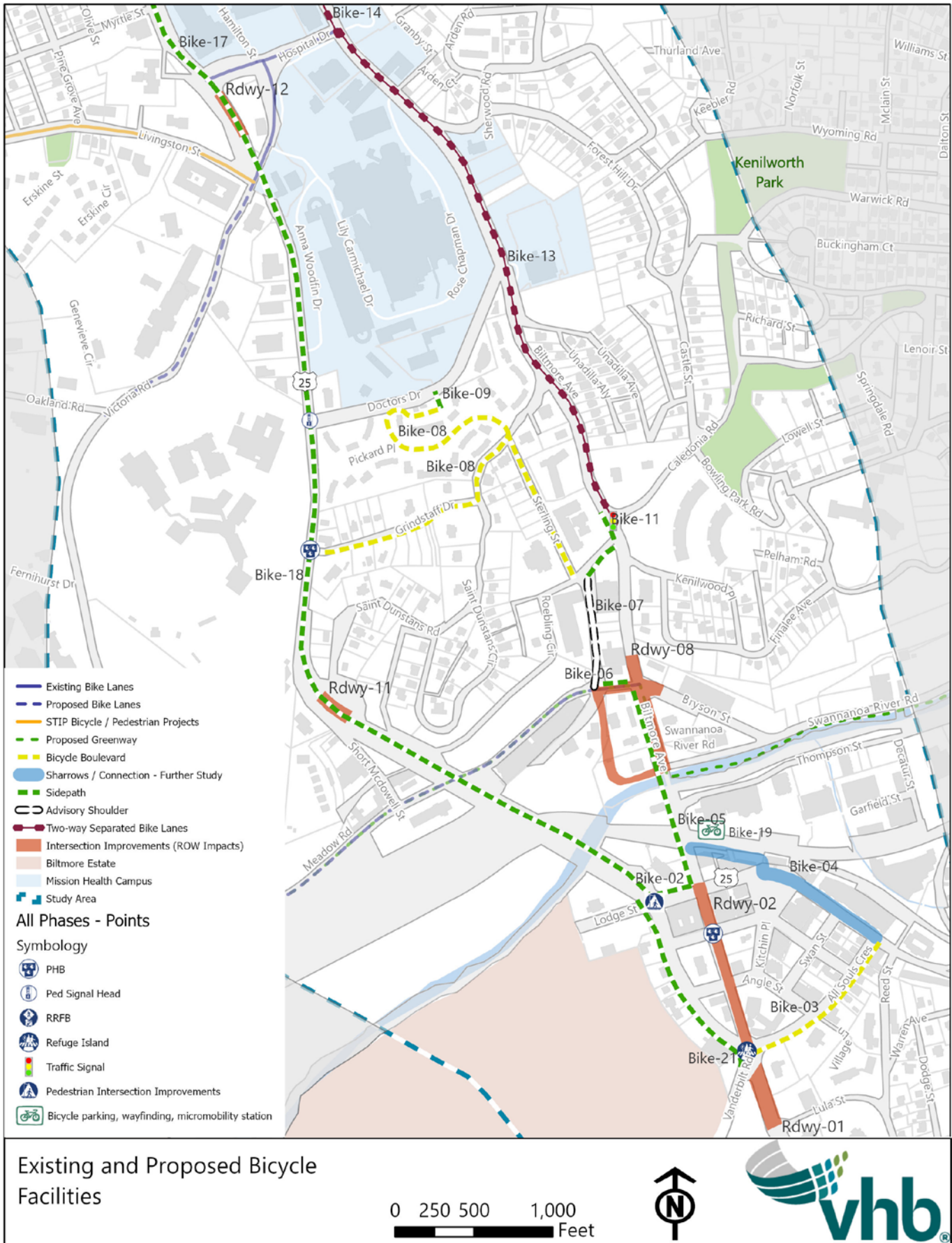


Figure 31 Existing Bicycle Facilities and Proposed Bicycle Improvements, Full Implementation under a Combined Scenario, Southern Portion of Study Corridor



## Recommendations for Further Study

There are several bicycle improvements that would require additional study for project-specific feasibility. These generally involve addressing multiple constraints and involving additional parties that are outside the scope of this study.

- » **Lodge Street/Brook Street Bicycle Improvements** – Evaluate potential bicycle facility recommendations and routing along or behind Brook Street/Lodge Street from Hendersonville Road gateway and bicycle parking area (Bike-19) to the All Souls Crescent bicycle boulevard (Bike-03). This may involve the temporary use of Shared Lane Markings and bicycle wayfinding signage; however, the existing elevated vehicle volumes do not support an all ages and abilities bikeway on Brook Street without separation from traffic. A detailed evaluation for an upgraded facility is recommended as part of a larger Biltmore Village study or Comprehensive Bicycle Plan update.



- » **All Souls Crescent Sidepath** – Evaluate widening of the existing sidewalk on west side to a sidepath along All Souls Crescent from Lodge Street to Vanderbilt Road. The sidepath connection would close the gap in the existing sidewalk network and provide a connection for bicyclist and pedestrians to Vanderbilt Road. Due to the constrained ROW, topography, adjacent historic properties, and involvement of multiple stakeholders and jurisdictions, this project is recommended for a detailed follow-up study.

## Transit Improvements

The Biltmore Avenue and McDowell Street corridors have the right combination and density of residences, jobs, and travel demand to be successful transit corridors. Several activity centers are located linearly along the corridors including Biltmore Village, AB Tech, Asheville High School, Mission Hospital, and Downtown Asheville. The strong inter-activity center demand between Downtown/South Slope, Mission Hospital, and Biltmore Village--as highlighted through the Existing Conditions StreetLight analysis--underlines the potential of higher frequency transit serving the area being anchored by lively activity centers. Additionally, the large tourism and entertainment travel market between downtown Asheville and Biltmore Village strengthens the prospect of higher frequency transit along the corridor to serve visitors and tourists who are more apt to try to transit over navigating unfamiliar streets. As congestion and parking costs increase along the corridor over time, transit will become even more of an attractive option.

The 2018 City of Asheville Transit Master Plan recommends increasing frequency of service along north-south routes as well as interlining north-south routes to allow for one seat rides through the corridor, Downtown, and Merrimon Avenue. The master plan also explored a deviated fixed route service dubbed the Shiloh Flex Concept operating between Biltmore Village and the Shiloh neighborhood, as well as a hospital circulator operating with frequent service between Mission Hospital and Biltmore Village. In addition to service recommendations, the Transit Master Plan identified Biltmore Village for two “Super Stops” which can include shelters, comfortable seating, and lighting.

As funding allows, service expansion along the Biltmore Avenue corridor between Downtown and Biltmore Village should be considered to reduce headways to every fifteen minutes. Frequent service along this corridor would allow for employees, residents, and visitors to have the freedom to take transit without relying on a schedule. Other transit elements such as bus stop amenities can further enhance the transit rider experience along the corridor through the implementation of shelters, bike racks, and real time arrival information. A Super Stop or enhanced transfer point in Biltmore Village could facilitate transfers between potential frequent transit along the study corridor and neighborhood and regional transit service to the south. The stop could also enhance the ease of transit use for visitors.

As part of the Rebalanced Biltmore Alternative A recommendation, a two-way separated bicycle lane is proposed along Biltmore Avenue north of Caledonia Road. Bus stops along this portion of the corridor would most likely be configured as shared bus stops, where buses make stops in the travel lane and bicyclists yield to transit riders boarding and alighting the bus from a raised shared separated bicycle lane and bus stop space (see image to the right).

As mentioned earlier in the report, ADA upgrades throughout the corridor are desirable to ensure mobility and



Shared Bus Stop Conditions with Separated Bicycle Lane, Charlotte NC

accessibility for all users. Accessible bus stops retrofitted with shelters, benches, signage and trash cans would be another desirable addition and could be implemented as stand-alone projects. In reviewing the ridership by bus stop, the following bus stops along Biltmore Avenue and McDowell Street Corridor rose to the top of priority for bus stop and shelter improvements, based on ridership levels (pre-COVID-19, 2019 ridership figures). Those bus stops are recommended for an expanded ADA-accessible bus stop pad with a shelter or a bench, to be implemented either in conjunction with road rebalancing and complete streets improvements or separately. A minimum flat loading area 5 feet wide by 8 feet deep would be required, clear of obstructions, to meet the ADA guidelines; a larger bus stop waiting pad would be preferred with a 30-foot wide pad allowing for rear-door access.<sup>15</sup> The TCRP Report 19: Guidelines for the Location and Design of Bus Stops suggest that an additional area four feet deep by 10 feet wide would be needed to accommodate a typical bus stop shelter.<sup>16</sup>

**Table 4 Bus Stops Recommended for Upgrade with ADA Accessible Loading Zone and a Bus Shelter or Bench**

Stop ID	Location	Routes Served	East/West Side	Total Weekday Ridership (October 2019, pre-Covid conditions)
605	Biltmore Avenue at Choctaw Street	S1, S2, S5	West	27
654	Biltmore Avenue at Choctaw Street	S1, S2, S5	East*	25
609	Biltmore Avenue at Meadow Road**	S1, S5	West	19
604	Biltmore Avenue at Short Coxe Avenue	S1, S2, S5	West	16

\*If Biltmore Avenue rebalancing is implemented, bus stop waiting area/shelter improvements on the east side at bus stop #654 would be paired with a shared bus stop due to the separated bike lane if separated bike lane implemented on the east side

\*\*Bus Stop 609, Biltmore Avenue at Meadow Road is already planned for improvements by the City of Asheville in the next three years

ITS and signal priority for buses can ensure more reliable transit user experience and reduced transit rider delays. As part of follow-up studies transit signal priority evaluation is recommended to be for consideration on Hendersonville Road/Biltmore Avenue and on McDowell Street, along with signal priority for emergency responders.

<sup>15</sup> Washington Metropolitan Area Transit Authority (2009). Design and Placement of Transit Stop Guidelines. Retrieved from [https://nacto.org/docs/usdg/design\\_and\\_placement\\_of\\_transit\\_stops\\_kfh.pdf](https://nacto.org/docs/usdg/design_and_placement_of_transit_stops_kfh.pdf)

<sup>16</sup> Transportation Research Board, National Research Council (1996). TCRP Report 19: Guidelines for the Location and Design of Bus Stops. Retrieved from [https://nacto.org/docs/usdg/tcrp\\_report\\_19.pdf](https://nacto.org/docs/usdg/tcrp_report_19.pdf)

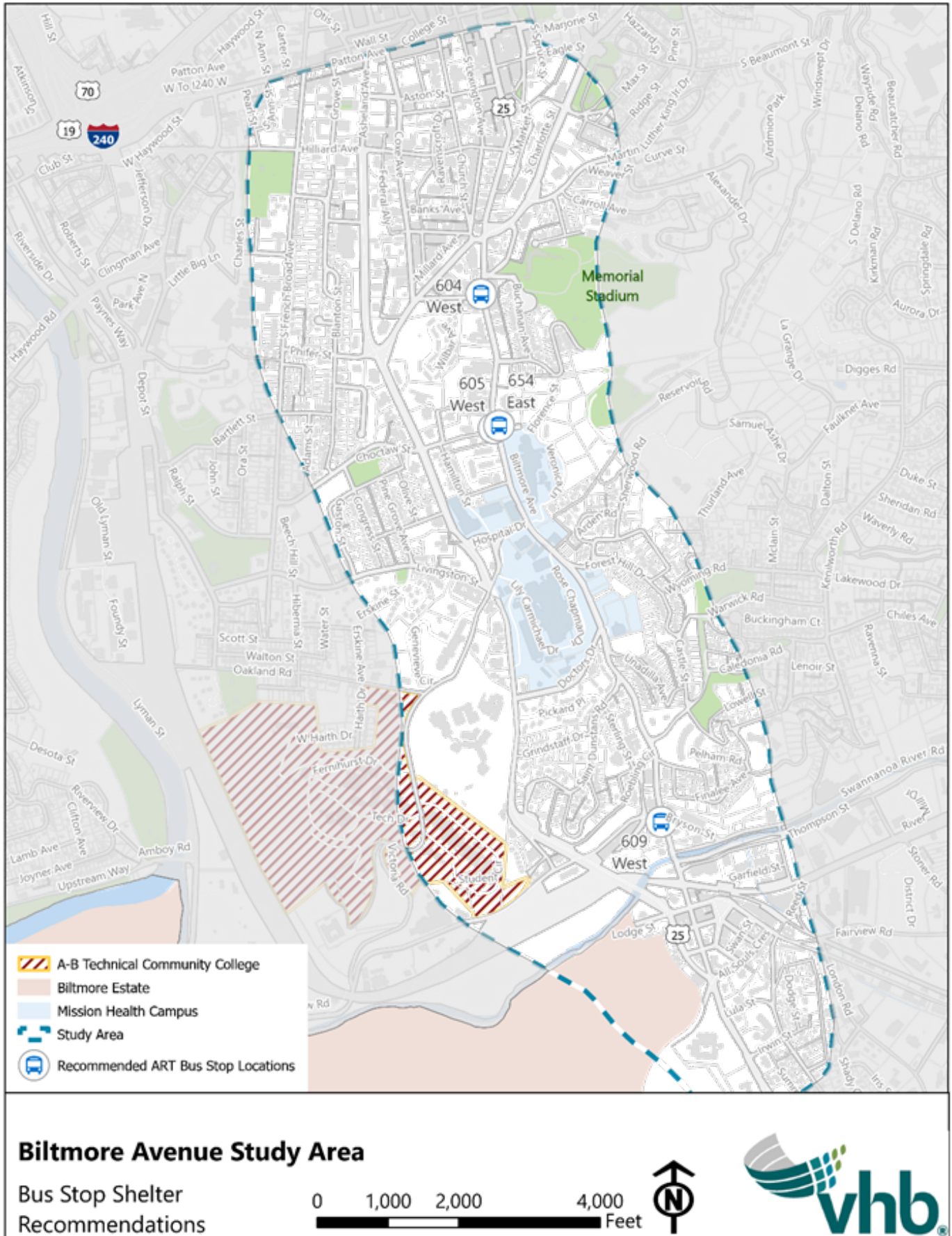


Figure 32 Bus Stop Locations Recommended for Shelter or Bench Improvements Based on Ridership

## Railroad Coordination

Railroads have long played a critical role in the growth and economy of Asheville. One railroad crossing is of particular interest for the Biltmore-McDowell Study. The Hendersonville Road / Biltmore Avenue railroad crossing is in the southern portion of the study area just north of Biltmore Village. According to the USDOT Crossing Inventory, the Norfolk Southern Railroad operates freight trains over the crossing with approximately three day thru trains, two night thru trains, and three switching trains for a total of eight trains traversing the crossing per day. Two tracks cross the four lanes of vehicular traffic at the crossing. The crossing has gate arms in a two quad configuration as well as flashing lights and bell. Maximum timetable speed for trains at the crossing is 20 miles per hour.



Railroad Crossing along Hendersonville Road Looking North

According to Federal Railroad Administration (FRA) Highway-Rail Grade Crossing Accident/Incident Reports, one vehicle-train collision has occurred at the Biltmore Avenue railroad crossing. The one collision occurred in 2003 and involved a driver moving around or through the gate and then being struck by a train during night conditions.

Any project encroaching on railroad ROW will require extensive coordination with the railroad and the NCDOT Rail Division. Two projects are proposed which would require railroad coordination, a sidepath facility north-south along Biltmore Avenue on the west side of the roadway crossing the at grade crossing (Bike-05) and a multi-use path parallel the Norfolk Southern S-Line east of the Biltmore Avenue grade crossing considered as a route alternative in the Swannanoa Greenway Feasibility Study.

## Special Events and Transportation Demand Management Strategies

- » A number of special events take place at Biltmore Estate, at McCormick Field, Asheville Memorial Stadium, Asheville High School, the Orange Peel music venue and at other locations along or near the study corridor throughout the year. While additional traffic and congestion associated with those events is likely to impact traffic operations the day of the event, there are diminishing returns associated with investing in significant infrastructure improvements to plan for those special events. Building infrastructure to accommodate special events peak traffic would be expensive, inefficient and disruptive to the existing community fabric.
- » Changes to roadways in Biltmore Village would be especially problematic and costly due to Biltmore Village historic district context, existing buildings located close to the street, and floodplain concerns. Generally there is more capacity and flexibility at the northern end of the study area; Charlotte Street can provide an alternate access route for the stadiums and southern edge of downtown. Some of the events at the stadiums and at the Orange Peel are likely to be in the evenings and during the weekend days, outside of peak period.

The following strategies focused on alternative transportation modes and Transportation Demand Management (TDM) strategies have been identified by the study team, grouped by location:

» **Biltmore Estate**

- » Review ticketing location for needed modifications; since the Biltmore Estate ticketing point has been moved to the interior, there is a significant length of vehicular storage already allocated on site
- » Configuration of Biltmore Estate driveway travel lanes is recommended for further study to examine if restriping to add an additional exit lane might be feasible (to help the traffic exiting the Estate, while making sure the entry way is easy to navigate for visitors entering Biltmore Estate (see Rdwy-05) )
- » TDM measures that could be considered include the following:
  - » Consider Biltmore Estate shuttles that would travel outside of the Estate to pick up visitors at downtown hotels and off-site parking areas
  - » Provide off-peak discounts to incentivize visitors to tour the Estate outside of peak days (pricing differences by season are already in place)
  - » Allow bicycling and walking access to the estate for paid visitors, with incentives (such as discounted admission or other benefits)
  - » Separate the cost of parking on Biltmore Estate grounds from the ticket fee
  - » Set up reserved admission times (if not already in place)
  - » Continue to expand on-site accommodations/hotel options
- » Review Approach Road connection to Meadow Road for needed upgrades, to allow easier exit for peak demand periods via Meadow Road
- » Consider upgrading western access points from NC 191 (Brevard Road) at Jones Farm Road and/or Long Valley Road to allow visitors to utilize western access for key peak demand events, taking advantage of the existing bridge over the French Broad River near the Biltmore Estate Winery

» **Northern end of the study area including McCormick Field and Memorial Stadium**

- » Continue to support multi-family residential and mixed use redevelopment along the corridor
  - » Pending multi-family residential developments is expected to bring more residents in walking proximity to those destinations; ensure walking and bicycling access is safe and attractive
  - » Pending multi-family residential developments will add new parking to the corridor; opportunities for shared parking during special events may be considered
  - » Additional expected commercial developments in the study area would encourages flexibility in arrival/departure, reducing peaks
- » Off-site parking opportunities could be an option during certain times, such as some parking lots on AB Tech campus or bank parking lots for after-hours/evening events
- » Downtown to Biltmore Village Circulator Shuttle could be considered that would make stops at key destinations (such as the South Slope, the stadiums) along the way

Parking pricing could be re-evaluated in downtown and at special event venues to make sure the pricing is consistent with desired drive-to-event mode share.

Overall, special events traffic can be considered as part of project design with small changes and accommodations. But the most efficient strategy for the City would be to improve the overall network of

multi-modal transportation facilities and to provide TDM strategies and parking pricing signals to encourage visitors to consider other forms of travel to special events other than driving along.

## Implementation Plan and Table of Recommendations

The study recommendations can be grouped into two general categories:

- » A list of capital improvement projects and follow-up studies that could be undertaken as stand-alone projects separately from the lane reallocation
- » Choosing a lane reallocation alternative and implementing improvements associated with that alternative (Rebalanced Biltmore, Rebalanced McDowell, or Combined Rebalanced alternatives)

It is recommended that the City seek to implement projects in the first category (implementable as stand-alone projects) through ongoing budgeting processes with local funds.

Implementing a combination of projects in support of one of the alternatives is going to be a much larger lift. Applying for federal grant funding or state funding is recommended in support of one of rebalanced alternatives.

### Implement under Any Scenario or as Stand-Alone Projects.

The study team has identified a variety of projects which are already programmed in the STIP and/or could be implemented as stand-alone projects and recommended for implementation apart from consideration for lane rebalancing along Biltmore Avenue or McDowell Street.

The accessibility-focused Projects Ped-01A and Ped-01B could be implemented as stand-alone projects. However, because of the length of the corridor (a combination of four miles) and total cost, it is recommended that the City consider a schedule of implementation over the course of 10 years starting with prioritizing areas in South Slope/southern end of Downtown, in Biltmore Village, and around Asheville High School and Mission Hospital first.



Table 5. Pedestrian Improvements Already Programmed or Recommended under Any Scenario

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Projects Programmed in the State Transportation Improvement Program (STIP)						
Ped-13 (W-5813A)	McDowell Street at Doctors Drive/ Asheville High School exit. Upgrade signalized intersection to add pedestrian signals, high visibility crosswalk, and curb ramps. Programmed in the STIP as W-5813A.	McDowell Street	Doctors Drive			\$74,000 (programmed in the STIP for FY 2021 CST)
EB-5790	EB-5790 programmed sidepath/ greenway connections and crossing improvements.	Southside Avenue and Short Coxe Avenue	between McDowell at Phifer Street and Biltmore Avenue at Short Coxe Avenue			\$1,146,000 (Programmed in the STIP for FY 2021 CST)
Additional Recommended Improvements not Yet Programmed						
Ped-01A	Provide sufficient ADA sidewalk width to account for obstructions (i.e. utility poles and signage) both sides of the street.	Hendersonville Road/Biltmore Avenue from and All Souls Crescent/ McDowell Street	All Souls Crescent at Hendersonville Road/Vanderbilt Road	Hilliard Avenue	4 miles	\$13,500,000 <sup>17</sup>
Ped-01B	Curb ramp retrofit and driveway sidewalk leveling (42 ramp pairs and 129 driveways along Hendersonville Road/ Biltmore Avenue and McDowell Street).	Hendersonville Road/Biltmore Avenue from and All Souls Crescent/ McDowell Street	All Souls Crescent at Hendersonville Road/Vanderbilt Road	Hilliard Avenue		\$1,000,000

<sup>17</sup> Cost estimates based on widening existing sidewalks by 1 foot, both sides, NCDOT STI Prioritization Bicycle and Pedestrian Cost Estimation Tool.



Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Ped-02	Upgrade signalized intersections to pedestrian signal heads with countdown timers.					\$125,000- \$175,000 per intersection
Ped-03	Hendersonville Road at All Souls Crescent / Vanderbilt Rd: shorten pedestrian crossing by adding pedestrian refuge island, improve signal timing.	Hendersonville Road	All Souls Crescent / Vanderbilt Road			\$50,000
Ped-04	Hendersonville Road at Boston Way in Biltmore Village: update crosswalk with a Pedestrian Hybrid Beacon, evaluate curb ramps for consolidation.	Hendersonville Road	Boston Way			\$130,000
Ped-05	All Souls Crescent at Biltmore Estate Driveway/Lodge Street/McDowell Street: Add high visibility pedestrian crossings across all legs of intersection, add ped signal heads.	All Souls Crescent/McDowell Street	Biltmore Estate Driveway/Lodge Street			\$150,000
Ped-09	Sidewalk infill (east side) along McDowell Street.	McDowell Street	Choctaw Street		0.1 mi	» \$180,000
Ped-10 (included as part of EB-5919)	Choctaw Street from McDowell Street to Biltmore Avenue, sidewalk gap closure (both sides).	Choctaw Street	McDowell Street	Biltmore Avenue	0.15 mi	\$446,000 (as programmed in the STIP)
Ped-11	Southside Avenue sidewalk gap closure (south side, along Asheville Gastroenterology building to intersection with Biltmore Avenue).	Southside Avenue	Biltmore Avenue		0.05 mi	\$115,000

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Ped-12	McDowell at Grindstaff/Asheville HS crossing. Add high visibility pedestrian crossing with a PHB, high visibility crossing markings across AHS driveway, update curb cuts for ADA compliance. Consider median refuge island.	McDowell Street	Asheville High School crossing just north of Grindstaff Drive			\$130,000
Ped-14	McDowell Street at Choctaw Street. Upgrade signalized intersection with pedestrian signal heads, countdown timers, high visibility crosswalks.	McDowell Street	Choctaw Street			\$145,000
Ped-15	McDowell Street at Phifer Street. Upgrade signalized intersection with pedestrian signal heads, countdown timers, high visibility crosswalks.	McDowell Street	Phifer Street/ Southside Avenue			\$145,000
Ped-16	Asheland Avenue at Morgan Avenue. Add a high visibility crosswalk with a PHB at or near Morgan Avenue Coordinate with bus stop locations.	Asheland Avenue	Morgan Avenue			\$130,000



Table 6. Bicycle Improvements Already Programmed or Recommended under Any Scenario

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Bike-01	Signalized intersection with separated bike lane crossings to be evaluated for a protected bicycle intersection (in conjunction with Bike-15; Bike-16).	Biltmore Avenue, Asheland Avenue	Southside Avenue	Hilliard Avenue		\$35,000 per pair of bicycle signals
Bike-02	Widen existing sidewalk to a sidepath along northern side of Lodge Street from Hendersonville Road to McDowell Street.	Lodge Street	Biltmore Avenue	McDowell Street	0.035	\$125,000
Bike-05	Hendersonville Road from Lodge St to Meadow Rd, widen sidewalk to a sidepath on one side (includes RR crossing upgrade and bridge over Swannanoa River).	Hendersonville Rd	Lodge Street	Meadow Road	0.198	\$570,000
Bike-15	Biltmore Avenue from Southside Avenue to Hilliard Avenue, reduce travel lanes to one lane in each direction and add a pair of separated bicycle lanes.	Biltmore Avenue	Southside Avenue	Hilliard Avenue	0.193	\$965,000
Bike-16	Asheland Avenue from Southside Avenue to Hilliard Avenue, reduce travel lanes to two northbound lanes and one southbound lane. Convert bicycle lanes to a pair of separated one-way bicycle lanes.	Asheland Avenue	Southside Avenue	Hilliard Avenue	0.442	\$1,495,000
Bike-01	Evaluate for bicycle signals all signalized intersections where a separated bikeway or shared facility is present, including Biltmore Avenue and Asheland Avenue from Southside Avenue to Hilliard Avenue (in coordination with Bike-15 and Bike-16).	Biltmore Avenue and Asheland Avenue	Southside Avenue	Hilliard Avenue		\$35,000 per pair of bicycle signals/ \$140,000 for four signalized intersections

Table 7. Roadway and Intersection Improvements Already Programmed or Recommended under Any Scenario

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Rdwy-07 (HL-0014)	Biltmore Avenue at White Fawn Drive. Convert stop-controlled intersection to a signal-controlled and add ped signal and high visibility crosswalk improvements. Programmed in the 2020-2029 STIP as HL-0014 (CST expected in 2022).	Biltmore Avenue	White Fawn Drive			\$440,000 (based on amount programmed in the STIP)
Rdwy-01	Hendersonville Road in Biltmore Village-add second northbound thru lane south of All Souls Crescent to Lula Street.	Hendersonville Road		All Souls Crescent/ Vanderbilt Road	0.085	\$450,000
Rdwy-02	Hendersonville Rd from All Souls Crescent to Lodge St, access management.	Hendersonville Road	All Souls Crescent/ Vanderbilt Road	Lodge Street	0.2	\$50,000
Rdwy-04	Biltmore Avenue at Caledonia Road: convert stop-controlled intersection to signal controlled, add ped signal heads and high visibility crosswalks.	Biltmore Avenue	Caledonia Road			\$260,000
Rdwy-10	McDowell Street at Choctaw Street. Add westbound right turn lane. Coordinate with Ped-10 and Ped-09 sidewalk gap closure.	McDowell Street	Choctaw Street			\$790,000

Table 8. Bus Stop Improvements Recommendations

Project ID	Project Description	Estimated Probable Cost
Bus-605	Biltmore Avenue at Choctaw Street, West Side. Bus stop #605. Upgrade bus stop with ADA accessible loading pad, bus shelter or bench, sign and trash can.	\$23,000
Bus-654	Biltmore Avenue at Choctaw Street. East Side. Bus stop #654. Upgrade bus stop with ADA accessible loading pad, bus shelter or bench, sign and trash can.	\$30,000
Bus-609	Biltmore Avenue at Meadow Road** West Side. Bus stop #609. Upgrade bus stop with ADA accessible loading pad, bus shelter or bench, sign and trash can.	\$ 20,000
Bus-604	Biltmore Avenue at Short Coxe Avenue. West Side. Bus Stop #604. Upgrade bus stop with ADA accessible loading pad, bus shelter or bench, sign and trash can.	\$ 21,500



Table 9. Projects Recommended for Further Study

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Bike-21	All Souls Crescent from Lodge Street to Vanderbilt Road/Hendersonville Road. Widen existing sidewalk to a sidepath along commercial buildings on west side, connect the gap to Vanderbilt Rd. Additional study recommended due to constrained ROW, multiple jurisdictions, and historic properties.	All Souls Crescent	Lodge Street	Vanderbilt Road/	0.2	\$50,000 (study)
Bike-04	Lodge Street/Brook Street from Hendersonville Road to All Souls Crescent (just West of Reed St.) Follow-up study needed to evaluate for bicycle facilities; Consider Shared Lane Markings and signage in the short term.	Lodge Street/ Brook Street	Hendersonville Road	All Souls Crescent	0.21	\$50,000 (study); \$20,000 (shared lane markings as interim solution)
Bike-20	Feasibility Study to examine a potential greenway bridge over Swannanoa River including expected floodplain modeling and permitting challenges	New alignment greenway bridge parallel to Biltmore Avenue	Swannanoa River Road			\$200,000 (study)
Rdwy-14	Evaluate emergency vehicle preemption for emergency responders on the way to the hospital and consider signal priority for transit. OPTICOM or similar technology may be considered. Further study recommended to evaluate potential systems and trade-offs.					\$50,000 (study)
Rdwy-03	Hendersonville Road at All Souls Crescent/Vanderbilt Road. Additional study recommended to evaluate realigning Vanderbilt Road further to the south and conversion to Right in Right Out only (stop-controlled).	Hendersonville Road	All Souls Crescent/ Vanderbilt Road			\$100,000 (study)

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Rdwy-05	McDowell Street at Lodge Street/Biltmore Estate Driveway: re-evaluate for restriping to add a dedicated eastbound left turn lane for traffic exiting Biltmore Estate onto McDowell Street. Additional study recommended to ensure lane restriping does not conflict with wayfinding for drivers entering the Estate.	Biltmore Estate Driveway	McDowell Street			\$20,000 (study)
Rdwy-06	Hilliard Avenue at Asheland Avenue intersection: evaluate for additional turn lanes along Hilliard Avenue as part of a larger east-west downtown connectivity study.	Hilliard Avenue	Asheland Avenue			\$175,000 (study)
Rdwy-08	Biltmore Avenue at Meadow Road and Bryson Street. Conduct a feasibility study to consider a partial quadrant Intersection to separate eastbound through and Meadow eastbound-to southbound right turn lane from Biltmore Avenue and Bryson Street intersection. To be coordinated with U-5832	Biltmore Avenue	Meadow Road/ Bryson Street			\$120,000 (study)
Rdwy-15	Feasibility study to evaluate new connector roadway from AB Tech Campus to connect Victoria Road to Short McDowell Street. Potential new roadway would help address roadway network deficiency and lack of parallel evacuation routes for AB Tech and Asheville High School campus.	New Roadway	Victoria Road	Short McDowell Street		\$125,000 (study)

## Implement as Part of Rebalanced Biltmore Avenue Scenario (Alternative A)

Table 10. Improvements Recommended as part of Rebalanced Biltmore Avenue (Alternative B)

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Ped-06	Biltmore Avenue from Meadow Road to Roebling Circle. Upgrade sidewalks to be ADA compliant (bike facility detour via Huntsman through this section).	Biltmore Avenue	Meadow Road	Roebling Circle	0.128	\$430,000
Bike-06	Implement sidepath improvement on Meadow Road (north side) from Biltmore Avenue to Huntsman Place to connect to Huntsman Place Advisory Shoulder.	Meadow Road	Biltmore Avenue	Huntsman Place	0.028	\$125,000
Bike-07	Advisory shoulder along Huntsman Place and short segment of a multi-use path across parking lot to connect to Biltmore Avenue at Roebling Circle.	Huntsman Place	Meadow Road	Biltmore Avenue at Roebling Circle	0.149	\$150,000
Bike-10	Bus Stops along Biltmore Avenue from Caledonia Road to Hilliard Avenue that overlap with separated bike lane facilities; implement shared bus stops.	Biltmore Avenue	Caledonia Road	Hilliard Avenue		\$290,000-\$435,000 for eight bus stop platforms including \$30,000-\$45,000 per bus stop platform plus 20% for design[1]
Bike-11	Biltmore Avenue from Roebling Circle to Caledonia Road, widen sidewalk to a sidepath on west side.	Biltmore Avenue	Roebling Circle	Caledonia Road	0.03	\$115,000



Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Bike-12	Evaluate intersections for protected intersections as part of separated bike lanes design.	Biltmore Avenue	Caledonia Road	Southside Avenue	1.2	\$35,000 per pair of bicycle signals
Bike-13	Biltmore Avenue from Caledonia Road to Hospital Drive. Reduce travel lanes to two lanes northbound, one lane southbound. Add a two-way separated bikeway or shared facility utilizing reallocated travel lane width; upgrade sidewalks for ADA compliance.	Biltmore Avenue	Caledonia Road	Hospital Drive	0.56	\$1,610,000
Bike-14	Biltmore Avenue from Hospital Drive to Southside Avenue. Add a two-way separated bikeway or shared facility utilizing reallocated travel lane width; upgrade sidewalks for ADA compliance.	Biltmore Avenue	Hospital Drive	Southside Avenue	0.64	\$1,885,000
Rdwy-08A	Biltmore Avenue at Meadow Road and Bryson Street: add eastbound right turn lane; coordinate with U-5832.	Biltmore Avenue	Meadow Road			\$460,000
Rdwy-11	McDowell Street and Short McDowell Street. Add southbound right turn lane.	McDowell Street	Short McDowell Street			\$300,000.00

## Implement as Part of Rebalanced McDowell Street Scenario (Alternative B)

Table 11. Improvements Recommended as part of Rebalanced McDowell Street (Alternative B)

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Ped-08	McDowell from Anna Woodfin Drive to Hospital Drive-Sidewalk Infill East Side (coordinate with McDowell lane reallocation).	McDowell Street	Anna Woodfin Drive	Hospital Drive	0.263	\$400,000
Bike-17	McDowell from Southside Avenue to Hospital Drive. Reallocate one travel lane, add a sidepath one side of the road, coordinate with closing sidewalk gaps (Ped-09) and address ADA deficiencies.	McDowell Street			0.479	\$1,390,000
Bike-18	McDowell from Hospital Drive to Lodge Street. Reallocate one travel lane, add a sidepath one side of the road, coordinate with closing sidewalk gaps (Ped-07 and Ped-08), address ADA deficiencies.	McDowell Street			1.01	\$3,750,000
Bike-19	Hendersonville Rd just north of RR tracks crossing-inside commercial area east side of Hendersonville Road, add a bicycle parking, micromobility station, and wayfinding gateway into Biltmore Village.	Hendersonville Road	South of Thompson Street			\$60,000-\$130,000, depending on size of micromobility e-bikes station
Rdwy-13	McDowell at Phifer/Southside. Intersection improvements to add a short eastbound right turn lane from Phifer Street onto McDowell Street. Coordinate with EB-5790 greenway connections, ped crossing (Ped-15).	McDowell Street	Southside Avenue/Phifer Street		0.198	\$260,000

### Implement as Part of Combined Rebalanced Scenario (Alternative C)

Combined Rebalanced Scenario (Alternative C) would require implementing projects identified in support of both Alternative A and Alternative B above. In addition to projects identified as part of Biltmore Rebalanced Scenario (Alternative A) and McDowell Rebalanced Scenario (Alternative B), the Combined Rebalanced Scenario would require the following additional improvements:

**Table 12. Additional Roadway Improvements Recommended as part of Combined Rebalanced Scenario (Alternative C)**

Project ID	Project Description	Facility	From (or Cross Street)	To	Length	Estimated Probable Cost
Rdwy-09	Southside Avenue at Biltmore Avenue, remove porkchop island on the west side of intersection and construct second eastbound combined through and right lane. Remove right turn slip lane. Coordinate with Southside Avenue sidewalk gap closure (Ped-11)	Southside Avenue	Biltmore Avenue			\$320,000
Rdwy-12	McDowell Street at Hospital Drive. Adding short northbound right turn lane just north of the tunnel (widening into the slope, retaining wall)	McDowell Street	Hospital Drive			\$810,000

## Potential Funding Sources

Roadway, bicycle, pedestrian, and safety improvements along Hendersonville Road/Biltmore Avenue and McDowell Street/Asheland Avenue are generally eligible for federal, state, and local transportation funding sources. The listing below summarizes some of the key funding sources potentially available for the City of Asheville to support implementation of the study recommendations.

### Federal:

- » Surface Transportation Block Grant Program Directly Attributable (STBG-DA) and Transportation Alternatives Program-Directly Attributable (TAP-DA) funds; application process through the French Broad River MPO, 20 percent local match required.
- » Competitive federal grant application process for Rebuilding American Infrastructure with Sustainability and Equity funds (RAISE, formerly BUILD grants); 20 percent or higher local match required; \$6.25 million minimum total project cost.
- » Highway Safety Improvement Program (HSIP) safety funds (selection process managed by NCDOT).

### State:

- » In North Carolina, state transportation funding for transportation capital expansion projects is allocated through a data-driven prioritization process known as STI Prioritization. Roadway projects, if funded in the State Transportation Improvement Program (STIP) do not require a local match. The City may submit projects through the French Broad River MPO or through Division 13 for consideration for funding every two years. A project must be included in a regional or locally-adopted plan. A local match is required for stand-alone bicycle or pedestrian projects.
- » Powell Bill grants: NCDOT allocates Powell Bill funds to municipalities based on municipal roadway lane-miles. The NCDOT's Powell grants exceed \$132 million statewide on an annual basis; Asheville received an allocation of \$2.3 million in the fall of 2020. Funds may be spent on resurfacing, construction and maintenance projects for roads, bridges, drainage systems and sidewalks.

### Local:

- » City Property Tax. Broadly eligible for transportation projects. Additional funds would require either raising the tax rate or re-allocating funding from other purposes.
- » Parking revenue from City parking decks can be used for any public purpose. Revenue from parking garages can be transferred to other public purposes. \$1.5 million has been used by the City of Asheville in the past to subsidize transit. The COVID-19 pandemic and associated travel behavior changes have impacted parking garage revenues. Revenues are expected to improve as travel returns to close to normal patterns.
- » Vehicle Registration Fees. The City levies a \$10 fee, of which \$5 is used for public transportation, and \$5 is currently assigned to the General Fund.
- » Rental Car Tax. Buncombe County and the City of Asheville each levy a 1.5% tax on rental vehicles. Additional

---

State Legislature approval would be required for a new 5% rental car tax to support a Regional Transportation Authority. In 2018, the City's revenues of \$531,000 were allocated to the General Fund.

- » General Obligation Bonds. Long-term bonds may be approved through voter referendum, to be repaid by property taxes. The purpose is established prior to the referendum vote. The last time the City held a referendum vote for a bond package in 2016, Asheville voters approved three bond measures: \$32 million for transportation projects, \$25 million for affordable housing projects, and \$17 million for Parks projects.
- » Municipal Service Districts (MSDs). The City of Asheville can designate Municipal Service Districts, where additional property taxes may be assessed to fund projects and services within the districts. The City is not currently assessing an additional tax on the existing Municipal Service Districts, also known as Innovation Districts. Established Municipal Service Districts that overlap with the study area include the following:
  - » Asheville Downtown (the Central Business District)
  - » The South Slope

### Grant Funding through Private Foundations and Other Agencies:

- » Buncombe County Tourism Development Authority. Tourism Product Development Fund grants based on ¼ of the 6% room occupancy tax in Buncombe County designated for tourism product development. Potential projects must show a link to tourism.
- » Dogwood Health Trust recently established in support of western North Carolina health and wellness initiatives is considering applications based on established strategic priorities. Transportation is not currently listed as one of the priorities.
- » AARP Community Challenge grants. Those grants help communities build change in support of the nationwide AARP Livable Communities initiative, which helps communities become great places to live for residents of all ages. Typical funding amounts under \$20,000.