Charlottesville to Monticello & Beyond

A Planning Study of Pedestrian and Bicycle Connections

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Sponsored by the Thomas Jefferson Planning District Commission

Info & Inquiries: http://cvilletomonticello.weebly.com/

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Cover Photos: Thomas Jefferson Foundation, Peter Krebs, Julie Murphy.

Executive Summary

Thomas Jefferson's Monticello is an important source of Charlottesville's history, cultural identity and economic vitality. In combination with the Academical Village at the University of Virginia, it is a World Heritage Site and a treasured resource, unusual for a city of this size. Monticello is close to the city, once had multiple connections, and is visible from some locations, yet it is difficult to get there without a car. This discontinuity poses problems of unrealized opportunity and equity for Monticello, the city, and the region.

In 2000, the Thomas Jefferson Foundation, which owns and operates Monticello, covered half the distance to town by opening the Saunders-Monticello Trail. This winding, two-mile pathway is accessible under the Americans with Disabilities Act (ADA) standards and its beauty attracts visitors from a diversity of backgrounds. Combined with the adjoining parkland, it is a wildly successful landscape and a destination in its own right. Yet a challenging half-mile gap remains between the gateway trail and the population center.

The remaining gap, the subject of this study, is small but complicated. The area is split between Charlottesville and Albemarle County's municipal jurisdictions, with Interstate 64 and a high-speed divided multi-lane roadway (VA-20) in the domain of the Virginia Department of Transportation. The highway interchange itself is a formidable physical and psychological barrier--there are no sidewalks or bicycle infrastructure. There are multiple institutional landowners as well, most of whom would like to bridge the gap in bicycle and pedestrian access.

As part of its decennial regional multimodal review, the Thomas Jefferson Planning District Commission (TJPDC) sponsored this research to support local governments and stakeholders working to complete this connection.

Stakeholders requested five areas of investigation:

1. Learn who uses the Saunders-Monticello Trail, how they use it, why they use it, and if there is demand for a connection to Charlottesville.
2. Examine four alternate corridors identified in the localities' Comprehensive Plans and provide a basis for comparison.
3. Study examples of other trail projects, identify lessons learned, and possible resources.
4. Explore implications for regional connectivity, economic and social impact, and educational programming.
5. Recommend a path forward.

The research team reviewed applicable planning and transportation documents, subject-area literature, and case studies. We met regularly with stakeholders, technical experts, and community groups. We conducted a highly successful survey, with in-person and email components, which yielded 1,010 responses in 18 days. We looked at trail usership data from counting devices and performed geospatial analyses of the identified corridors.

1890 Charlottesville Land Company Map, showing several of the lost roads and the path of I-64 (Special Collections Library, University of Virginia/Scholars' Lab).

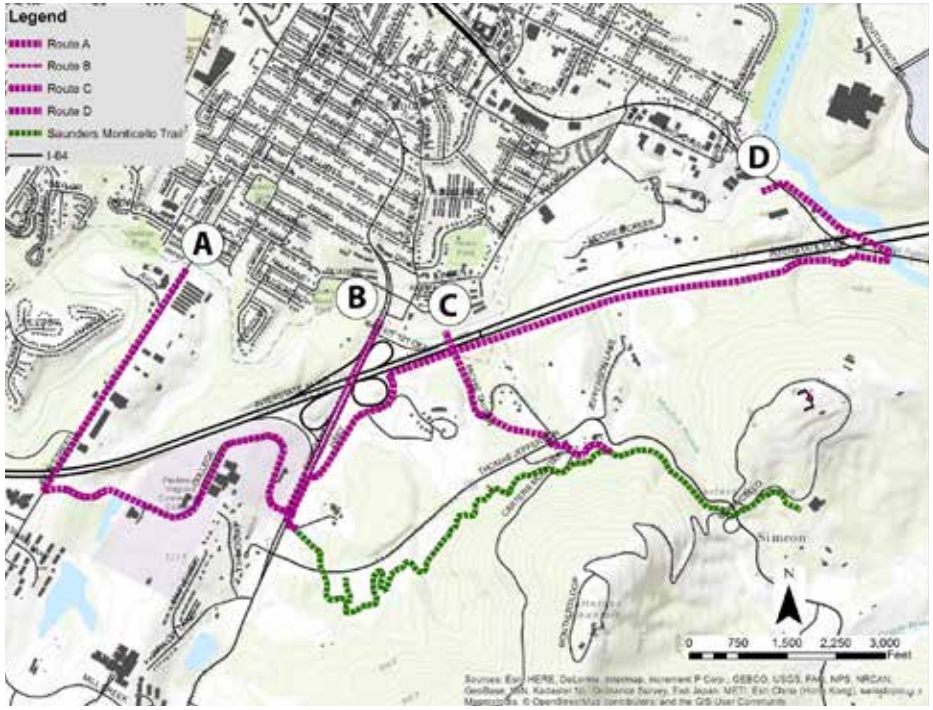
Key Findings

The survey found tremendous support for the Saunders-Monticello Trail and substantial demand for a connector.[1] Residents of both the City and County are excited about the possibilities. The public is engaged and enthusiastic. The Thomas Jefferson Foundation recognizes that the Saunders-Monticello Trail is an important community asset.

Trail users gave a very clear explanation of why the Saunders-Monticello Trail is successful: it is a beautiful, natural space close to town, it feels safe, and is built with such gentleness and generous proportions that it can be enjoyed by almost anyone. Respondents said they would like to be able to get there more easily without a car and be more connected to nearby destinations such as Piedmont Virginia Community College (PVCC), Albemarle's Southern Neighborhood Area, James Monroe's Highland, Morven, and local schools.[2]

We selected four corridors identified in local Comprehensive Plans and named them A, B, C, and D for convenience.[3] Each is unique, with distinct characteristics and opportunities. For example:

- Route B is very flat, A and C are rolling, and D is very steep.
- Route A requires a pedestrian bridge, B an interchange redesign, C a tunnel, and D a railroad easement.
- Routes A and B would make PVCC more accessible, an opportunity that many survey respondents highlighted as desirable.



Corridor route map

- Route C creates a new access point in the middle of the Saunders-Monticello Trail, spreading usership and relieving congestion.
- Routes A and B could be multi-modal commuter routes for County residents.
- Routes B and C would improve one of the least bike-friendly segments of National Bike Route 76.
- Routes A, B and C have potential for adding parking. Those same lots could be used for park-and-walk, park-and-bike, or park-and-transit access to downtown, reducing city traffic.
- Routes B and C would help activate the long-dormant Blue Ridge Hospital site. A combination of those two routes could also bypass the difficult interstate interchange.
- Route D is extremely beautiful and historic but, due to the challenging terrain, raises concerns about accessibility

1 Only 3% said they would not use a connector (84% yes, 13% maybe).

2 Morven is sponsoring a separate but related study of a potential trail connecting Morven, Highland and Monticello. There are two elementary schools and a high school near the study area.

3 By choosing routes from Comprehensive Plans, we knew that they would be acceptable to most stakeholders and could build on the research that got them included. That does not mean that other routes are not interesting, but they have not been vetted by the Comprehensive Planning process.

standards and will need to be combined with portions of C and/or B. Study constraints also require a very indirect route to Monticello.

- Route A begins close to the largest number of low-income and minority residents, which improves trail access and equity.

We recommend a phased comprehensive approach that uses elements of all routes. A wider network provides greater access, disperses users through space, reduces crowding, and creates a diversity of route options. Each route has at least one major advantage—and at least one major disadvantage. None will meet all the goals alone.

All of the routes contribute to the localities' transportation and recreation goals. Together, they create a robust network that aligns with the broader vision, values, goals, and objectives established in Albemarle County, Charlottesville City, TJPDC, the Commonwealth of Virginia, and local foundations' plans.

Trails can be significant drivers of economic activity, generating revenue from both tourists and local users. Business opportunities exist around the trail access points and along several of the routes in the core study area. Trails can also promote healthy lifestyles, and these connectors are strategically close to neighborhoods, parks, and sites of opportunity. A resource like Monticello and the beautiful surrounding lands should be available to all, regardless of access to a car.

There are abundant opportunities for education in an area so rich in heritage, culture, and natural variety. Programming can and should extend into Charlottesville city, linking with partner organizations with symbiotic missions, such as the local schools, the University of Virginia, the Jefferson School Center for African American Heritage, and PVCC.

We actively investigated the literature and consulted our advisory committee and could not find any clear downsides besides cost.[4] On the other hand, we found multiple cases in which significant positive outcomes (such as connecting sundered educational resources, new business formation, increased sales tax revenue, revitalized towns and new community celebrations) were directly attributable to trail construction. We found many examples of communities that have overcome barriers similar to those here, often with fewer available resources than Charlottesville and Albemarle possess.

Strategic Considerations

The Virginia Department of Transportation (VDOT) is most likely to fund projects that accomplish multiple goals, as these do, especially those with statewide or national heritage and recreation implications.[5] VDOT has many resources that will be of assistance.

There is the potential for quickly, but partially, increasing connectivity by modifying the intersection of VA-20 and College Drive to accommodate pedestrians and adding a footbridge over Cow Branch Creek. This would relieve pressure on the Saunders-Monticello Trail parking lots by adding parking at PVCC and create safer access from the County's Southern Neighborhood Area.[6]

Significant savings can be obtained in the medium term by routing Route B through the Route C tunnel and skirting the interchange, reducing the need for pedestrians to cross it. Thus, the route could be

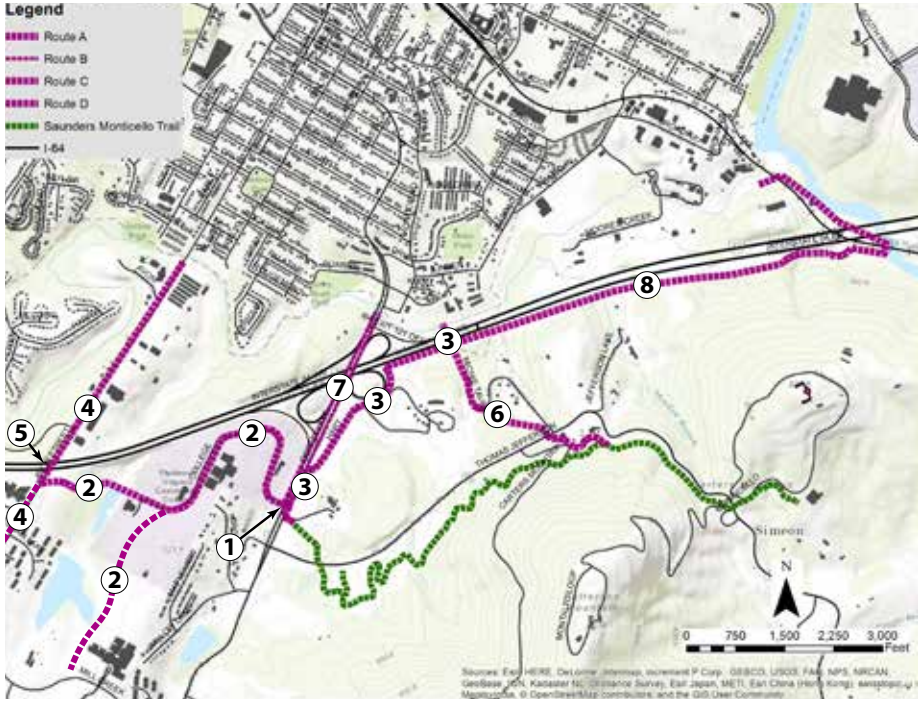
4 There have been news articles suggesting that trails cause affordability gaps. While there is no clear evidence of a causal link, process must be inclusive and design welcoming for the result to be positive.

5 "Projects along existing and/or planned tourism, recreation corridors such as U.S. Bicycle Routes 1, 76 and 176 shall include bicycle and pedestrian accommodations." (Virginia Department of Transportation (2017), 2.

6 PVCC is currently using the Stultz Center parking lot for workforce training programs. A spatially or temporally specific agreement would be required. College Drive is not currently safe for pedestrians, which is why the new footbridge is required. This approach would not solve the connection but would significantly mitigate it.

made safe before the interchange is reconfigured.[7] These two trails start at a site that would make a fine trailhead parklet with bathrooms and parking that could also serve in-bound commuters, reducing city traffic.

One more short term solution would be to work with Carter Mountain Orchard to restore pedestrian access during their operating season. This connection could open pedestrian access to James Monroe's Highland and, potentially, to Morven.[8]



Proposed phasing plan

Next Steps

The next step will be for the stakeholders to reconvene and establish a path forward. Projects like this generally have a convening body or champion that keeps the process moving forward by providing a central voice and point of contact. We suggest that TJPDC play that role, with local governments, in cooperation with VDOT, handling implementation.

They should determine priorities, bring in new partners, including local businesses, and involve the public. There is a considerable well of excitement that can be tapped for advocacy, fundraising, technical support, and volunteer assistance. The community can build on the engagement and momentum this project has generated and work together to bring this shared opportunity to fruition.

7 We still recommend modifying the interchange for reasons described earlier: more connections are better and they accomplish different tasks.

8 The rustic trails connected to the Saunders-Monticello Trail and Highland's trails both go right up to the Carter's Mountain fenceline. Morven is studying trail feasibility and its project scope specifically includes connectivity to Highland.

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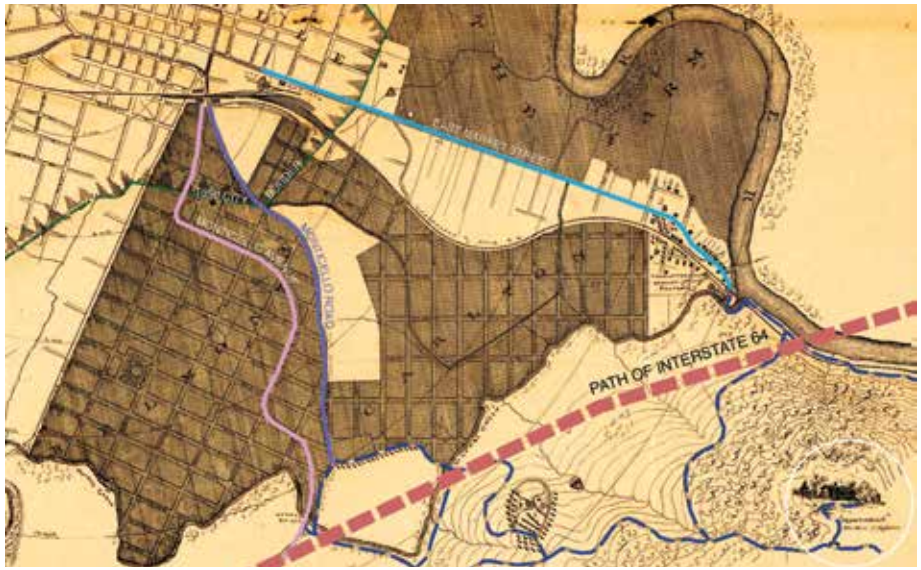
Introduction

Charlottesville is unique in that it hosts a UNESCO World Heritage site, split in two locations: Thomas Jefferson's Academical Village at the University of Virginia and his home at Monticello. These are important sources of the city's and region's identity, vitality, and economy. It is no exaggeration to state that this would be a different—and less prosperous—place had Jefferson chosen to settle elsewhere.



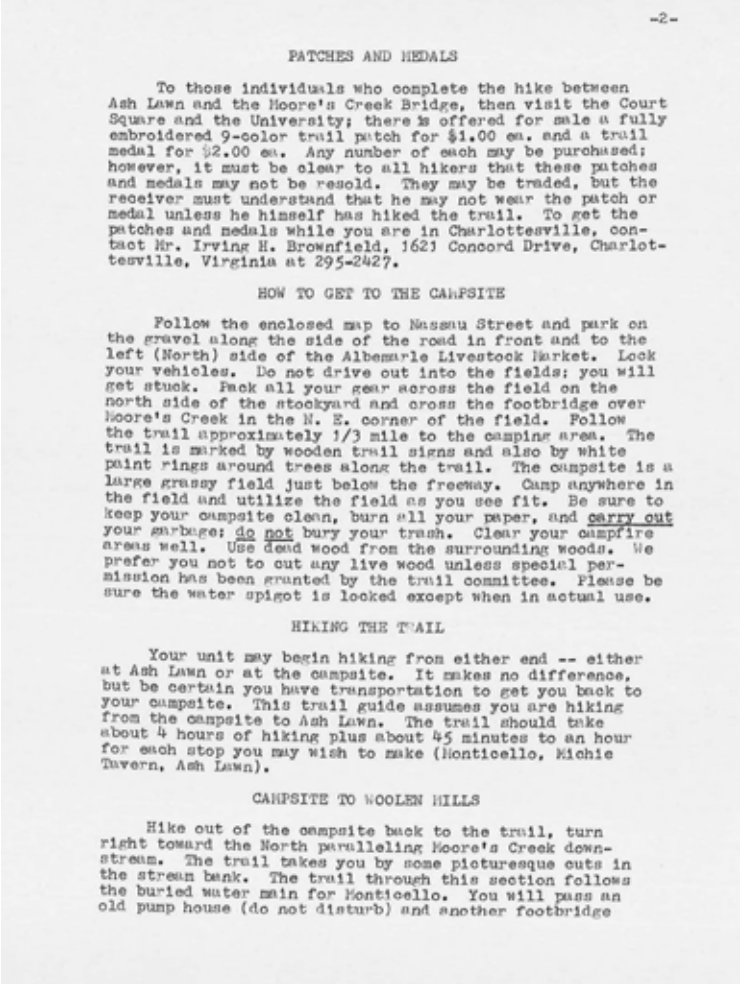
1890 Charlottesville Land Company Map, showing several of the lost roads (dashed), and the path of Interstate 64. (Special Collections Library, University of Virginia via Scholars' Lab).

Monticello is very close to Charlottesville and it is visible from many parts of the city. Its gateway, the Saunders-Monticello Trail, is just a half mile from the city's border. That narrow zone is intersected by Interstate 64 and contains a stretch of high-speed roadway (VA-20) without pedestrian and bicycle facilities, making the UNESCO World Heritage site and its adjoining park inaccessible to those who cannot, or chose not to, drive there. Since parking lots are often filled above their capacity, driving there can be unpredictably difficult. There is no transit connection.

However, Charlottesville was once connected to Monticello via multiple routes, and there was lively interchange between the two. There are countless stories of workers both free and enslaved, travelers, and residents—both historical and contemporary—who traveled frequently back and forth along the hilly, winding routes. The construction of the interstate, and the transformation of the only surviving route (VA-20) into a high-stress corridor, severed the connection for all but the boldest cyclists and pedestrians. As a result, the city is physically disconnected from its reason for being.

Monticello, is a site of global importance and an invaluable cultural resource, yet it is not accessible to everyone who lives near it. That inaccessibility is both a missed opportunity and an injustice. Tourism and scholarship are two of the region's most important economic

Spout spring and watering trough on old Monticello Road. (Courtesy Thomas Jefferson Foundation).



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PATCHES AND MEDALS

To those individuals who complete the hike between Ash Lawn and the Moore's Creek Bridge, then visit the Court Square and the University; there is offered for sale a fully embroidered 9-color trail patch for $1.00 ea. and a trail medal for $2.00 ea. Any number of each may be purchased; however, it must be clear to all hikers that these patches and medals may not be resold. They may be traded, but the receiver must understand that he may not wear the patch or medal unless he himself has hiked the trail. To get the patches and medals while you are in Charlottesville, contact Mr. Irving H. Brownfield, 1621 Concord Drive, Charlottesville, Virginia at 295-2427.

HOW TO GET TO THE CAMPSITE

Follow the enclosed map to Nassau Street and park on the gravel along the side of the road in front and to the left (North) side of the Albemarle Livestock Market. Lock your vehicles. Do not drive out into the fields; you will get stuck. Pack all your gear across the field on the north side of the stockyard and cross the footbridge over Moore's Creek in the N. E. corner of the field. Follow the trail approximately 1/3 mile to the camping area. The trail is marked by wooden trail signs and also by white paint rings around trees along the trail. The campsite is a large grassy field just below the freeway. Camp anywhere in the field and utilize the field as you see fit. Be sure to keep your campsite clean, burn all your paper, and carry out your garbage; do not bury your trash. Clear your campfire areas well. Use dead wood from the surrounding woods. We prefer you not to cut any live wood unless special permission has been granted by the trail committee. Please be sure the water spigot is locked except when in actual use.

HIKING THE TRAIL

Your unit may begin hiking from either end -- either at Ash Lawn or at the campsite. It makes no difference, but be certain you have transportation to get you back to your campsite. This trail guide assumes you are hiking from the campsite to Ash Lawn. The trail should take about 4 hours of hiking plus about 45 minutes to an hour for each stop you may wish to make (Monticello, Michie Tavern, Ash Lawn).

CAMPSITE TO WOOLEN MILLS

Hike out of the campsite back to the trail, turn right toward the North paralleling Moore's Creek downstream. The trail takes you by some picturesque cuts in the stream bank. The trail through this section follows the buried water main for Monticello. You will pass an old pump house (do not disturb) and another footbridge

Trail Guide to Jefferson Historical Trail (page 2). Courtesy, Chris Gensic

drivers, yet the heart of these endeavors (Monticello and UVa) is split and separated.[1] The lack of connection limits who can access the benefits of these unique resources, whether it be locals without cars or visitors who arrived by train, for example. A World Heritage Site should be easily accessible to all who are near it.

The City's Downtown Mall is car-free and the Saunders-Monticello Trail, which opened in 2000, is an important recreational destination in its own right, yet one must drive from one to the other. Communities where people walk and bike regularly, like Charlottesville, tend to be healthier, yet this prime destination is cut off.[2] For instance, children can see Monticello from the windows of nearby Clark Elementary School but they cannot easily get there. All of these add up to a cascade of missed opportunities for a destination that was once just an afternoon's walk away.

One of the stakeholders brought an old pamphlet describing a Boy Scout trail from UVa to Highland (then called Ashlawn) via Monticello. Such a trek would be inadvisable for even an enterprising youth today. There is strong enthusiasm to make the situation right and this paper explores the feasibility of doing so.

Planning Environment

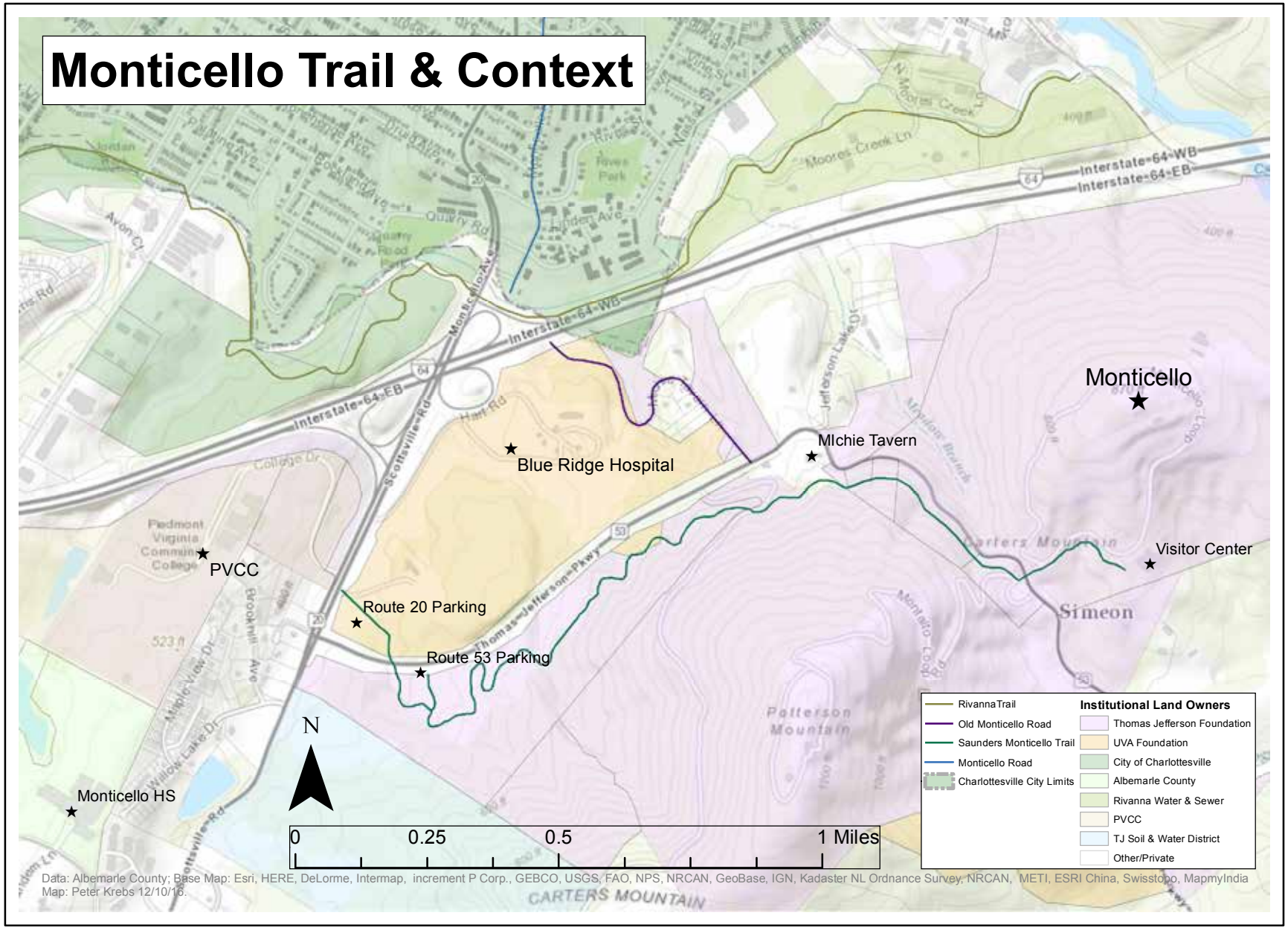
Although the zone between Charlottesville and the Saunders-Monticello Trail is narrow, it is jurisdictionally complicated. It is divided between two localities (Charlottesville city and Albemarle County) with Interstate 64 in between. There are multiple adjacent landowners, and they would like to solve the problem, but none of them can tackle it alone. A collaborative approach is required.

Both localities' Comprehensive Plans call for pedestrian and cyclist connectivity along multiple routes, several of which are close to the lost historic approaches. The Thomas Jefferson Planning District Commission (TJPDC), the local regional planning body, has sponsored several studies and is in the process of updating a decennial regional multi-modal planning process. National Bike Route 76 passes through the heart of the study area, and TJPDC gave the segment a "D" rating, calling it "highly stressful" and "unsuitable" in its 2015 study.[3]

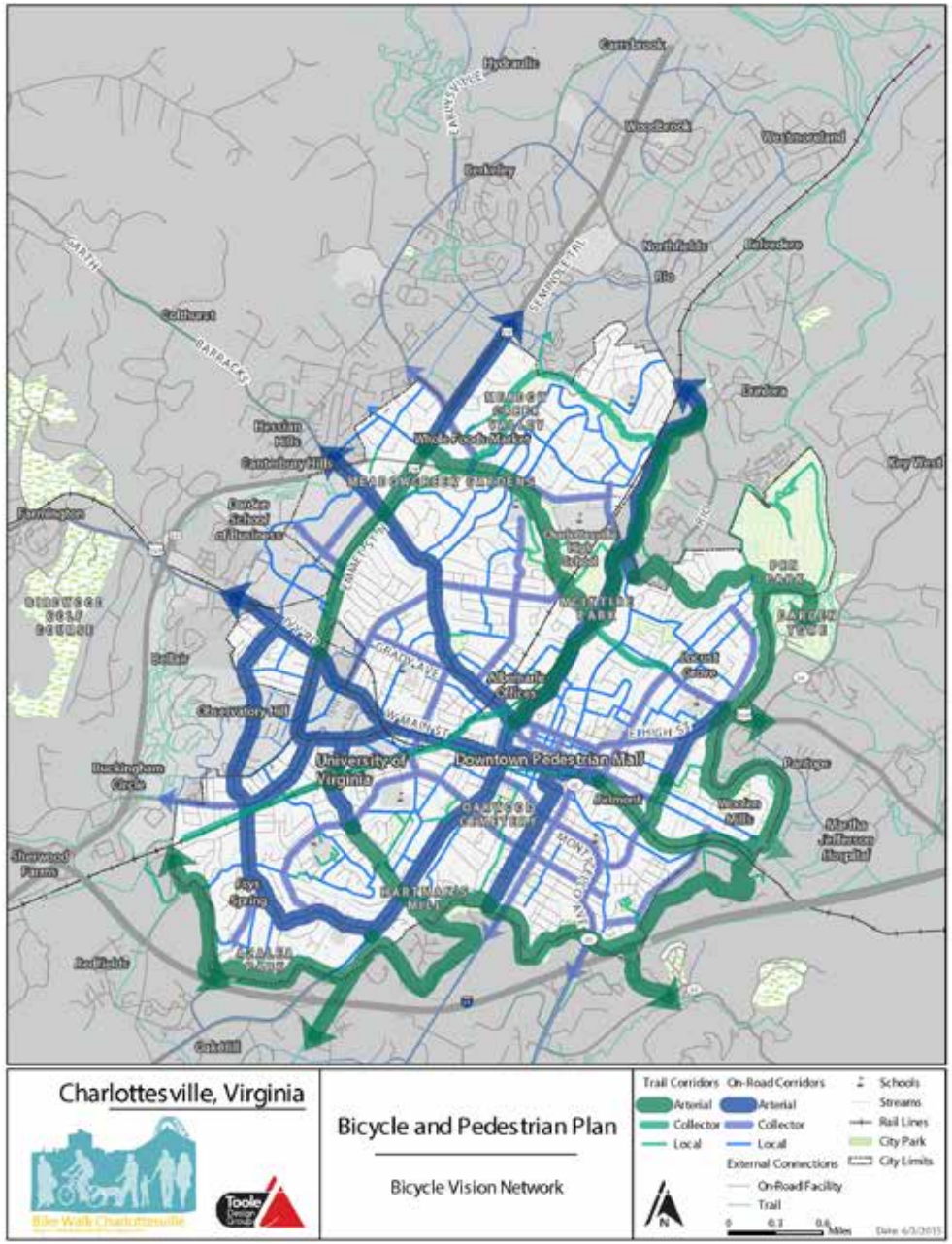
1 Healthcare is a third major industry and, fascinatingly, the study area happens to include a significant and historic hospital site (Blue Ridge), which is currently awaiting redevelopment. There is also a community college (Piedmont Virginia) with a nursing program.

2 For the health benefits of cycling, see for example Knapton (2017) or investigation IV of this report.

3 Thomas Jefferson Planning District Commission (2015), 71-79. See Krebs (2016) for full summary of related Planning documents. The major reports are listed in this document's bibliography.



Map from Pre-Assessment report showing land ownership in heart of the study area. Krebs (2016) 16.

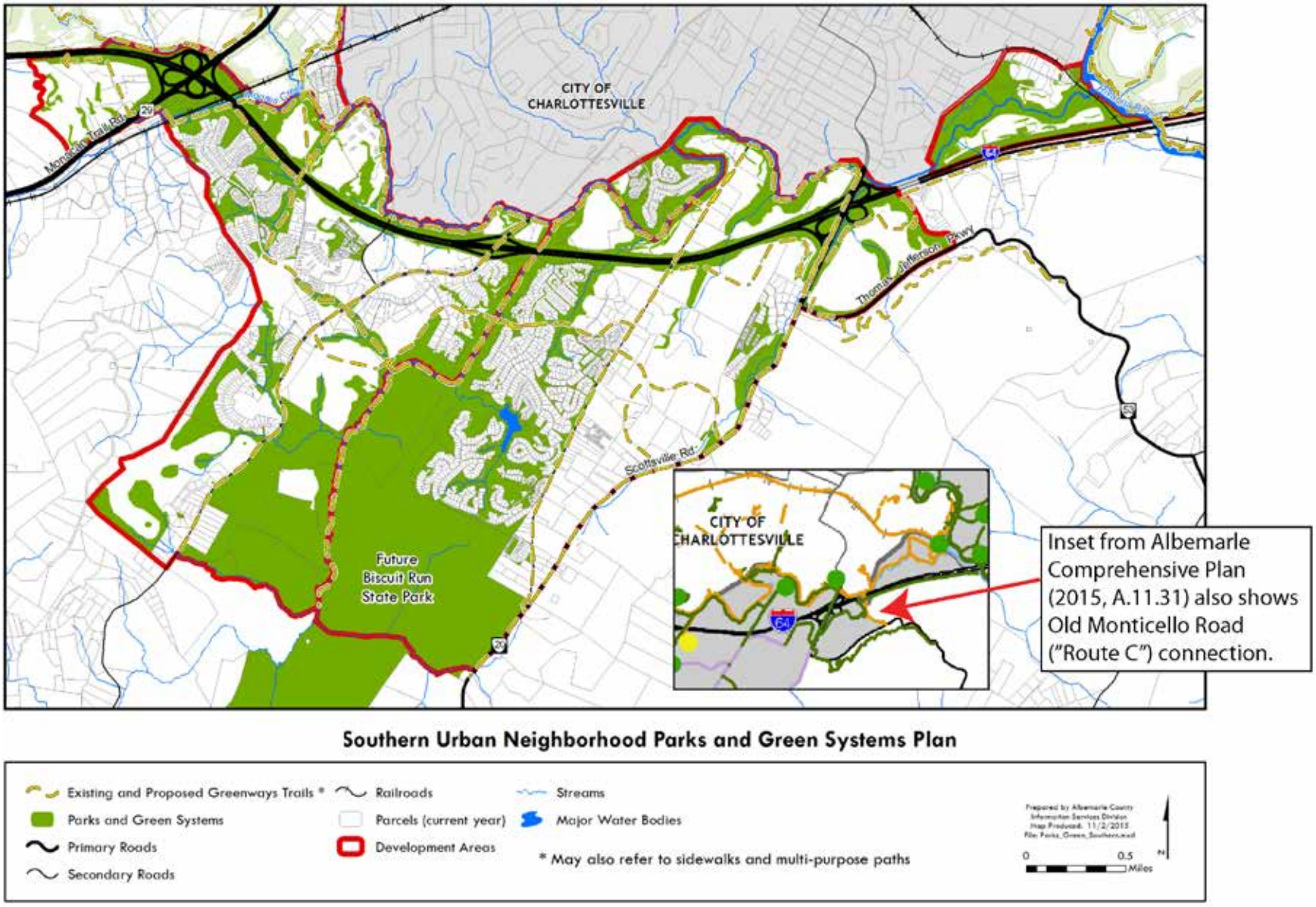


The Charlottesville Bicycle and Pedestrian Plan (2015) calls for connectivity via Old Monticello Road, Monticello Avenue, and Avon Street (Routes A, B, and C). The Woolen Mills corridor is outside of their jurisdiction.

Project Background

Peter Krebs, a member of the project team, conducted a pre-assessment study in 2016 that reviewed the literature as well as identified stakeholders, issues, and opportunities. The pre-assessment also examined whether the situation was ripe for a solution. Highlights include:

- The key stakeholders are motivated and empowered, with good, but informal, working relationships.
- Regional cooperation is not the norm but it is improving, and can be better with facilitation from TJPDC.
- The notion of reconnecting Monticello to the community is socially complicated, but the key actors are affirmatively energized.
- The landscape in question is stunningly beautiful but has environmental constraints.
- It is part of a continuum reaching from Monticello, through Charlottesville, to the University of Virginia, and beyond.
- This segment is at the core of a regional multimodal network with significant discontinuities. It is not only a question of connecting Charlottesville to Monticello but also the County neighborhoods to the City and to Monticello. There are significant opportunity sites in or near the zone, such as Piedmont Virginia Community College and the UVa Foundation's historic Blue Ridge Hospital site.
- There are nascent plans to extend connectivity in the other direction to James Monroe's Highland, Morven Farm, and beyond, which would open a vast cultural landscape for exploration, discovery, storytelling, relaxation, and tourism.



All of the routes in the study appear on Albemarle County' Comprehensive and Neighborhood Plans. Source: Albemarle County. (2015, Southern and Western Urban Neighborhoods Master Plan) S+W-23. Inset: Albemarle County (2015, Comprehensive Plan) A11-31.

- This would not be a typical recreational or commuter trail, though it would be those things, too. It is about connecting people with opportunity and unlocking heritage and human potential in multiple, transformational ways.
- The planning environment is indeed ripe for a collaborative solution.

The TJPDC agreed to sponsor this Practicum report to develop ideas identified in the pre-assessment and study the feasibility of a pedestrian and cyclist connector. Several of the stakeholders identified in the pre-assessment agreed to act as an advisory group for this project.[4]

Project Objectives

We met with the advisory group in January of 2017 and distilled a set of investigations that would support them in resolving the situation. We checked in with them periodically for direction and to refine our research, resulting in the report's four investigative sections, plus recommendations and a path forward.

1. Learn who uses the Saunders-Monticello Trail, how they use it, why they use it, and if there is demand for a connection to Charlottesville.
2. Examine four alternate corridors identified in the localities' Comprehensive Plans and provide a basis for comparison.
3. Study examples of other trail projects, identify lessons learned, and possible resources.
4. Explore implications for regional connectivity, economic and social impact, and educational programming.
5. Recommend a path forward.

4 See Acknowledgments and Interview Log.

Project Parameters & Assumptions

Based on feedback in the pre-assessment, the project had a few built-in assumptions that framed the investigation:

- Access to Monticello must be through the Saunders-Monticello Trail. Even though other routes might be historic or theoretically possible, Monticello is only prepared to receive visitors through the Saunders-Monticello Trail at the present time.
- A connector must be of a similar level of accessibility as the Saunders-Monticello Trail. It would not be acceptable to create an access trail that excludes some users. If possible, the experience should be similar to the Saunders-Monticello Trail. If not practical, it should be viewed as a guiding aspiration.
- Actual costs will be heavily contingent upon design, so the figures we cite will be broad estimates, based on best practices.[5]
- We assume that each route will require an extensive environmental assessment, but that is beyond the scope of this report.
- Good intentions do not guarantee positive results. Sound planning requires humility; we must actively challenge our own methods and communicate frequently with stakeholders and the public.

5 Trail Modeling and Assessment Platform: Trail Traffic Calculator https://www.railstotrails.org/our-work/research-and-information/trail-modeling-and-assessment-platform/trail-traffic-calculator/

Investigative Approach

We reviewed literature, with a particular focus on successful case studies of similar projects and reports from local planning agencies and US and Virginia Departments of Transportation. We learned that the state agency has significant resources to offer and that VDOT supports multimodal connections like this one as a matter of policy.[6]

We widened our circle to a larger group of stakeholders, including non-profit organizations conducting related work.[7] We reached out to the public with a web site, email blasts, and social media posts that were widely shared.[8] We attended community meetings, conducted a survey with online and in-person components, and studied the data both in aggregate and through text analysis. These diverse interactions provided clear insight into why the Saunders-Monticello Trail is so successful and what characteristics a connector ought to have.

We also used counting devices and Geographic Information Systems (GIS) to spatially analyze the four potential corridors in order to better understand each route's physical properties in addition to the surrounding populations and assets such as schools. Even though the routes are physically close to one another, we were able to detect some significant differences among them.

Screenshot of project web site http://cvilletomonticello.weebly.com

6 "Projects along existing and/or planned tourism, recreation corridors such as U.S. Bicycle Routes 1, 76 and 176 shall include bicycle and pedestrian accommodations." (Virginia Department of Transportation (2017), 2.

7 See Interview Log.

8 More than a thousand survey responses in 18 days.

I: Understanding the Saunders-Monticello Trail

The Saunders-Monticello Trail has lived up to its goal of being a gateway to Monticello. It already covers more than half the distance from the city and is arguably a more frequent destination for locals than the historic home. In fact, the Saunders-Monticello Trail is one of the region's most best-loved parks and its popularity has lessons for how to create a successful connector. It is therefore both a destination and a standard.

We approached the investigation from two angles: through a user survey and by analyzing data from counting devices.

Outreach event on the Saunders-Monticello Trail

Trail User Survey

Distribution

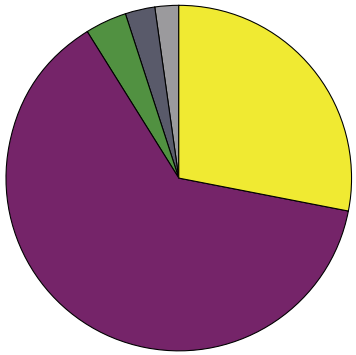
To conduct the Saunders-Monticello Trail User Survey, we used a combination of neighborhood meetings, outreach events on the Saunders-Monticello Trail, and email to reach potential respondents. In order to reach a broad audience, an electronic survey was available on the practicum team's website,[9] and a paper survey was available on location. The initial distribution of the paper survey occurred at the Belmont-Carlton and Fifth and Avon neighborhood meetings. [10] To gauge trail users on-site, two outreach events on the Saunders-Monticello Trail were held: Sunday, March 25th (10:00am - 2:00pm); and Wednesday, March 29th (3:00pm - 7:00pm). As a result of diverse outreach methods, 169 paper surveys and 841 electronic surveys were collected, for a total of 1,010 respondents. The survey was available from March 16th - April 2nd (18 days).

9 http://cvilletomonticello.weebly.com/
10 Both held on Wednesday, March 15, 2017.

General Profile of Survey Respondents

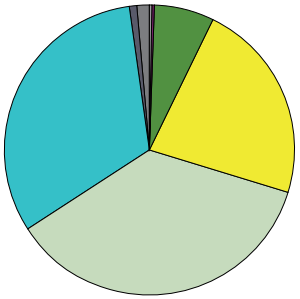
Most of the people we surveyed indicated that they live in Charlottesville city (63%) or Albemarle County (28%). The remaining people either lived in the surrounding counties (Fluvanna, Louisa, Green, or Nelson, 4%) or elsewhere (5%). Additionally, more than half of the respondents identified as "female" (58%), with 37% of those surveyed responding "male" and 5% preferred not to say. The age breakdown was as follows: 7% of the respondents were in the 19-25 age bracket, 23% were in the 26-35 age bracket, 36% were in the 36-50 age bracket, and 32% were in the 50-75 age bracket.

Where do you live?



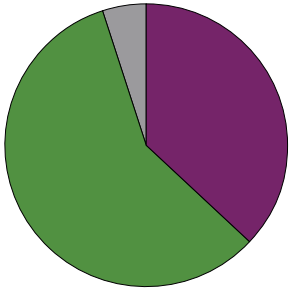
- 2% Outside of Virginia
- 3% Outside the 5-county area but in Virginia
- 4% Fluvanna, Louisa, Green, or Nelson Counties
- 63% Charlottesville City
- 28% Albemarle County

What is your age?



- 1% Prefer not to say
- 1% 76 +
- 32% 50-75
- 36% 36-50
- 23% 26-35
- 7% 19-25
- 0% 13-18
- 0% Less than 13

What is your gender?

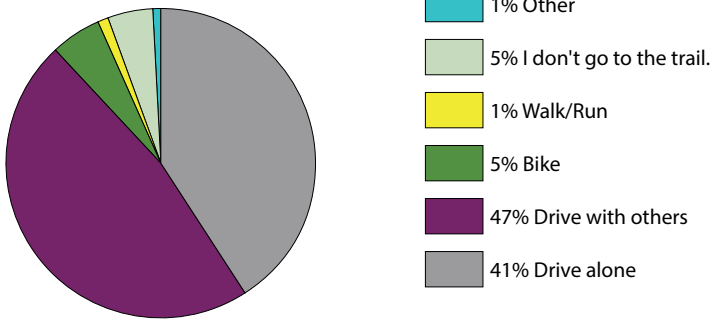


- 5% Prefer not to say
- 58% Female
- 37% Male

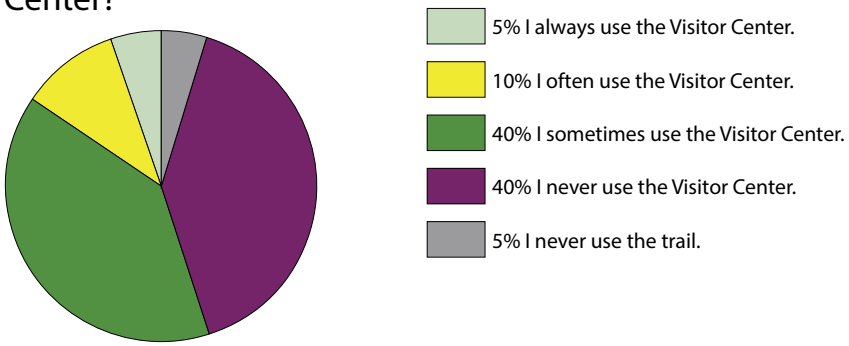
Current Trail Use

When asked how they get to the trail, 47% of respondents said they typically drive with others, 41% said they drive alone, 5% bike to the trail, and 1% run or walk. One respondent said Uber was how s/he arrived at the trail. When asked about the David M. Rubenstein Visitor Center, 40% said they never use the visitor center, and 40% said they sometimes use the Visitor Center. Respondents could check all of the user activities that applied, and the vast majority (over 80%) indicated that they walk on the trail, along with biking, running, walking dogs and bringing kids (each in the 20-30% range). Most respondents use the trail monthly (27%) or a few times a year (39%). Fewer use the trail weekly (14%) or several times a week (10%).

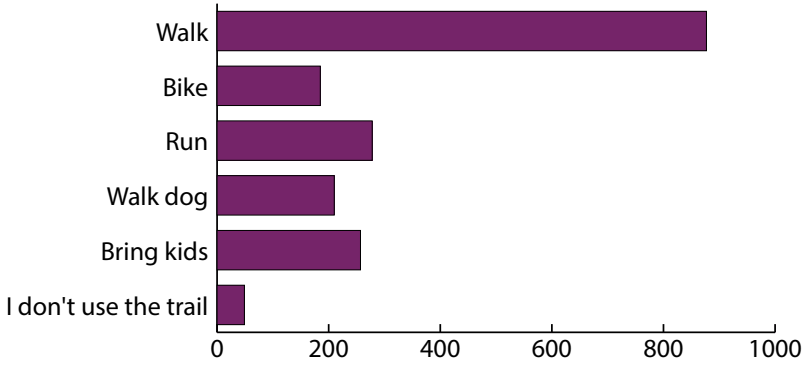
How do you typically get to the trail?



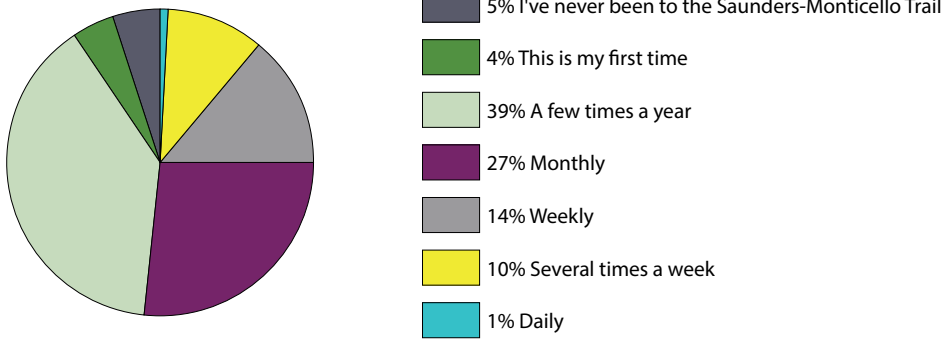
How often do you use the David M. Rubenstein Visitor Center?



How do you use the Saunders-Monticello Trail?



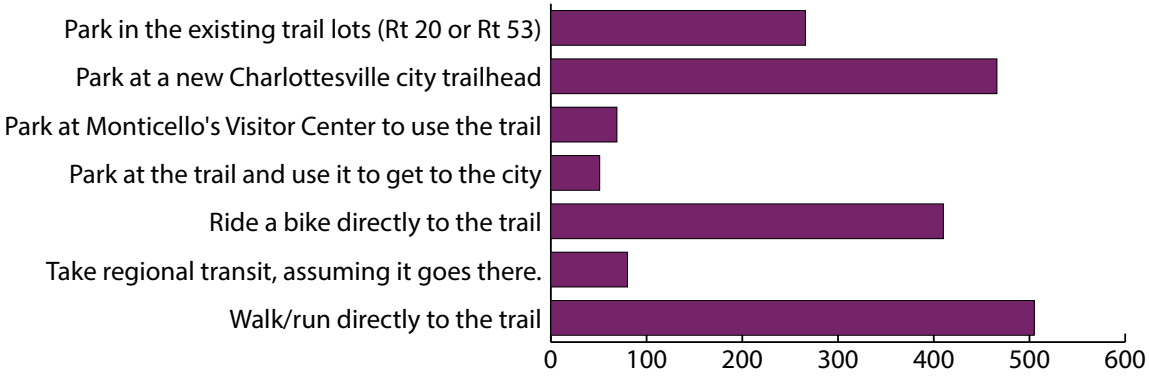
How often do you use the trail?



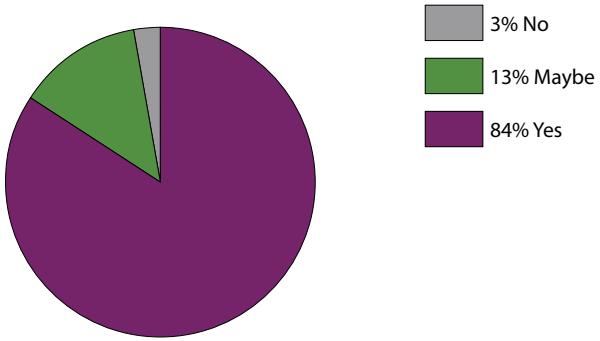
Demand for Proposed Extension

Overall, 84% of respondents said they would use the extension, and 76% would use the trail more frequently because of the extension. Only 3% said they would not use the extension, and 1% said they would use the trail less frequently because of the extension. Respondents were allowed to check multiple options for arriving at the trail. Half of respondents indicated that they would walk or run directly to the trail if given the opportunity, as well as 41% saying they would ride a bike directly to the trailhead, and 46% of respondents indicating that they would park at the new Charlottesville trailhead to access the trail.

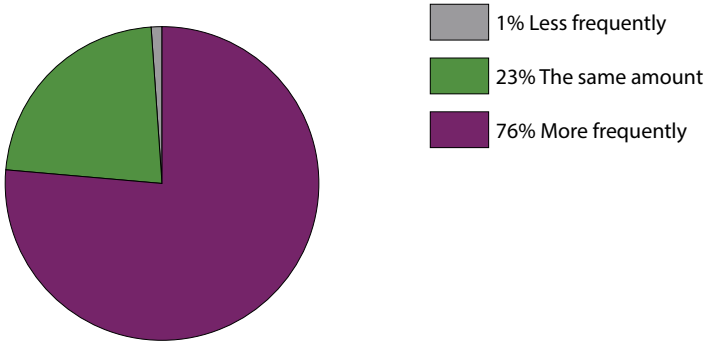
How would you get to the Saunders-Monticello Trail, with the new extension?



Would you use an extension of the Saunders-Monticello Trail?



How frequently would you use the extension?



What Users Like Best About the Trail

Out of the 1,010 survey responses, there were 681 comments of various length. We divided the terms into categories, among which a few key themes emerged.[11] They are summarized in the chart on the following page.

Design and Upkeep

The gentle, sloping boardwalks are wildly popular. Users like that the design moderates the challenge of climbing a mountain and makes the trails accessible to people of all abilities. They like that they are wide enough to be social, that there are also more rugged options, there is educational signage along the way, and they are long enough to merit a trip. The meticulous maintenance is a significant contributor to the sense of welcome.

Nature

Simply put, visitors love the park's natural beauty.

Proximity to Where they Live and Work

Exposure to beautiful nature in a way that is highly welcoming and close to home completes the basic explanation of the park's success.

No Cars, No Fear, No Stress

The Saunders-Monticello Trail is a stress-free environment. Some users talked about safety from cars, others about safety from crime. Most users just used the word "safe" without specific context. They also see the park as a place to get away from daily life. It would be interesting to follow up with research to know how much (and what kind of) contact with humanity is enough for perception of safety from crime. It is clear, however, that park users value the absence of cars, which is interesting given that the trail was built as part of a parkway project.

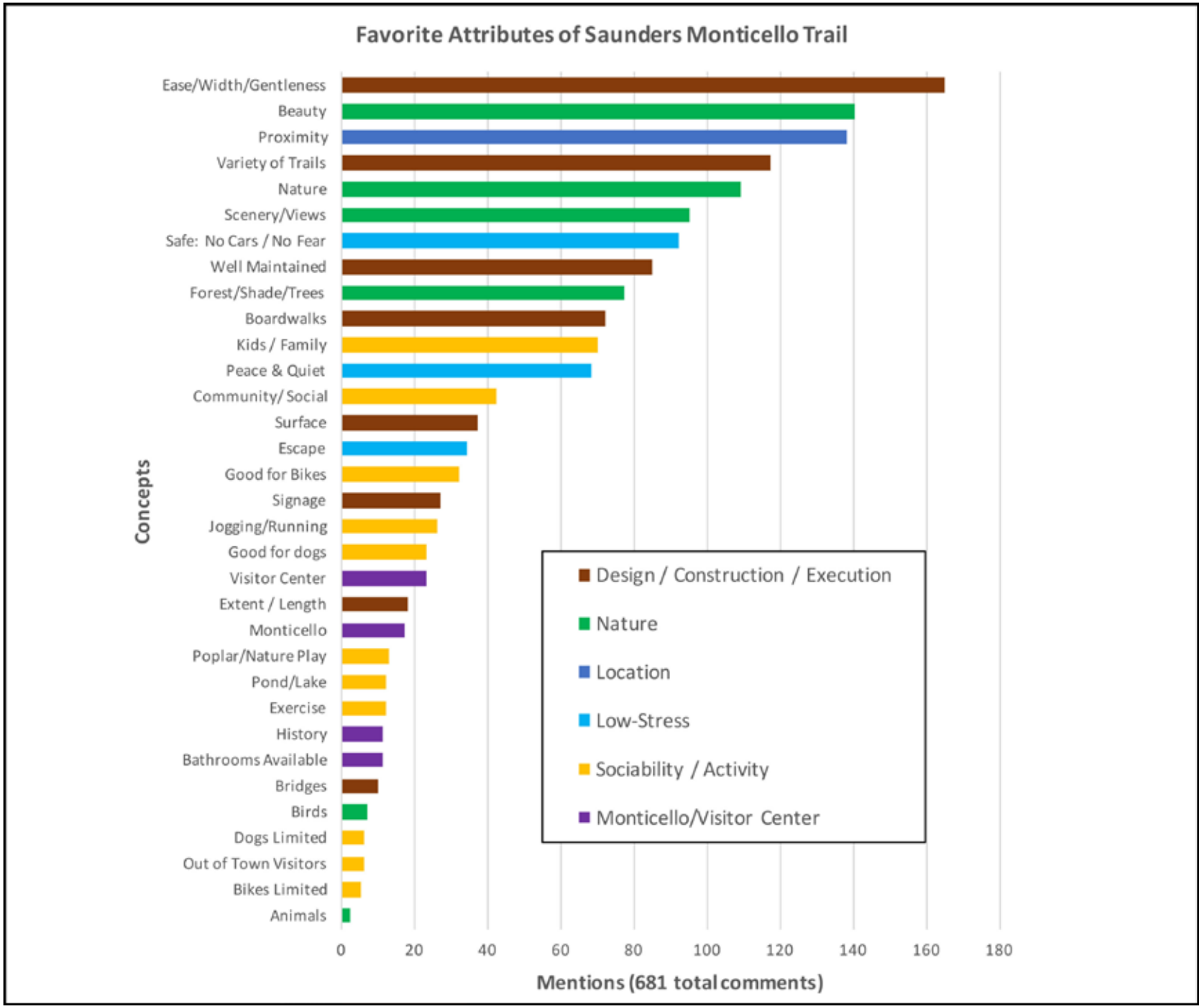
Kids, Families, Community and Activities

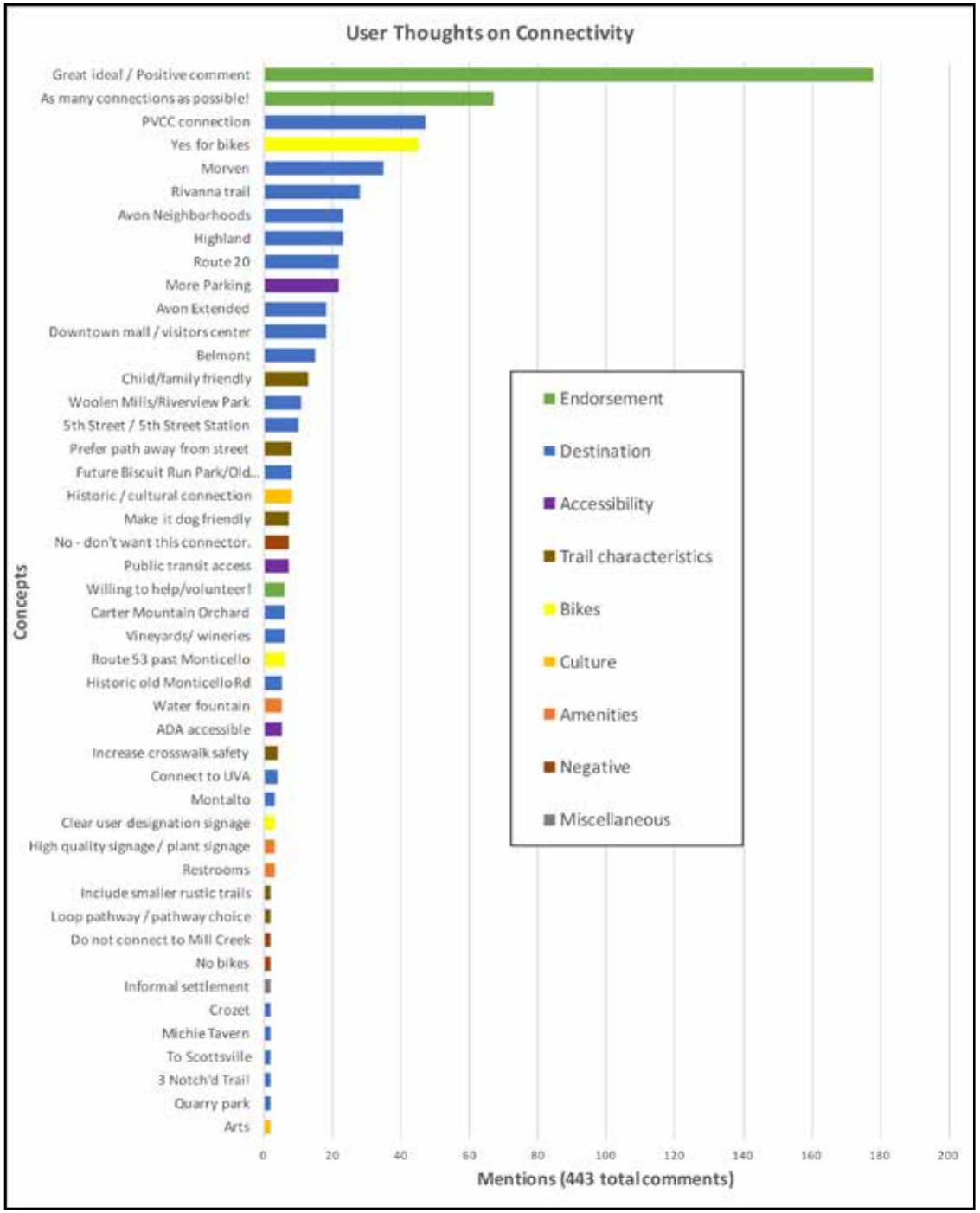
Even though the trail is a place of natural escape, users still value the social connections that happen there, whether they go with friends or run into acquaintances. The park is designed in such a way to promote positive interaction as well as harmony between active and contemplative uses and that is how it functions.

Amenities at the David M. Rubenstein Visitor Center and Monticello

It appears that most Saunders-Monticello Trail users visit the park as a destination independent of Monticello. A small number did indicate appreciation for the connection to the World Heritage Site and the Visitor Center as a destination and amenity for the trail.

11 This is far more time consuming than an automated word cloud, but it is far more sophisticated, allowing the grouping of terms that are linguistically unrelated but conceptually tied within this specific context. For example, you can only see the preponderance of ideas like "easy grade," "accessibility" and "gentle," which all point to the same phenomenon by actually reading the text.


Favorite Attributes of Saunders Monticello Trail
Ease/Width/Gentleness
Beauty
Proximity
Variety of Trails
Nature
Scenery/Views
Safe: No Cars / No Fear
Well Maintained
Forest/Shade/Trees
Boardwalks
Kids / Family
Peace & Quiet
Community/ Social
Surface
Escape
Good for Bikes
Signage
Jogging/Running
Good for dogs
Visitor Center
Extent / Length
Monticello
Poplar/Nature Play
Pond/Lake
Exercise
History
Bathrooms Available
Bridges
Birds
Dogs Limited
Out of Town Visitors
Bikes Limited
Animals
Concepts
0
20
40
60
80
100
120
140
160
180
Mentions (681 total comments)
Design / Construction / Execution
Nature
Location
Low-Stress
Sociability / Activity
Monticello/Visitor Center



User Thoughts on Connectivity

Out of the 1,010 survey responses, there were 443 comments in response to the open-ended question "Do you have any other comments about connecting the trail to Charlottesville and/or other destinations (e.g. Morven Farm, Highland, Mill Creek, PVCC)?" The chart on the left illustrates the relative themes that emerged. All topics with two or greater mentions are included.

Endorsements

Among the responses, the most mentioned by far was a positive response expressing support and excitement for the trail.

Destinations

Respondents mentioned Piedmont Virginia Community College more than any other destination, but quickly followed by many of the major destinations explored in the study: Morven Farm, the Rivanna Trail, James Monroe's Highland, Route 20, Belmont and the Charlottesville downtown area, and Avon extended and its associated neighborhoods (including Mill Creek). Several other respondents considered the broader regional connection possibilities, including the 3 Notch'd Trail, Scottsville, and Crozet.

Bikes and Accessibility

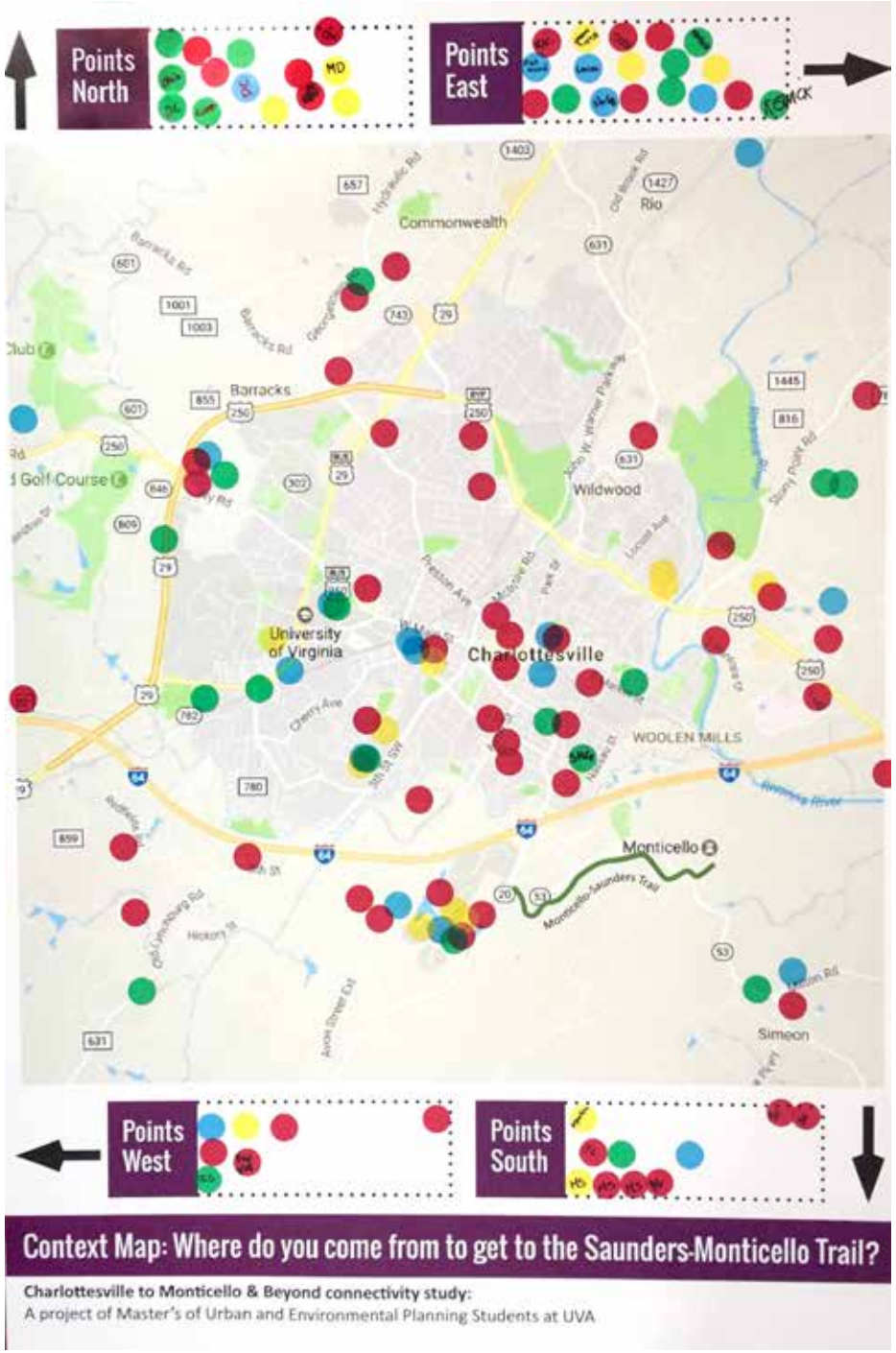
A significant number of respondents mentioned desire for bike access through the connection. Some respondents hoped for facilities if the trail is expanded and connected into a wider network, particularly parking. Regarding accessibility, several respondents mentioned a desire to continue bringing their family to the trail, others mentioned a desire to bring dogs,

to connect the trail to transit, and for the trail to be ADA accessible and friendly for senior users. Of particular note about the transit access, several respondents mentioned a desire for a shuttle bus that would connect the end of the trail to key destinations within Charlottesville, including PVCC, UVA, and the Downtown Mall.

Trail Characteristics and Amenities

Several respondents mentioned a desire to highlight and maximize historic and cultural connections through the trail network expansion. Some respondents mentioned key physical aspects of the trail, including a preference for a pathway that is not directly adjacent to the street, and a desire to increase crosswalk safety.

A few respondents reacted negatively to the premise of the study: either they did not desire a trail, did not desire a trail to connect to their neighborhood, or did not desire bikes to be allowed to use the trail. Two respondents expressed concern and recommended thoughtful consideration about the people who have set up camps beneath and near the I-64 and Route 20 bridges.



Dot Map exercise employed during two on-site outreach events. Most trail users come from Charlottesville, those who do not either come from Albemarle's urban areas or from out of the area entirely (indicated by writing on the dots).

Survey Implications for a Connector Trail

The overwhelming response to the survey indicates very high demand for a connector.

A large percentage of users are from Charlottesville, the others from urban parts of Albemarle, or from out of state.[12] All of these users would benefit from a connection, and the majority have stated they would use it. Many would leave their cars at home, improving community fitness and reducing stress in the parking lot.

Users are interested in a widely connective network that is both kid- and bike-friendly.[13] Accessibility by public transportation and for the elderly and disabled is important. Destinations near all of the corridors are mentioned, with enthusiasm roughly proportional to proximity. There is strong support for an extension to Highland and Morven, which is not one of the routes studied in this report, but is being addressed independently by Highland and Morven.

Amenities like bathrooms, water fountains, and quality signage are desirable. A fractional minority oppose the trail for fear that more users will spoil the Saunders-Monticello Trail experience, but far more indicated they expect an enlarged network would spread users and reduce crowding.

In order for the trail to be well integrated with the Saunders-Monticello Trail it will need to exhibit the following qualities:

- Users should be fully separated from automobiles.
- It should be wide enough to comfortably accommodate cyclists and groups of pedestrians.
- Inclines should be as gentle as possible.
- It should feel safe for women and the elderly.
- There should be natural scenery.
- There needs to be a sustainable maintenance plan.
- If cyclists and pedestrians use the same corridor, it needs to be well-managed either through signage, clear rules, or separate facilities.
- Clear directional and even some interpretive signage would be welcome.

12 The survey indicates 63% of trail users are from Charlottesville. While not a perfect measure it is strongly indicative.

13 It is worth considering how people on bicycles and people on foot can best share the trail and its network connections.

Current Trail Usage and Capacity Analysis

Overview

One way to measure the impact of the Saunders-Monticello Trail is to measure how many people use it. These data, in combination with usership data on surrounding road and trail networks, provides a baseline understanding for the number of people who might utilize a trail extension. It also can serve as a metric for understanding current trail conditions and potential capacity issues. To this end, this section identifies current estimated trail usage, identifies the current level of service (LOS), and explores the limited data that are available for bicycle and pedestrian use on the surrounding multimodal network.

Estimating annual number of Saunders-Monticello Trail users

The Thomas Jefferson Foundation publicizes that "nearly 140,000 annual walkers, runners, cyclists and birdwatchers" use the Saunders-Monticello Trail.[14] In working with the Thomas Jefferson Foundation staff, stakeholders, and technical advisors, we determined that an updated annual estimate of Saunders-Monticello Trail users would be useful.

In late 2016, the Thomas Jefferson Foundation installed several infrared trail counters to begin capturing the number of trail users. However, without a full year of data, it was necessary to estimate annual trail usage based on just several months of data. To accomplish this task, the Trail Modeling and Assessment Platform (T-MAP), developed by the Rails-to-Trail Foundation, was identified as a preferred method.[15] This tool, based on seasonal expansion methods identified in the Federal Highways Administration (FHA) Traffic Monitoring Guide, expands limited datasets to an annual estimate using factors developed from a major nationwide study of urban and suburban mixed-use trails.

The practicum team obtained data collected from January 1, 2017 through March 31, 2017, from the foundation's TRAFx trail counters. These devices were positioned at the three main entrances to the Saunders-Monticello Trail. The counters were placed by Foundation staff with the intent of capturing most trail users entering from the two lower parking area. Although some users park at the David M. Rubenstein Visitor Center and hike down the trail, a decision was made to not use trail count data from the top of the trail, as these users could not be separated from users who made a complete round-trip from the bottom.

Based on this analysis, we estimate that 152,161 people use the trail each year. This results in an estimate of 416 average annual daily trail users.

Peak Usership

In addition to annual usership, looking at trail use per hour can provide insight into capacity issues. To better understand peak usage, the table on the next page illustrates the five most used hours of the trail during the first three months of 2017, as measured by the same counters used to estimate annual trail usage.

Trail Level of Service (LOS)

In addition to peak hours, another method of understanding the stress experienced by users on a trail is a level of service (LOS) metric. The Federal Highways Administration report titled "Shared-Use Path

14 The Thomas Jefferson Foundation: Support The Trail https://www.monticello.org/site/give/support-trail

15 Trail Modeling and Assessment Platform: Trail Traffic Calculator Trail Traffic Calculator https://www.railstotrails.org/our-work/research-and-information/trail-modeling-and-assessment-platform/trail-traffic-calculator/

Peak Trail Usage Hours

As measured from 1/1/17 to 3/31/17

Date	Time	Total Count	**Estimated Users** (total count divided by 2)
2017-02-19 (Sunday)	11am-noon	327	164
2017-02-12 (Sunday)	1pm-2pm	313	157
2017-02-19 (Sunday)	Noon-1pm	286	143
2017-02-19 (Sunday)	10am-11am	267	134
2017-02-12 (Sunday)	Noon-1pm	266	133

Condensed Trail Level of Service (LOS) Definitions as Defined in the FHA Shared-Use Path Level of Service Calculator Guidebook

LOS A	**Excellent.** Trail has optimum conditions for individual bicyclists and retains ample space to absorb more users of all modes, while providing a high-quality user experience.
LOS B	**Good.** Trail has good bicycling conditions, and retains significant room to absorb more users, while maintaining an ability to provide a high-quality user experience.
LOS C	**Fair.** Trail has at least minimum width to meet current demand and to provide basic service to bicyclists.
LOS D	**Poor.** Trail is nearing its functional capacity given its width, volume, and mode split. Peak period travel speeds are likely to be reduced by levels of crowding.
LOS E	**Very Poor.** Given trail width, volume, and user mix, the trail has reached its functional capacity.
LOS F	**Failing.** Trail significantly diminishes the experience for at least one, and most likely for all user groups.

Level of Service Calculator" describes one method for identifying LOS on a mixed-use trail.[16] Published in 2006, the guidebook is intended for use on paved, off-road mixed-use trails of varying widths. Despite this, in consultation with our technical advisers it was determined that this LOS metric still provides some insight.

In order to identify the design and actual trail width, we turned to the "Conceptual Plan for the Thomas Jefferson Parkway," prepared by Rieley & Associates. According to the plan, the Saunders-Monticello Trail was to be a width "of 10 feet to accommodate both bicyclists and pedestrians. They will be graded to accommodate a 12-foot surface so that they could be expanded to that width in the future should that become desirable."[17] Based on physical measurements taken in April 2017, the trail ranges from 10-11 feet in width, likely due to natural spreading. Using the data collected on the trail from counters, the trail width, and the FHA guide,[18] we estimated the LOS provided on the Saunders-Monticello Trail.

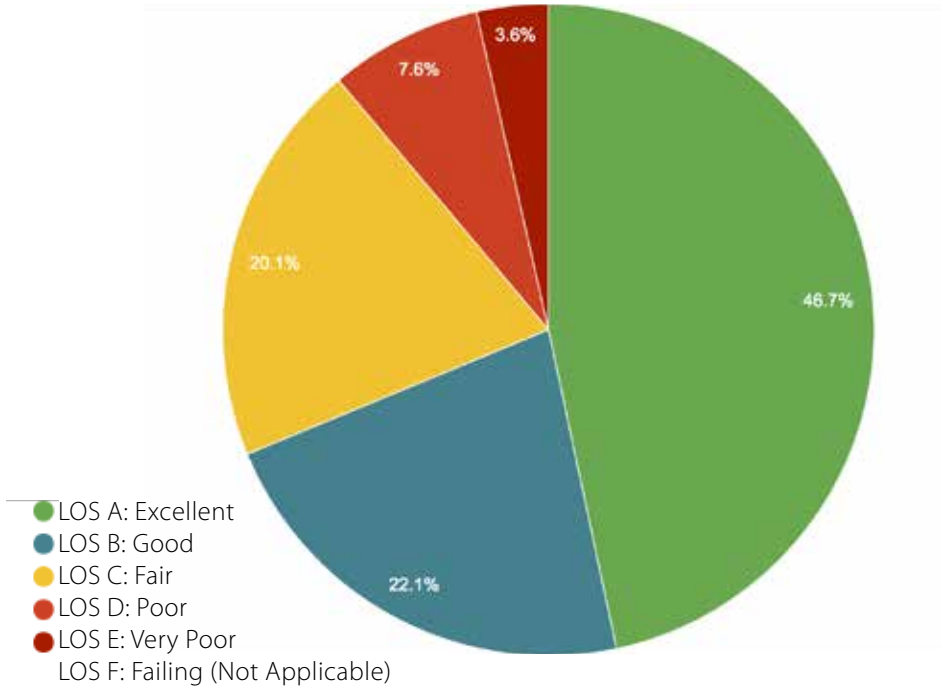
16 Shared-Use Path Level of Service Calculator: A User's Guide https://www.fhwa.dot.gov/publications/research/safety/pedbike/05138/05138.pdf

17 From the Thomas Jefferson Parkway Archival Collection [No. 50], courtesy The Thomas Jefferson Foundation, Inc.

18 The "high pedestrian mode split" table was used to better align with observed trail use. See "Shared Use Path Level of Service (LOS) Lookup Table" in the Appendix for the table and associated assumptions.

Distribution of Hourly Level of Service (LOS) on Saunders-Monticello Trail

Data from 1/1/2017 to 3/31/201 during hours with at least one counted trail user represented. LOS based on 10' trail width.



Strava User Heatmap

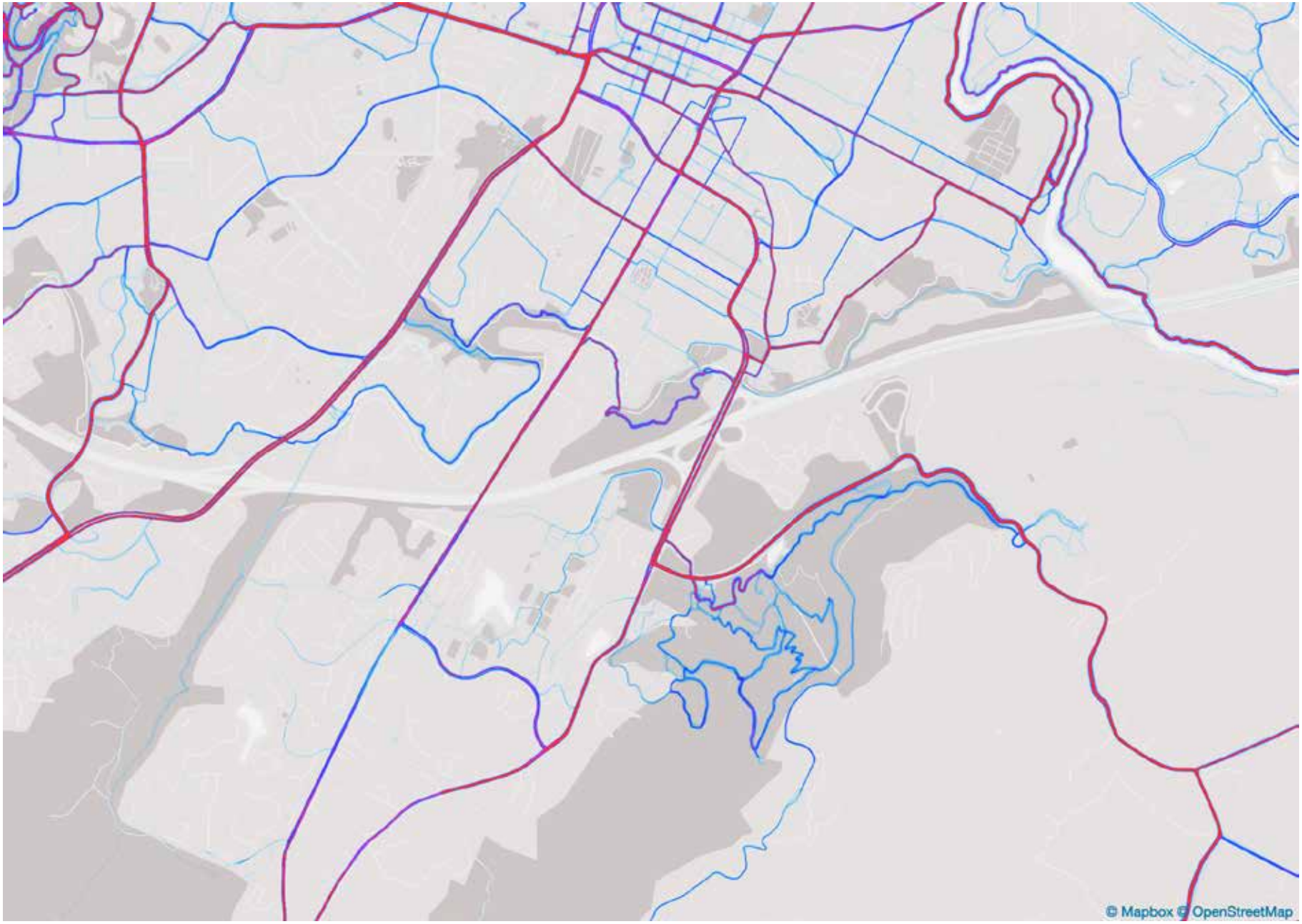
VDOT, Albemarle County, the City of Charlottesville, and TJPDC do not collect data on the number of pedestrians or cyclists who travel through the study area.[19] Due to this data limitation, we identified Strava—an app that enables users to track and share their outdoors activities—as a useful metric. Strava publishes aggregate user data in the form of heat maps that illustrate relative use on road and off-road networks. The graphic on the next page represents relative 2015 Strava usage in the study area. It is important to consider that Strava users tend to be performance-oriented individuals. Therefore, this map is only representative of certain type of trail user. A key takeaway is that Avon Street, Monticello Road, and Thomas Jefferson Parkway all serve as significant active transportation corridors in the study area.

User Count Implications for the Connector Trail

Trail usership is almost certain to increase if the connector is built. This will mean increased wear and tear on the existing trail. A potential to the originally-envisioned twelve foot width could become necessary.[20] As illustrated in the LOS lookup table in the Appendix, even a 2-foot expansion could significantly improve capacity. At the same time, a larger network will spread usership throughout and could actually reduce crowding.[21] Adding new entry points will further spread usership and reduce bottlenecks. A majority of survey respondents indicated that they would park elsewhere or leave their car at home if the connection is built. Therefore, a connection would reduce demand for parking at the Saunders-Monticello Trail's existing lots, which are now at times overcrowded.

The Strava data indicate that there are cyclists on Route 20 who

19 Strava global Heatmap
http://labs.strava.com/heatmap/#13/-78.48238/38.01638/blue/bike
20 From the Thomas Jefferson Parkway Archival Collection [No. 50], courtesy The Thomas Jefferson Foundation, Inc.
21 Consider Route B, for example, which is the shortest one. It's half-mile would lengthen the trail experience by 25%, essentially absorbing a usership increase of the same amount.



2015 Strava Heatmap of Study Area. Red indicates heavy relative levels of use. Light blue indicates lower relative levels of use. Source: http://labs.strava.com/heatmap/

would be likely to use a protected facility. Many of them continue past Highland, which corroborates requests for that extension expressed in the survey. We suspect that the connector could increase the percentage of cyclists in the user mix because the bicycle is a faster and easier way to cover intervening distance.[22] Because of that consideration, and because a few survey respondents expressed trepidation about how bicyclists and pedestrians would coexist, we think the mix of uses warrants attention. Some case studies offer examples of how these uses have been successfully combined in similar circumstances. Wider, multi-surface trails, painted lines and markings on paved trail surfaces, and clear signage are some means of promoting positive mixed uses. However, the Strava map also shows that performance cyclists are already in the area--and they are using Route 53 more than the Saunders-Monticello Trail.

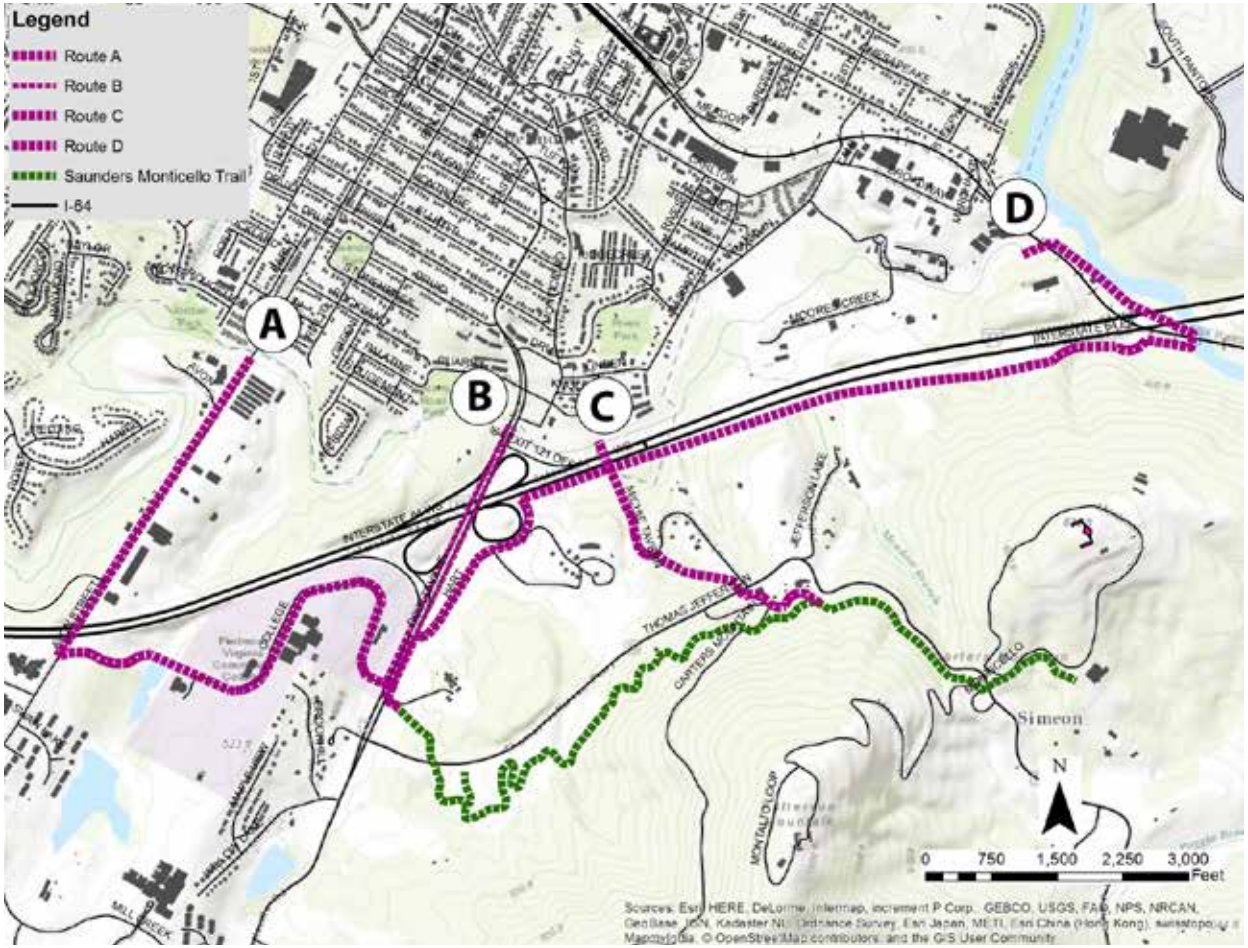
Increased usership in general, and more cyclists in particular will mean more customers at Monticello's David M. Rubenstein Visitor Center, which could be viewed as a burden or an opportunity depending on one's perspective. Newly-connected businesses, institutions like PVCC, and facilities will also absorb visitorship, and we recommend that the new trailheads offer restroom facilities of some kind.[23] We do not therefore foresee any automatically negative impacts on the Visitor Center.

22 The survey indicates rough parity between people who would ride to the trail versus those who would walk/run.

23 Keep in mind that one of the project's basic parameters is that it must be highly accessible and welcoming. Restrooms are part of that, especially for the elderly and parents of small children.

II: Corridor Connections

The practicum team and its advisors studied four corridors to connect Charlottesville to the Saunders-Monticello Trail based on City and County Comprehensive Plans, which are closely aligned on this subject.[24] Although it is possible to get from source to destination using other routes, such as stream valleys, our analysis had to be finite and build upon our stakeholders' previous consensus-building work. Our work focuses mainly on transportation corridors, while acknowledging that a truly comprehensive outcome will probably make other, more recreational connections, too.



The four routes explored in this planning study.

24 All four routes appear in both Albemarle County's 2015 Comprehensive Plan (appendix 11.31) and Charlottesville's 2015 Bicycle and Pedestrian Master Plan Update (p. 33).

Route A: Avon Street Corridor via PVCC

Route A: Avon Street Corridor via PVCC

Overview

Route A follows the Avon Street corridor, crosses Interstate 64 on a proposed pedestrian bridge, passes through the woods and campus of Piedmont Virginia Community College, and crosses VA-20 at a redesigned intersection at College Drive.

Overall Advantages

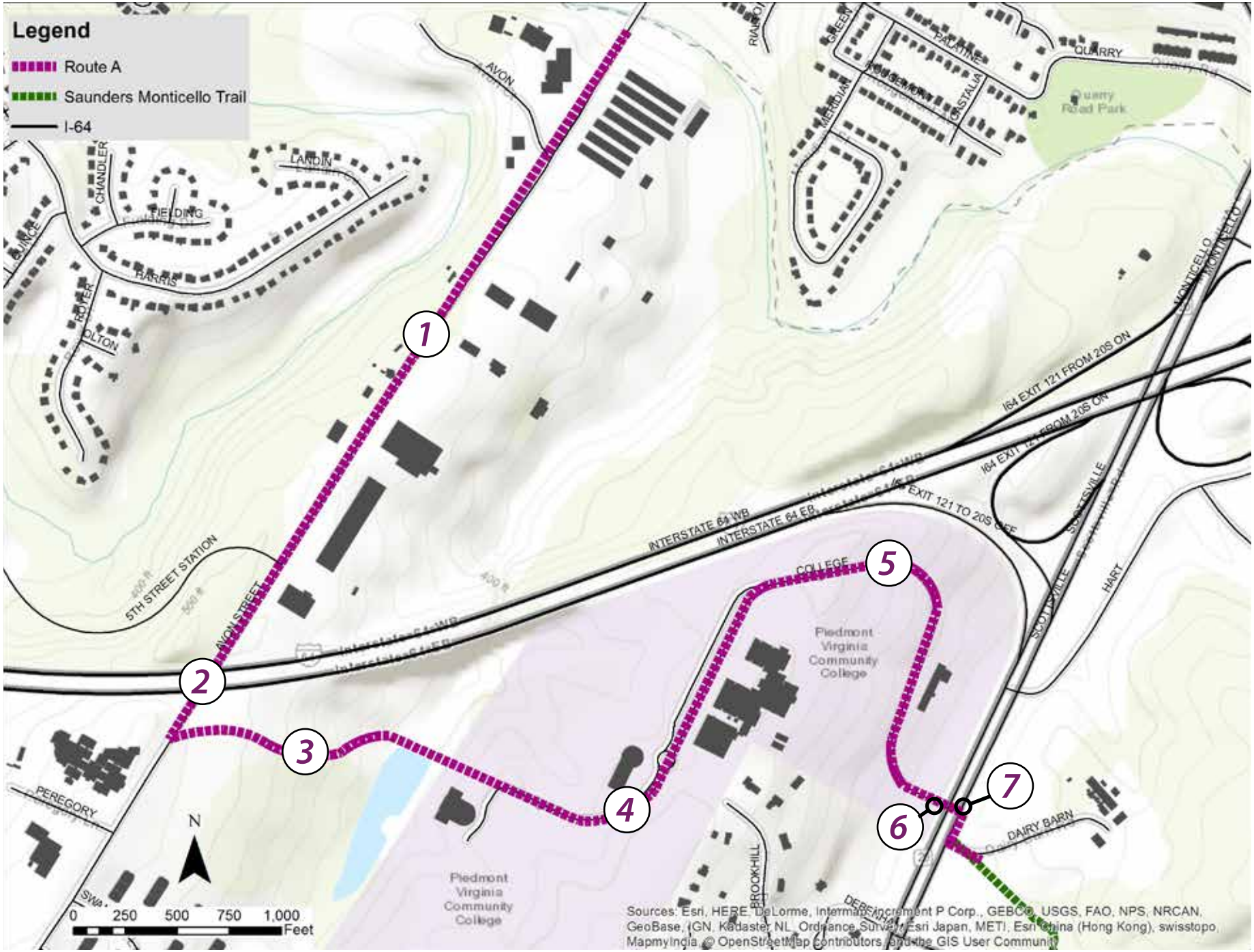
- Access to PVCC
- Connection to low-income Charlottesville city neighborhoods and Albemarle County's Southern Neighborhood Area
- Possibility to add parking

Overall Disadvantages

- Much of Avon Corridor is not ready for multi-modal access
- Crossing Interstate 64
- Crossing VA-20
- Steep hills along Avon Street and College Drive
- Relatively long distance

Detailed Description

Segment Number	Description	Advantages	Disadvantages
1	Add Bike/Ped facilities along Avon Extended	In County Master Plan	Terrain not friendly; Steep hill
2	Pedestrian bridge over Interstate 64	Connects City to Southern Neighborhood area.	
3	Traverse PVCC land along upgraded trails	Beautiful wooded setting; Trails almost ready to use	Large hill
4	Traverse PVCC Campus	Campus, cafe, bathrooms, parking	Need to coordinate with PVCC
5	College Drive	Connects two parts of campus	Steep grade down to VA-20 from PVCC
6	Cross Creek at College Drive		Footbridge needed
7	Crosswalk at College Drive/Pedestrian Bridge	Vastly increases parking for Saunders-Monticello Trail if establish agreement with PVCC	Speed of approaching traffic


Legend
Route A
Saunders Monticello Trail
I-64
1
2
3
4
5
6
7
AVON STREET
5TH STREET STATION
INTERSTATE 64 WB
INTERSTATE 64 EB
I64 EXIT 121 FROM 20S ON
EXIT 121 TO 20S OFF
COLLEGE
Piedmont Virginia Community College
PEREGORY
BROOKHILL
DAIRY BARN
HART
MONTICELLO
SCOTTSVILLE
QUARRY
Quarry Road Park
N
0 250 500 750 1,000 Feet
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Cost Estimate

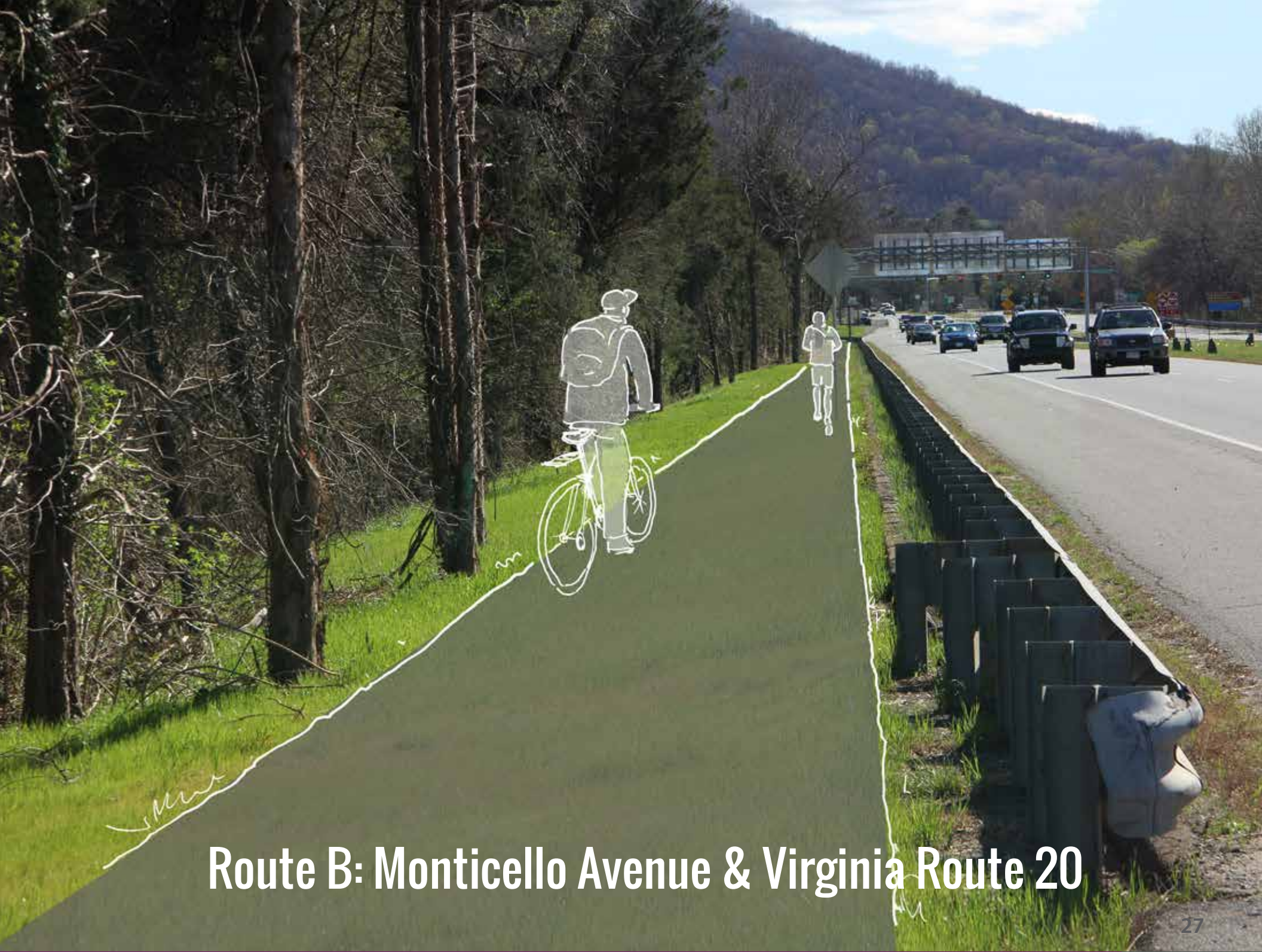
Segment Number	Description	Approximate Distance (ft)	Estimated Cost	Unit cost (per foot)	Cost Assumptions and Source
1	Add Bike/Ped facilities along Avon Extended	3,630	$671,514	$184.99	10 ft. paved, shared use path, off road. See Note A below.
2	Pedestrian bridge across I-64	250	$1,800,000	N/A	Based on "I-81 Pedestrian Bridge Planning Study." See Note B below for source.
3	Traverse PVCC land along upgraded trails	5,617	$1,039,089	$184.99	10 ft. paved, share use path, off road. See Note A below for source.
4	Traverse PVCC Campus				
5	College Drive				Wooden bridge, median figure. From "Costs for Pedestrian and Bicyclist Infrastructure Improvements," table 16, page 43. See Note C below.
6	Cross Creek at College Drive	55	$122,610	N/A	
7	Signalization for bikes/ peds at College Drive	92	$12,800	$12,800	Average cost for bicycle signals, page 27 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See Note C below.
	High Visibility Crosswalk		$3,070		Crosswalk High Visibility Crosswalk. Table 19, page 24 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See Note C below.
8	Path linking to Parking Lot	334	$61,787	184.99	10 ft. paved, share use path, off road. See Note A below for source.
Total			**$3,710,869**		

Note A: 10 ft. paved, share use path, off road. Estimate is median of high and low range from "Costs for Pedestrian and Bicyclist Infrastructure Improvements" final database (bit.ly/pedbikecosts). Virginia Transportation and Mobility Planning Division estimate used.

Note B: The 2016 "I-81 Pedestrian Bridge Planning Study," which explores the cost of a bicycle/pedestrian bridge crossing I-81 in Broome County, NY, estimated the cost between of the bridge to be $1.6 and $2 million, depending on the difficulty of the alignment. https://www.dot.ny.gov/content/delivery/region9/projects/950112-Home/950112-Repository/PIN_950112_Planning_Study_Final_12012016.pdf

"Costs for Pedestrian and Bicyclist Infrastructure Improvements" notes that "Overpasses (excluding bridges) have a range from $150 to $250 per square foot or $1,073,000 to $5,366,000 per complete installation, depending on site conditions"

Note C: "Costs for Pedestrian and Bicyclist Infrastructure Improvements," http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf



Route B: Monticello Avenue & Virginia Route 20

Route B: Monticello Avenue & VA-20

Overview

Route B begins on Monticello Avenue at the Charlottesville border and follows Monticello Avenue/VA-20 south past the Interstate 64 cloverleaf to the entrance to the Saunders-Monticello Trail. The most ideal expression of this route includes facilities on both sides of the road.

Overall Advantages

- Gentlest topography
- Links to PVCC
- Potential to add parking
- Designated Bike Route 76

Overall Disadvantages

- Adjacent to a busy road (VA-20)
- Requires reconfiguration of I-64 interchange and crossings[25]

Detailed Description

Segment Number	Description	Advantages	Disadvantages
1	Complete sidewalks on Monticello Ave	Already underway by the City of Charlottesville	Controlled crossing may be needed at Quarry Road.
2	Redesign interchange to accommodate bicycles and pedestrians	Could be bundled into larger VDOT request	Expensive, but can be part of larger road project
3	Multimodal path along VA-20	Flat; wide right-of-way already exists. Opportunity to connect to PVCC	Adjacent to high speed traffic

25 Resource for interchange redesign: Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges, An ITE Recommended Practice. Institute of Transportation Engineers. 2016.


Legend
Route B
Saunders Monticello Trail
I-64
1
2
3
MERIDIAN
I64 EXIT 121 OFF
I64 EXIT 121 FROM 20S ON
I64 EXIT 121 FROM 20S ON
INTERSTATE 64 WB
INTERSTATE 64 EB
I64 EXIT 121 TO 20S OFF
COLLEGE
SCOTTSVILLE
HART
MICHIE TAVERN
DAIRY BARN
THOMAS JEFFERSON
N
0 250 500 750 1,000 Feet
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Cost Estimate

Segment Number	Description	Approximate Distance (ft)	Estimated Cost	Unit cost (per foot)	Cost Assumptions and Source
1				$184.99	10 ft. paved, share use path, off road. See Note A below.
2	Redesign interchange to accommodate bicycles and pedestrians	2583			Costs for reconfiguring interchange to accommodate pedestrians and bicycles beyond the scope of this project. However, possible redesign options include those outlined in ITE guide titled "Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges" (2016)
3a	Signalization for bicycles and pedestrians at College Drive	92	$12,800	$12,800	Average cost for bicycle signals: $12,800. Page 27 in "From "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See Note B below.
3b	High visibility crosswalk at College Drive		$3,070		Crosswalk High Visibility Crosswalk. Table 19, page 24 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements."
4	Multimodal path along both sides of Scottsville Road (950ft each side)	1900	$351,481	$184.99	10 ft. paved, share use path, off road. See Note A below.
Total			**$367,351**	**<-- Excludes cost of I-64 interchange reconstruction to accommodate bicycles and pedestrians.**	

Note A: 10 ft. paved, share use path, off road. Estimate is median of high and low range from "Costs for Pedestrian and Bicyclist Infrastructure Improvements" final database (bit.ly/pedbikecosts). Virginia Transportation and Mobility Planning Division estimate used.

Note B: "Costs for Pedestrian and Bicyclist Infrastructure Improvements," http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf

Route C: Monticello Road (Re)extended

Route C: Monticello Road (Re-)extended

Overview

Route C begins just north of Moore's Creek, to the east of Monticello Avenue. It crosses Moore's Creek on a proposed bridge, passes under I-64 through a proposed tunnel, then follows the eastern edge of the Blue Ridge Hospital Site. The route then crosses VA-53 (Thomas Jefferson Parkway) on a proposed bridge, connecting with the Saunders-Monticello Trail at Michie Tavern.

Overall Advantages

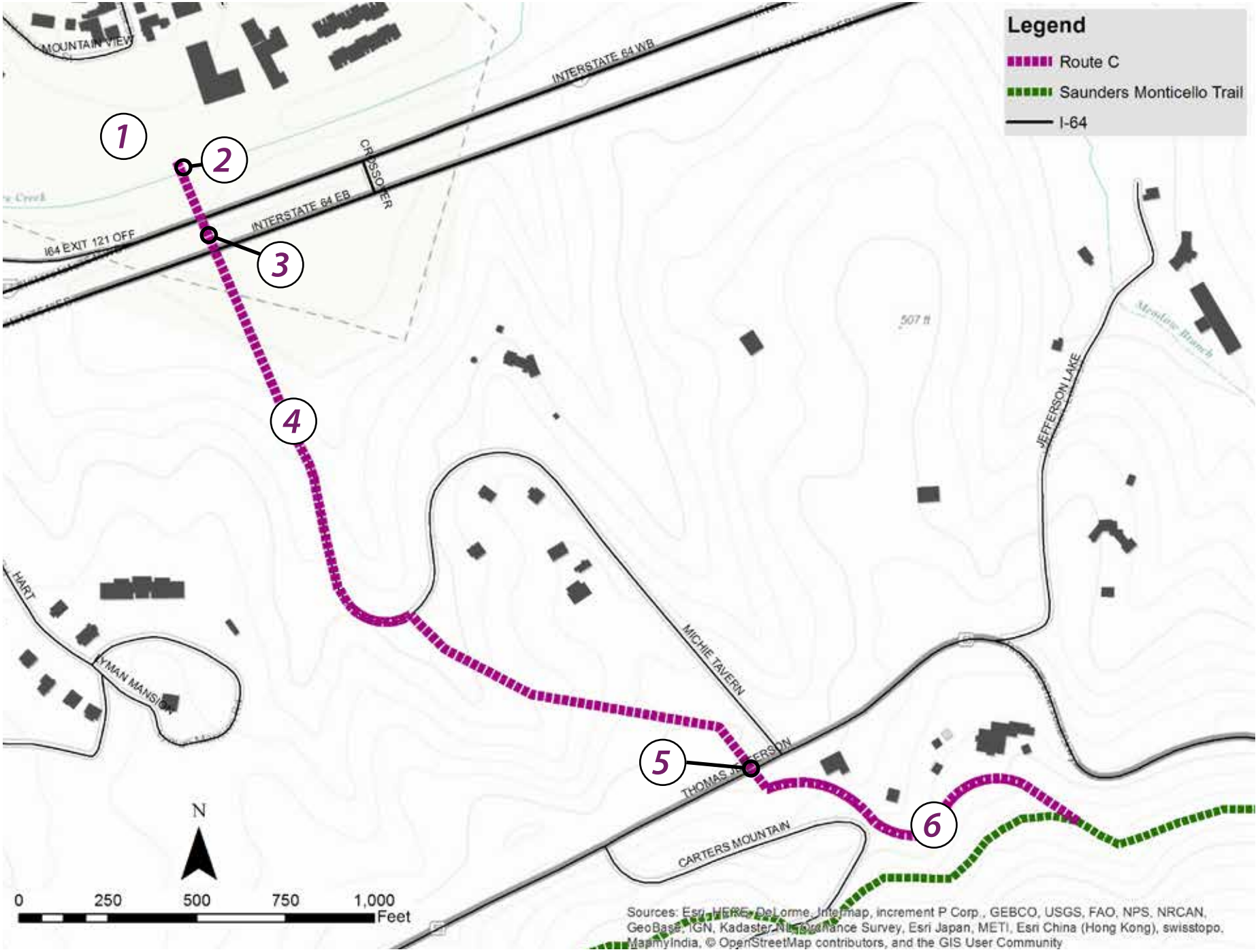
- Most direct route
- Surrounded by scenic forest environment
- Historic continuity

Overall Disadvantages

- Cost of tunnel (including engineering)
- Possible land acquisition
- Wetland/floodplain
- Pedestrian Bridge needed at Michie Tavern
- Access through Michie Tavern property

Detailed Description

Segment Number	Description	Advantages	Disadvantages
1	Traverse private land at foot of Monticello Road	Excellent potential for parking; excellent development opportunities	Easement needed. Informal settlement currently located adjacent to here.
2	Bridge over Moore's Creek		Flooding potential
3	Tunnel under 64	Provides off-road alternative for bypassing I-64 interchange	Flooding potential
4	Follow old Monticello Road right-of-way to VA-53	Does not need to use the road itself: gentler slope might be off-road	UVa Foundation easement needed; possible Thomas Jefferson Foundation; neighbors' blessing desirable.
5	Ped Bridge over VA-53 to Michie Tavern	Opportunity for parking to serve both trail and Michie Tavern.	Permission from Michie Tavern
6	Connect with Saunders-Monticello Trail	Activation of Michie Tavern connection is a potential bathroom/ amenity opportunity.	Steep slopes


Legend
Route C
Saunders Monticello Trail
I-64
1
2
3
4
5
6
INTERSTATE 64 WB
INTERSTATE 64 EB
CROSSOVER
I64 EXIT 121 OFF
MOUNTAIN VIEW
507 ft
JEFFERSON LAKE
MICHIE TAVERN
HART
LYMAN MANSION
CARTERS MOUNTAIN
N
0
250
500
750
1,000
Feet
Sources: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

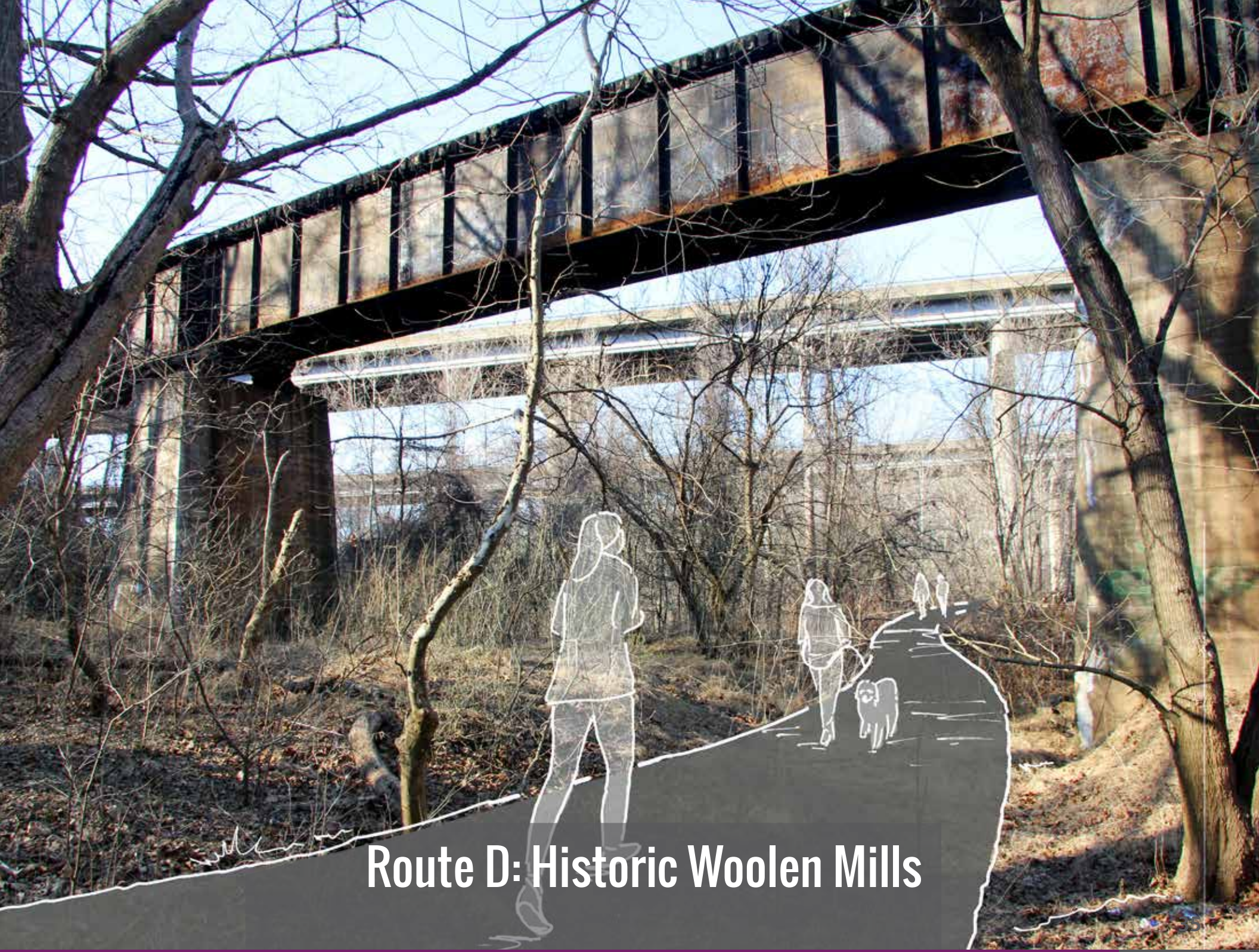
Cost Estimate

Segment Number	Description	Approximate Distance (ft)	Estimated Cost	Unit cost (per foot)	Cost Assumptions and Source
1	Traverse private land at foot of Monticello Road	30	$5,549.70	$184.99	10 ft. paved, shared use path, off road. See Note B below.
2	Bridge Moore's Creek	40	$122,610	N/A	Wooden bridge (median). From table 16, page 43 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See Note A below.
3	Tunnel under 64	195	$2,200,000	N/A	Based on Lynchburg case study and "Costs for Pedestrian and Bicyclist Infrastructure Improvements" See Note C below.
4	Follow eastern edge of Blue Ridge Hospital site to VA 53	2,211	$409,013	$184.99	10 ft. paved, shared use path, off road. See Note B below.
5	Ped Bridge over 53 to Michie Tavern	80	$191,400	N/A	Overpass/Underpass Pre-Fab Steel Bridge. From table 16, page 21 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See Note A below.
6	Connect with Saunders Trail	1035	$191,465	$184.99	10 ft. paved, shared use path, off road. See Note B below.
Total			**$3,120,037**		

Note A: "Costs for Pedestrian and Bicyclist Infrastructure Improvements," http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf

Note B: 10 ft. paved, share use path, off road. Estimate is median of high and low range from "Costs for Pedestrian and Bicyclist Infrastructure Improvements" final database (bit.ly/pedbikecosts). Virginia Transportation and Mobility Planning Division estimate used.

Note C: "Estimate based on Lynchburg case study, where a 200 ft. tunnel under a Norfolk Southern rail line with a 7-foot wide path cost $2.2 million to construct, according to university publications. The tunnel opened in 2013.



Route D: Historic Woolen Mills

Route D: Historic Woolen Mills

Overview

Starts at Woolen Mills, crosses Moore's Creek and follows the Rivanna River and the railroad corridor, passes under the existing Interstate viaduct and follows south side of highway to join the other routes.

Overall Advantages

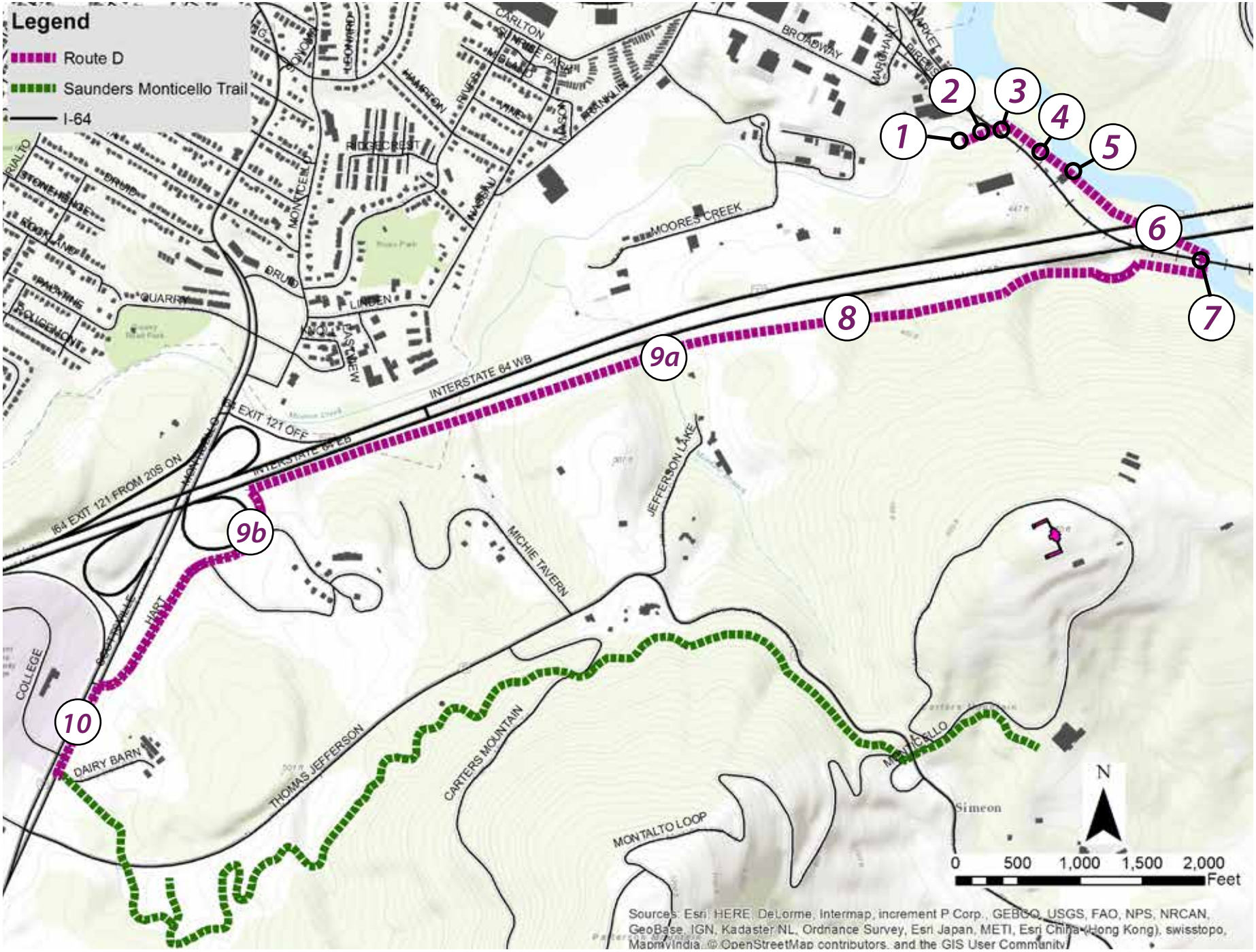
- Close connection to a park and the Rivanna Trail
- Near a potential river crossing
- Developer of new mixed-use property eager for trail and willing to contribute.

Overall Challenges

- Parking already an issue
- Easement required from a second landowner
- Disused factory site in unstable condition
- Steep land
- Railroad easement likely needed

Detailed Description

Segment Number	Description	Advantages	Disadvantages
1	Terminus of Market Street		Easement required
2	Bridge over Moore's Creek	Developer could proffer	Cost
3	Cross under railroad trestle to Rivanna River		Laterally very steep
4	Follow Rivanna Floodplain to C&A Plant	Beautiful view	Laterally very steep
5	Pass disused C&A power plant	Landlord willing but financially unable to stabilize site; Site itself tremendous opportunity	Dangerous attractive nuisance: building unstable with many places to fall through
6	Cross under existing I-64 Bridge	East side has space but is in the floodplain	Not enough clearance on W. side of tracks; must access through floodplain on E side
7	Cross under railroad trestle	Plenty of width	Railroad permission needed
8	Follow South side of I64	Already cleared for power line	Critical slope. This side of mountain not currently open to public.
9a	Cross at least 2 streams along route	Surrounded by scenic forest environment	Bridges needed.
9b	Continue along interstate all the way to the clover leaf, around it to VA-20.	Can use VDOT right-of-way.	Critical slopes, unpleasant to be near highway
10	Follow VA-20 to Saunders-Monticello Trail Parking lot	Complements Route B and creates large circuit.	Duplicates much of Route B.

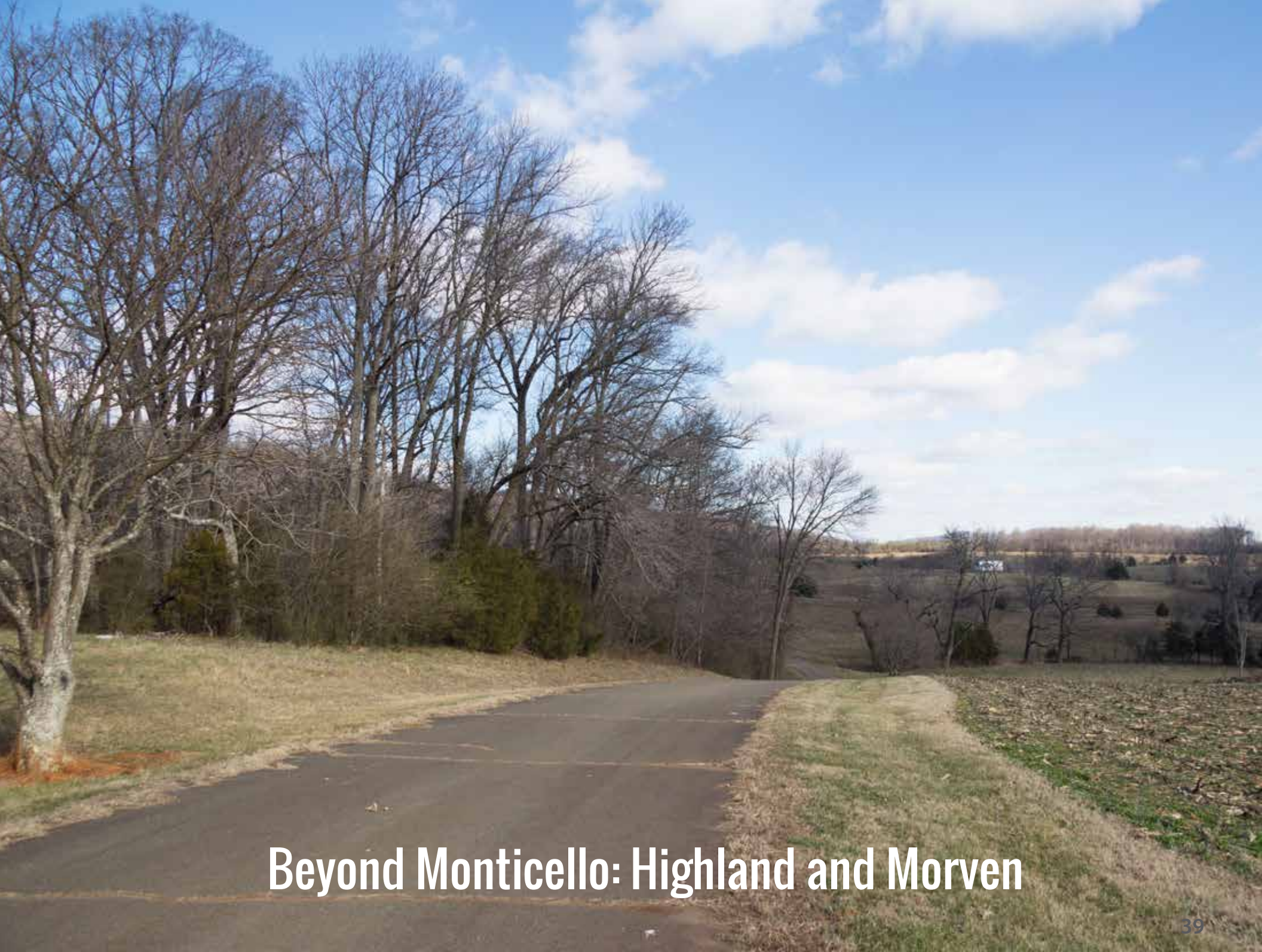

Legend
Route D
Saunders Monticello Trail
I-64
1
2
3
4
5
6
7
8
9a
9b
10
INTERSTATE 64 WB
EXIT 121 OFF
I64 EXIT 121 FROM 20S ON
MOORES CREEK
JEFFERSON LAKE
MICHIE TAVERN
CARTERS MOUNTAIN
THOMAS JEFFERSON
MONTALTO LOOP
DAIRY BARN
QUARRY
BROADWAY
N
0 500 1,000 1,500 2,000 Feet
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Cost Estimate

Segment Number	Description	Approximate Distance (ft)	Estimated Cost	Unit cost (per foot)	Cost Assumptions and Source
1	Terminus of Market Street (private)	115	$122,610	N/A	Wooden bridge (median). From table 16, page 43 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See note A below.
2	Bridge Moore's Creek				
3	Cross under RR Trestle to Rivanna River	115	$21,274	$184.99	10 ft. paved, shared use path, off road. See Note B below.
4	Follow Rivanna Floodplain to C&A Plant	1,267	$234,382	$184.99	
5	Pass C&A Plant				
6	Cross under existing I64 Bridge	536	$99,155	$184.99	
7	Cross under RR Trestle	307	$56,792	$184.99	
8	Follow South side of I64	11,073	$2,048,394	$184.99	
9a	Continue along interstate all the way to the clover leaf, around it to Route 20. Follow Route 20 to Saunders Trail Parking lot				
9b	Cross min 2 streams along route		$245,220	$122,610	2x Wooden bridge (median). From table 16, page 43 in "Costs for Pedestrian and Bicyclist Infrastructure Improvements." See Note A below.
Total			**$2,827,827**		

Note A: "Costs for Pedestrian and Bicyclist Infrastructure Improvements," http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf

Note B: 10 ft. paved, share use path, off road. Estimate is median of high and low range from "Costs for Pedestrian and Bicyclist Infrastructure Improvements" final database (bit.ly/pedbikecosts). Virginia Transportation and Mobility Planning Division estimate used.



Beyond Monticello: Highland and Morven

Beyond Monticello: Highland and Morven

There is a nascent plan to extend connectivity from the Saunders-Monticello Trail to Morven Farm via James Monroe's Highland, creating a 7-mile trip from the Rotunda to Morven. Morven used a Dominion Foundation research grant in part to fund a course at the Schools of Architecture (LAR 5320, Cultural Landscapes) and Law to provide research for a forthcoming feasibility study. Although Monticello and Highland are aware and generally supportive, the UVa Foundation (which owns and operates Morven) is evaluating the idea.

The prospect of a trail connecting UVa, Charlottesville, Monticello, Highland, and Morven offers nearly limitless opportunities for natural and cultural discovery. All of the connected sites offer very different environments and programs. For example, Morven has simultaneous narratives of William Short's ideas for a slave-free agrarian republic and a future-facing Sustainability Program. The sum of all of the local Presidential Precinct sites is a vast space for learning.[26]

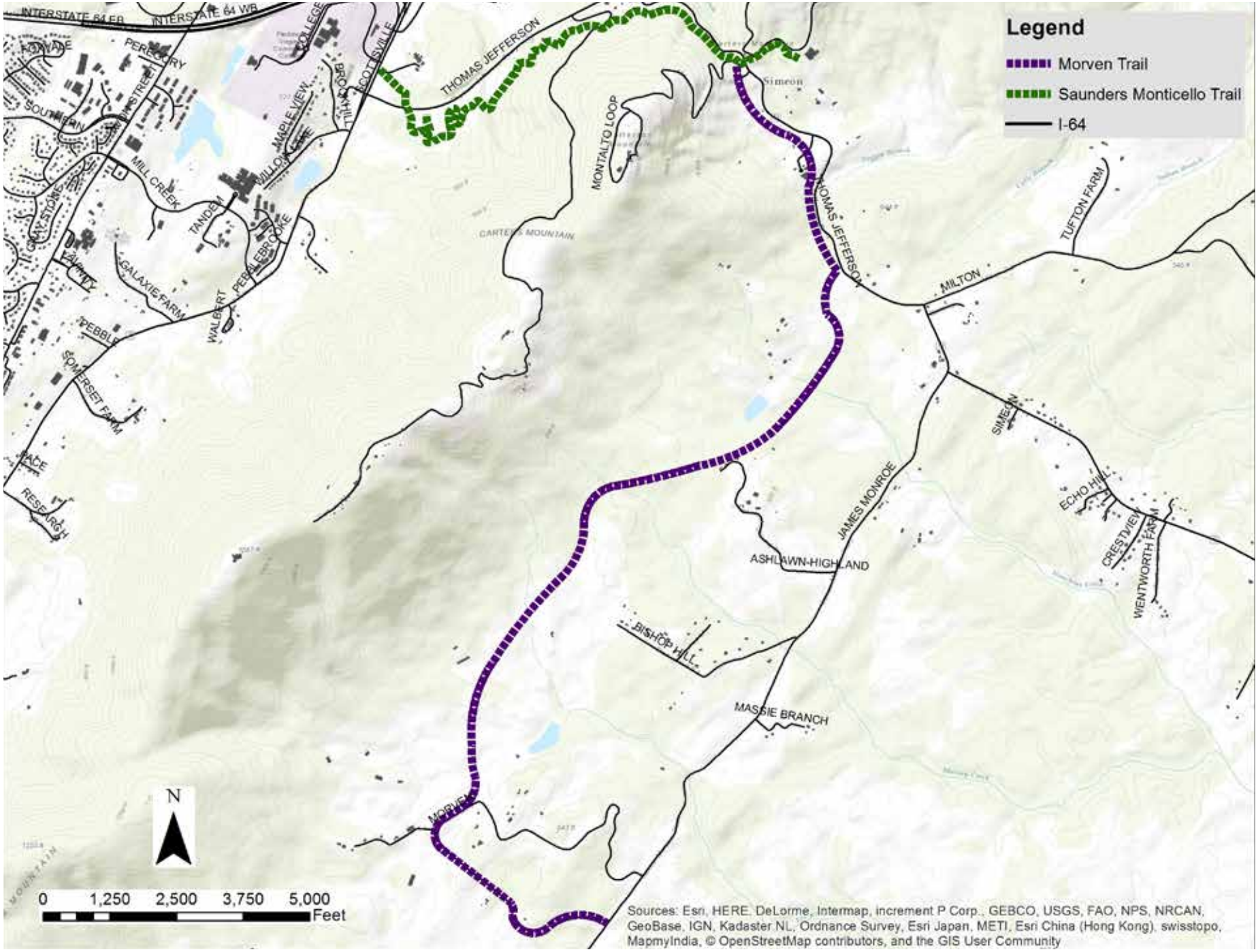
The precise route of this extension is unknown at this point, and while Morven is itself a compelling destination, it need not be seen as the end. An off-road, multi-modal connection would allow cyclists to safely bypass the Thomas Jefferson and James Monroe Parkways, two of the worst local segments of the Bike 76 route, while also providing access to the corridor's many points of interest.[27] The country roads beyond Morven are better for cycling and provide a relatively low-stress route to Scottsville.

It is an exciting project but not yet ready for a public planning process. Because so many questions remain, we cannot provide further analysis for that route, but our survey indicated very strong interest.

Note that some pedestrian connectivity could be very quickly reestablished via Carter Mountain Orchard, pending an agreement between all the landowners and trail managers. Both Monticello's and Highland's trail systems approach a recently-erected barrier fence.

26 The Presidential Precinct is a non-profit that unites the University of Virginia, the College of William & Mary, William Short's Morven, and the homes of three Founding Fathers, Thomas Jefferson's Monticello, James Monroe's Highland and James Madison's Montpelier. Montpelier is not in the study area.

27 TJPDC's Route 76 Corridor Study gives the segment a "D" bike compatibility rating, yet a "high" recreation value, stating, "The TJPDC should explore opportunities to establish alternative routes that bypass US 53, for cyclists who would like to avoid the hazards on this corridor. Many touring cyclists will want to visit Monticello and Ash Lawn Highland (sic), so there will always be a need for BR 76 to access these destinations." TJPDC (2015) 78.


Legend
Morven Trail
Saunders Monticello Trail
I-64
INTERSTATE 64 EB
INTERSTATE 64 WB
THOMAS JEFFERSON
MONTALTO LOOP
CARTER'S MOUNTAIN
MILTON
TUFTON FARM
ASHLAWN-HIGHLAND
JAMES MONROE
BISHOP HILL
MASSIE BRANCH
ECHO HILL
CRESTVIEW
WENTWORTH FARM
SIMEON
MILL CREEK
TANDEM
PEBBLEBROOKE
GALAXIE FARM
SOMERSET FARM
RESEARCH
N
0 1,250 2,500 3,750 5,000 Feet
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Route Population and Demographic Coverage Analysis

In order to understand demographic variations between routes we conducted an analysis of the areas surrounding each trail. Using ESRI Business Analyst Online, we generated ¼ and 1 mile buffers.[28] The following tables based on ESRI demographic data show our findings.[29] Darker green indicates a higher relative value per column.

1/4 Mile Trail Buffer

	Trail Length (feet)	Trail Buffer Area (sq. miles)	2016 Population (ESRI)	2016 People Per Square Mile	2016 Minority Population (ESRI)	2016 Minority Population (ESRI) Per Square Mile	Households with Income Below Poverty Level (Census 2010-14 ACS)	Households with Income Below Poverty Level Per Square Mile (Census 2010-14 ACS)	2016 Median Household Income (ESRI)
Route A	10219	1.02	2229	2181	582	569	126	123	$54,480
Route B	3701	0.54	424	791	89	166	38	71	$50,558
Route C	3666	0.53	220	417	87	165	54	102	$26,218
Route D	13529	1.35	234	174	82	61	47	35	$30,740

1 Mile Trail Buffer

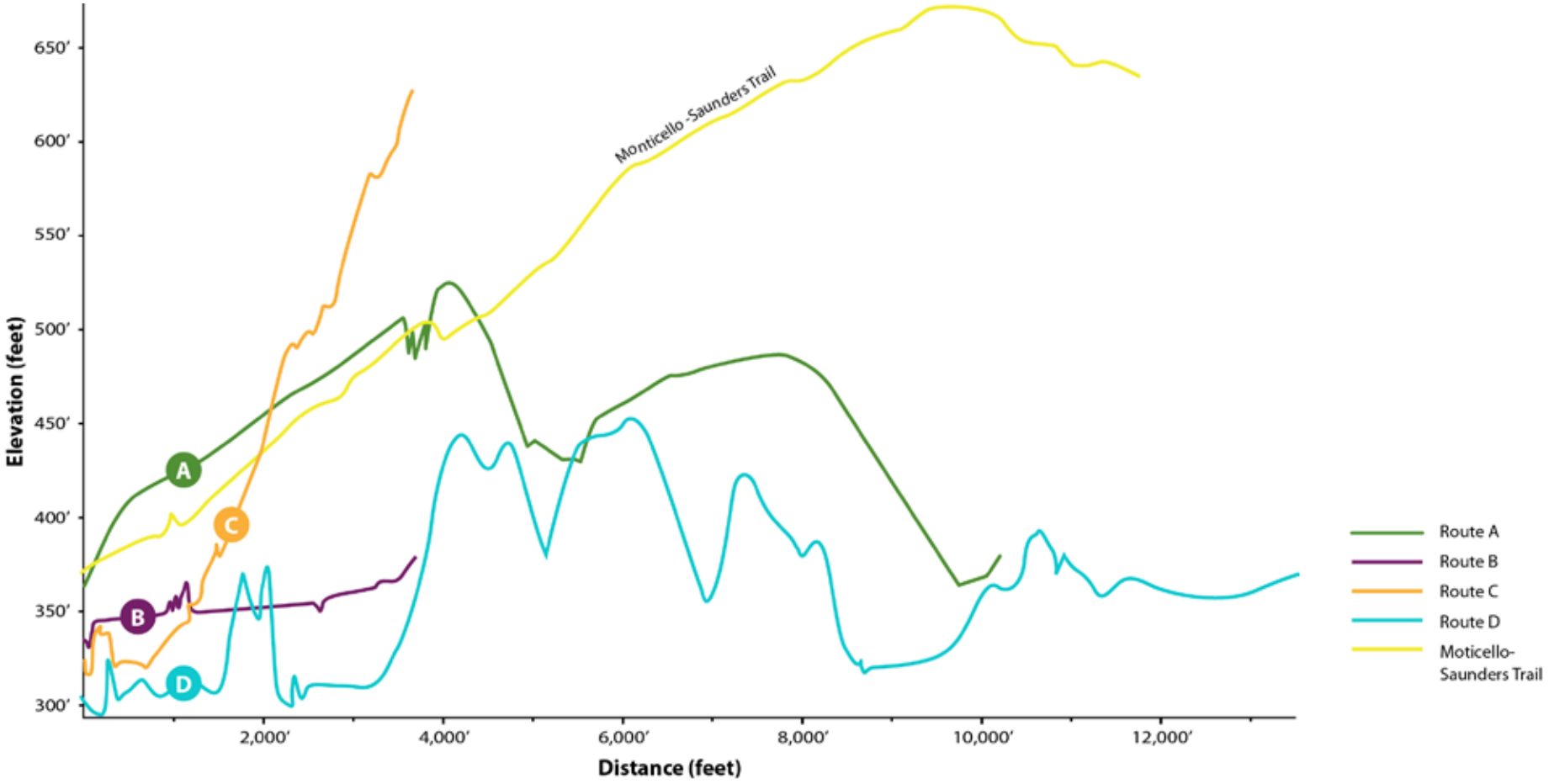
	Trail Length (feet)	Trail Buffer Area (sq. miles)	2016 Population (ESRI)	2016 People Per Square Mile	2016 Minority Population (ESRI)	2016 Minority Population (ESRI) Per Square Mile	Households with Income Below Poverty Level (Census 2010-14 ACS)	Households with Income Below Poverty Level Per Square Mile (Census 2010-14 ACS)	2016 Median Household Income (ESRI)
Route A	10219	3.54	11115	3139	4711	1330	749	212	$50,209
Route B	3701	3.03	5957	1967	2406	794	397	131	$46,839
Route C	3666	2.97	5658	1903	1767	594	390	131	$47,685
Route D	13529	4.47	6254	1400	1984	444	355	79	$53,063

28 ESRI Business Analyst Online https://bao.arcgis.com/esriBAO/login/
29 ESRI Demographics: U.S. Data Overview http://doc.arcgis.com/EN/ESRI-DEMOGRAPHICS/DATA/US-INTRO.HTM

Route Elevation Comparison

According to our Saunders-Monticello Trail Survey User results, one of the most commonly appreciated aspects of the trail is its gentle slope. Because this factor is important to current users, and because it will impact the type of user that can traverse the link, the practicum team produced elevation profiles for each corridor. Although further study of any alignment would be needed and will ultimately alter the final trail profile, the intent of this graphic is to provide a relative understanding of the current elevation conditions of each corridor.

The following chart presents all of the elevation profiles. Each route below is plotted with elevation in feet over distance, with 0 feet representing the further end from where the route intersects the Saunders-Monticello Trail. Elevation data used in this analysis was obtained from Albemarle County and was generated in 2013.[30]



30 Albemarle County GIS Data Details https://www.albemarle.org/department.asp?department=gds&relpage=3914

Summary Matrix

Metric	Route A	Route B	Route C	Route D
Setting	Roadside multi-modal trail; Leaves road and passes through woods, past a pond, crosses ridge-top community college campus.	Roadside multi-modal trail along a stream (estimate does not include cost of interchange redesign necessary to accommodate bicycles and pedestrians)	Tunnel to wooded multi-modal trail that passes a pond and partially uses old road trace	Wooded path along a river and along a highway
Trail Length (miles)	1.9	0.7	0.7	2.6
Dist Trail Head to Monticello (miles)	3.9	2.7	1.4	4.6
Number of Road Crossings	2 (Avon into PVCC, PVCC across VA-20)	1 (across VA-20)	1 (VA-53)	1 (Blue Ridge Hospital site driveway)
100-Year Flood Plain	No	Yes	Yes	Yes
Critical Slope	Yes	No	Yes	Yes
Other key resources/ opportunities	Southern Neighborhood area, Transit center, PVCC, Links to two shopping centers, Links to two schools	Blue Ridge Hospital site, PVCC, Links to school, Links to retail area	Blue Ridge site, Michie Tavern, Retail area, Links to school	Mixed-use development, Rivanna River, C&A Power plant site, Links to park, Future link to Pantops
Possible Easements Needed	Private, PVCC, VDOT x2 + PVCC	VDOT, UVa Foundation, PVCC?	Private (City), VDOT, UVa Foundation, Thomas Jefferson Foundation, Private (County)	Private, Railroad x2, Private (factory site), VDOT, Thomas Jefferson Foundation, Poss. Private, Poss. UVa Foundation
Total Cost	**$3,710,869**	**$367,351**	**$3,120,037**	**$2,827,827**

III: Case Studies

In the attached appendix, each of the fifteen case studies is independently evaluated and outlined. This page summarizes the key lessons learned from all the case studies, in total.

Case Studies Explored

American Tobacco Trail, Durham, NC

Atlanta BeltLine, Atlanta, GA

Bikeabout event, Columbia, MD

Danville Riverwalk Trail, Danville, VA

Freedom Trail, Boston, MA

Journey through Hallowed Ground, PA, MD, VA

Liberty University Pedestrian Tunnels & Bridge, Lynchburg, VA

Minuteman Commuter Bikeway, Cambridge, MA

Richmond Slave Trail, Richmond, VA

Rivanna Trail, Charlottesville, VA

Heritage Arts Trail, Santo Domingo Pueblo, NM

Saunders-Monticello Trail, Charlottesville, VA

September 11 National Memorial Trail, NY, PA, MD

Virginia Capital Trail, Richmond - Jamestown, VA

Virginia Creeper Trail, Abingdon, VA

Lessons Learned

Bike and pedestrian trails are very popular and are economic drivers.

A well-cited study from the Virginia Creeper Trail calculated that the total economic impact of the trail in 2005 was $1,600,000 in economic activity, with $670,000 of new income.[31] They calculate about $2.00 spent per local user, which is particularly applicable to the Monticello-Saunders Trail context, with many local trail users.

Many trails are successfully built and maintained among multiple jurisdictions.

Of the fifteen case studies, nine trails cross multiple jurisdictions - it is very common. Most trails divide construction and management among jurisdictions; some have an independent or inter-jurisdictional partnership.

Similar trails have been constructed in rural eastern and western Virginia, and are embraced both by urban and rural constituencies.

The Virginia Creeper Trail and Virginia Capital Trail both cross a majority of rural areas, and the trails have been very successful with locals and visitors in both cases. In the case of the Virginia Capital Trail, managers have found that constituencies that were initially lukewarm to the idea of the trail fully embraced its value once it was built. This is a very common occurrence: that trails are more popular than initial projections, once completed.

31 Bowker, Bergstrom and Gill (2007)

Most significant trail projects are achieved through diverse funding sources.

This includes federal, state, and local funding as well as philanthropic grants. For example, the City of Atlanta has funded the BeltLine trail by a majority of city and bond sources, but also used county, public schools, federal, and private grants. At a much smaller scale, the Danville Riverwalk trail was initially funded by Federal Highway Administration trails programs, and has recently been expanded by a mix of state, city, Duke Energy, Rotary Club, and other grant sources.

All of the engineering challenges of the proposed routes have been faced and overcome by trail projects in similar locations.

The City of Lynchburg, VA, and Liberty University partnered to build several pedestrian connections across highways, including a tunnel and bridge over the past decade. NCDOT worked with the American Tobacco Trail to build a tunnel underneath a major 4-lane highway of similar scale to Interstate 64 in Chatham County, NC. Boston has several examples of trails successfully combining history, tourism, recreation, and even commuters.

Powerful narratives can motivate significant projects - particularly historic and cultural narratives.

History and culture proved significant for many of the case studies. While not strictly a trail, one of the case studies is the Journey Through Hallowed Ground partnership, linking heritage sites and areas in Pennsylvania, Maryland, and Virginia along U.S. Route 15 and VA-20. This partnership of over 350 contributing or endorsing institutions demonstrates how diverse entities can work together on issues of heritage, preservation, and tourism - appreciating their economic value.[32]

32 Many of the institutional stakeholders in this projects are members of the Journey Through Hallowed Ground partnership.

Further Resources

There are many other successful applicable case studies across the country. The Rails to Trails Conservancy has done an excellent job compiling a vast catalogue of case studies and research to promote and support trail development. More information can be found on their website.[33]

33 https://www.railstotrails.org/resource-library/.

IV: Socioeconomic Decision Factors

Enhancing Connectivity in Accordance with Local, Regional, and State Plans

All of the corridors analyzed in this study align with the broader goals, objectives, and values outlined in various City of Charlottesville,[34, 35] Albemarle County,[36] TJPDC,[37] and Commonwealth of Virginia[38,39] documents. Although the corridors vary in the nature of the connections created, all enhance connectivity in the regional multimodal transportation network.

Beyond these localities directly, the corridors also support the broader goals and objectives of various regional and state-level planning documents.

Economic Impact

With easy access and a compelling destination, the trail would benefit the regional economy with increased direct spending—by new local and non-local users—and with positive indirect effects. Local businesses and institutions like Moose's by the Creek, Michie Tavern, Piedmont Virginia Community College, vineyards in the surrounding area, as well as Monticello would likely see increased visitors and foot traffic, which will lead to increase sales and visibility.

The historic Blue Ridge Hospital site is in the heart of the study area. (Peter Krebs)

These local businesses are ready to serve additional customers, and development potential in the neighboring areas. According to the Charlottesville-Albemarle Convention and Visitors Bureau, tourism in the Charlottesville region contributes $345 million to the economy annually. Additionally, according to the Bureau of Labor Statistics, the leisure and hospitality industry ranks among the top five industries in Charlottesville for employment, and the industry is growing steadily.[40] Because several of the corridors also have sites where new businesses could form or existing ones could expand, a boost to the regional network and better bicycle and pedestrian connections to local tourism sites will also bolster the local tourism industry.[41]

34 City of Charlottesville 2015 Bicycle and Pedestrian Master Plan
35 City of Charlottesville Comprehensive Plan, 2013
36 Albemarle County Comprehensive Plan, adopted 2015
37 TJPDC Bike Route 76 Corridor Study
38 VDOT State Bicycle Policy Plan.
39 Virginia Office of Intermodal Planning and Investment: VTrans 2040 Vision

40 https://www.bls.gov/regions/mid-atlantic/va_charlottesville_msa.htm
41 Beth Weisbrod (Virginia Capital Trail) told us that several new cycling-related businesses opened during that trail's first year of operation. (See Stakeholder Log)

Alignment with City of Charlottesville and Albemarle County Planning Documents

City of Charlottesville Bicycle and Pedestrian Master Plan - Chapter 2: Plan Update Vision and Goals	Charlottesville City Comprehensive Plan: Vision and Values	Albemarle County Comprehensive Plan - Chapter 10: Transportation
Vision: Walking and biking will be practical, convenient, safe, and pleasant ways to travel to destinations within and adjacent to the City.	Value: Charlottesville citizens live in a community with a vibrant urban forest, tree-lined streets, and lush green neighborhoods. We have an extensive natural trail system, along with healthy rivers and streams. We have clean air and water, we emphasize recycling and reuse, and we minimize stormwater runoff. Our homes and buildings are sustainably designed and energy efficient.	Goal: Albemarle's transportation network will be increasingly multimodal, environmentally sound, well maintained, safe, and reliable.
Goal: Expand and improve the transportation network such that walking and bicycling are practical and appealing to both dependent and choice users within the City and to the adjacent County	Value: All residents have access to high quality health care services. We have a community-wide commitment to personal fitness and wellness, and all residents enjoy our outstanding recreational facilities, walking trails, and safe routes to schools. We have a strong support system in place. Our emergency response system is among the nation's best.	Objective 3: Continue to improve, promote, and provide regional multimodal and accessible transportation options.
Goal: Prioritize safety for the most vulnerable road users when designing roadways, trails and intersections throughout the City.	Value: The City of Charlottesville is part of a comprehensive, regional transportation system that enables citizens of all ages and incomes to easily navigate our community. An efficient and convenient transit system supports mixed-use development along our commercial corridors, while bike and pedestrian trail systems, sidewalks, and crosswalks enhance our residential neighborhoods. A regional network of connector roads helps to ensure that residential neighborhood streets remain safe and are not overburdened with cut-through traffic.	Objective 4: Strengthen efforts to complete a local transportation system that includes access to pedestrian and bicycle facilities.
Goal: Foster a culture that encourages and incentivizes walking and biking for transportation, health, recreation and fitness.	Transportation Goal 7: Continue to work with the appropriate governing bodies to create a robust regional transportation network.	Objective 6: Continue to provide safe, effective, and improved urban roads in the Development Areas while recognizing that multimodal opportunities help to improve road functions.
Goal: Create an attractive, comfortable environment for biking and walking that promotes and supports a healthy community and a vibrant economy	Transportation Goal 8: Develop a sustainable transportation infrastructure by designing, construction, installing, and using the city's transportation assets and equipment in efficient, innovative, and environmentally responsible ways.	

Alignment with Regional and State Planning Documents

VDOT State Bicycle Policy Plan	Virginia Office of Intermodal Planning and Investment: VTrans 2040 Vision	TJPDC Bike Route 76 Corridor Study
Vision For The Plan: Virginia is for bicyclists . . . The Commonwealth is a place where people can safely ride bicycles for transportation and recreation along roadways, trails, rural roads, downtown streets, and in urban activity centers. Virginia's transportation system accommodates and encourages bicycling by providing facilities for bicyclists of all ages and abilities, as well as policies, procedures, and programs that support bicycling as one of Virginia's multimodal options.	Goal E - Healthy Communities and Sustainable Transportation Communities: support a variety of community types promoting local economies and healthy lifestyles that provide travel options, while preserving agricultural, natural, historic and cultural resources. Objective E.1. Reduce per-capita vehicle miles traveled. Objective E.2. Reduce transportation related NOX, VOC, PM and CO emissions. Objective E.3. Increase the number of trips traveled by active transportation (bicycling and walking).	This is a critical link for BR 76, connecting the City of Charlottesville with eastern Albemarle County and providing access to historic destinations with national significance. Despite the great importance of this area as a tourism destination, there are numerous cycling hazards along the Thomas Jefferson Parkway that diminish cycling safety and comfort.

According to a 2007 study of the Virginia Creeper Trail, local visitors to that trail spend about $2.00 per visit.[42] An increase of visitors per year and increased connectivity will cause ripple effects in the local economy. Examples include increases in income, visitors to other tourism locations, according to a study from the University of Georgia for the Virginia Department of Conservation.[43]

New trails also come with some additional challenges, such as the perception that trails increase housing prices in the surrounding neighborhoods, although an analysis of nine studies on the topic found inconclusive or neutral effects on property values for narrow, urban trails.[44] We recommend an inclusive, community-engaged design process when implementing this trail, in order to ensure that all residents can contribute to the projects and feel ownership.

While an exact delineation of the economic impact of an extension to the Saunders-Monticello Trail would require additional data and analysis, it is clear that broadly speaking, trails bring foot traffic to local businesses and connectivity is a valuable asset in the region. This trail extension has the potential to open up economic opportunities for accessible bicycle/pedestrian travel between the Downtown Mall and Monticello and human-capacity development by linking to PVCC.

42 Bowker, Bergstrom and Gill, 2007. That study also noted that the small towns along the route lack hospitality capacity to adequately serve trail users, so impact leaks to larger cities. Charlottesville/Albemarle has a very robust hospitality sector.

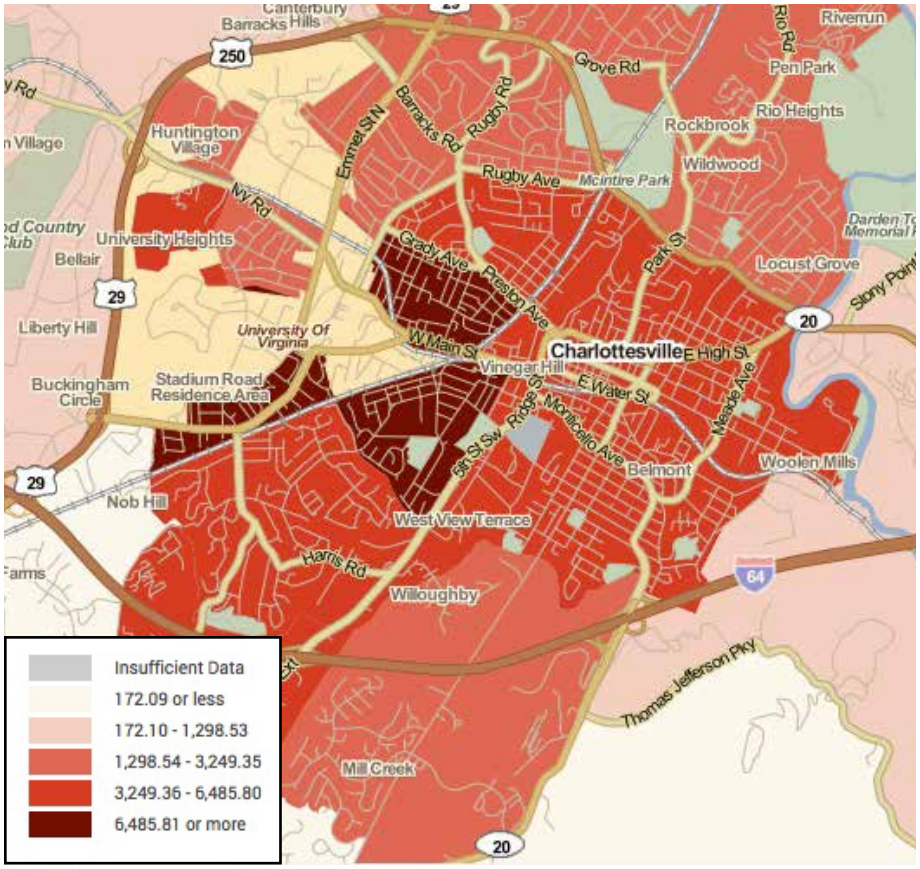
43 The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences and Economics (2004)

44 Compton, John L. "Perceptions of How the Presence of Greenway Trails Affects the Value of Proximate Properties". Journal of Park and Recreation Administration, Fall 2001. 19:3 p. 114-132

Demographics & Opportunity

Connecting to Dense Neighborhoods

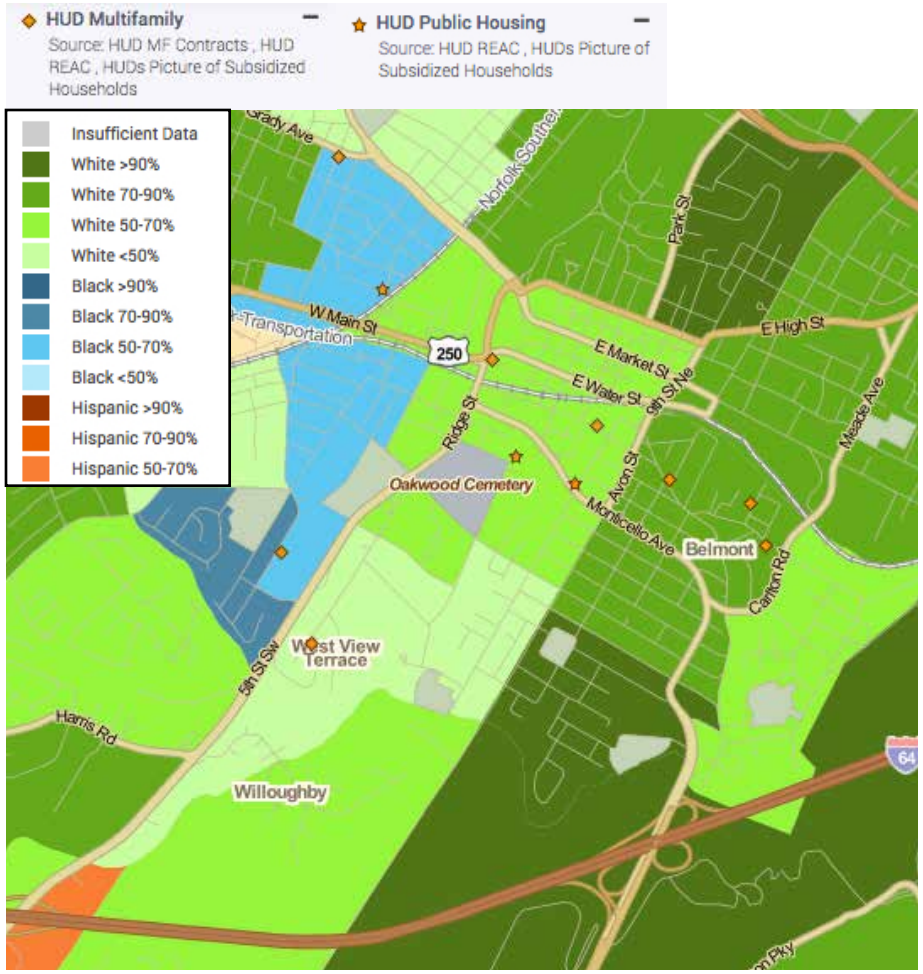
A great place to begin an extension of the Saunders-Monticello Trail is in a high-density area for maximum usage potential. In Charlottesville, the densest areas are near the Downtown Mall (Main Street) and along 5th St/Ridge St, near the Vinegar Hill area. Additionally, this area is located near several public and private K-12 schools. By emphasizing the trail's educational significance for local schools and beyond, usership could increase.



Population Density; 2015 data by 2010 Census tracts

Connecting to Diverse Neighborhoods

Route A is only a half of a mile from 5th Street, which contains segments of predominantly African American, Hispanic and white populations. Additionally, the vicinity contains HUD Multifamily, public and private low-income housing. Similarly, there is a growing node of service housing--including the Sunrise Community--not far from the trail head of Routes C and D. Several of these connections are close to those to diverse ethnic and socio-economic groups.



Predominant Race or Ethnicity; 2015 data by 2010 Census tracts

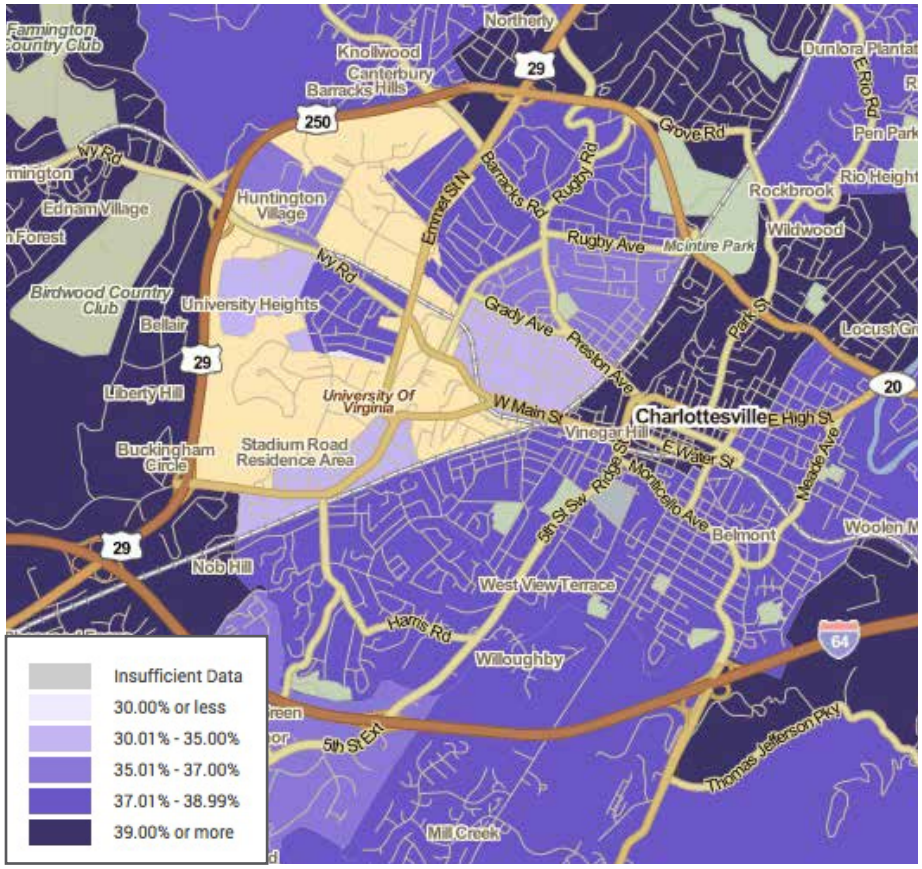
Health Impact

Throughout Charlottesville, at least 1/3 of the population per Census tract reported being overweight, with some areas at 40% or higher. Overweight designation is equated to a Body Mass Index (BMI) between 24.9 and 30. Each route alternative provides an opportunity to encourage physical activity, mental health, and create healthier communities.[45]

According to the 2015 American Community Survey (ACS) 5-Year estimate, walking is the second preferred modal choice to get to work in Charlottesville, behind driving.[46] While 60% of Charlottesville commuters drive alone to work, 12.6% of commuters walk. To put it in perspective, Charlottesville residents walk to work nearly 11 percentage points more than Virginia's state average of 2%. The Pedestrian and Bicycle Information Center and the Center for Disease Control (CDC) link physical activity to the prevention of obesity, heart disease, high blood pressure, Type 2 diabetes, osteoporosis, and mental health problems such as depression.[47] In fact, the CDC revealed that 2,600 Americans die annually from cardiovascular disease, which is the leading cause of death in the United States.[48]

Walking 30 minutes a day will produce measurable benefits, even among the least active, most who never get more than 10 minutes of vigorous physical activity per week. Regardless of the chosen route alternative, introducing more multimodal pedestrian options will only improve health outcomes. Furthermore, while anyone can benefit from increased access to open space and active recreation, it is most important that those benefits be accessible to those facing the greatest health challenges.

45 National Trails Training Partnership: http://www.americantrails.org/resources/benefits/



Percent of adults reporting to be overweight (BMI > 24.9 and < 30); 2013 data on 2010 Census tracts

46 Data USA: American Community Survey: https://datausa.io/profile/geo/charlottesville-city-va/#healthcare

47 Pedestrian and Bicycle Information Center: http://www.pedbikeinfo.org/data/factsheet_health.cfm

48 Centers for Disease Control and Prevention: https://www.cdc.gov/healthyplaces/healthtopics/physactivity.htm

Education and Programming

Linking to Heritages and Legacies

This is not a typical transportation or recreational project; it is about connecting a community to a site of world significance, Monticello, and linking that resource to related nearby institutions. The opportunities for discovery and learning along a trail of this kind are nearly unlimited. It is not difficult to imagine educational programming covering historical or environmental topics and weaving them together in a variety of ways.

To organize the program, consider the links between synergistic or sibling resources and institutions, including:

- The Monticello's Dome Room and the UVa's Rotunda
- Mulberry Row and the Jefferson School African American Heritage Center
- Monticello's Entrance Hall[49] and the Lewis and Clark Discovery Center
- Local schools and the David M. Rubenstein Visitor Center and Smith Education Center at Monticello[50]
- The Kitchen Gardens at Morven, Highland, Monticello, and the Local Food Hub
- Monroe Hill and James Monroe's Highland
- UVa's Sustainability Program and Morven

There could be signage, audio tours, community walks, rides, tours, and processions. These itineraries could continue into town and situate the lessons learned along the way in the present living city, adding value for residents as well as visitors. For example, as we spoke with stakeholders at the Jefferson School, we began to realize

Youth heritage hike from Monticello to Charlottesville. The middle portion required a 90-second bus ride. (Peter Krebs/StoryLine)

that our original notion of a trail to Monticello should be viewed both ways: from a storytelling perspective, the journey from Monticello is the one that matters.[51]

A trail from Monticello would provide needed space and tranquility for reflection on the profound questions one encounters there. The wooded landscape and the generously wide trail invite discussion and meditation. We know from the survey that visitors value this reflective space. That meditation can continue through the heart of the city to the University.

For example, Charlottesville, the Jefferson School and the University of Virginia recently collaborated to celebrate a new holiday: Liberation & Freedom Day. Celebrants marked the day with events that included a procession from the UVa Chapel to the Jefferson School and one could imagine the descendants of Monticello's enslaved laborers doing something similar. The Getting Word Oral Histories Project already has a place-based storytelling program, a mobile app, and an occasional walking tour in Charlottesville. The Jefferson School is their partner and a resource hub for the local community. Similarly,

49 Monticello's Entrance Hall served as a museum of natural history, where Jefferson displayed artifacts from Lewis and Clark's expedition.

50 Clark and Cale Elementaries and Monticello High School are all a short walk from proposed connector routes

51 See stakeholder interview log.

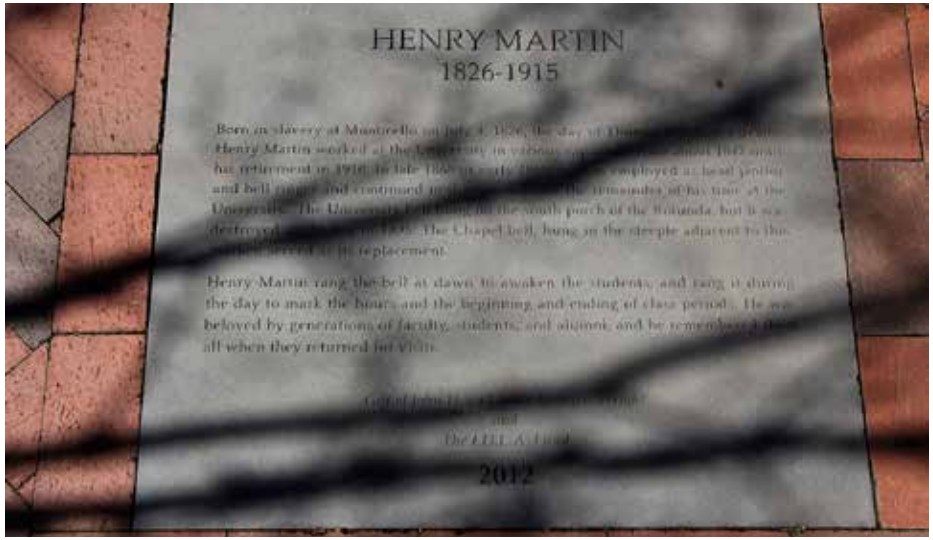
the UVa President's Commission on Slavery at the University offers a walking tour and the monument they are developing is explicitly intended to embrace the wider community. There are clear synergy opportunities.

We mention the example of slavery because Monticello, UVa, and the local community have done extensive work on the subject, but it is by no means the only possible topic. For example, a journey of discovery could extend from Monticello to the Lewis and Clark Discovery Center and the birthplace of Meriwether Lewis, all along safe and connected bicycle routes. Or one could imagine a "Landscapes of Work" tour that explores the legacy of local crafts and trades.[52] Sixth Street, Monticello Road, and Market Street--all corridors we recommend as connectors--are rich in history. And many local storytellers are still around and ready to share their tales.

Natural Heritage

The lands around Monticello (including the Saunders-Monticello Trail) are situated within the extraordinary Catoctin Formation, with tremendous potential for ecological discovery. In our survey, Saunders-Monticello Trail visitors valued the natural beauty above all other attributes, with more than half mentioning either nature, beauty, or vistas. The lands to be crossed for this connector are equally beautiful, with cliffs, streams, ponds, hills, woods and varied ecosystems.

We know that Saunders-Monticello Trail visitors go there for meditative calm, yet they also appreciate the informative tree identifications. Parents and children enjoy the climbable poplar logs, which include just enough signage to communicate their origin, while also letting



The City, University and Monticello are already working together to tell a nuanced story about the African American experience. The trail can provide a physical connective thread reaching from Monticello to University Grounds--and points in between. (Peter Krebs)

them be mysterious.[53] The landscape is itself an opportunity for discovery.

Just as with cultural heritage, there are many local organizations with whom to partner for ecological interpretation, including, but not limited to, the Rivanna Conservation Alliance, Piedmont Environmental Council, Charlottesville Master Naturalists, Center for Urban Habitats, Virginia Outdoors Foundation.

A Light Touch

Parklands provide space for the imagination to roam freely, and it is important that it not be overfilled or over-interpreted. Too much signage or programming can diminish the space's tranquility. In Design for Ecological Democracy, Randolph Hester warns that too

52 Local legend has it that the curious stucco siding on many Belmont homes originated from the artigiani who came to work on Monticello but whose children had to find--or make--work for themselves.

53 A massive hollow log from a 150-year-old poplar that grew alongside Monticello until 2008, is now a popular natural playground on the Saunders-Monticello Trail.

much information adds stress: "Quiet spaces, with no additional information, are as important as instruction."[54] Our survey confirms that this matters to visitors, with one in six visitors saying they go there for peace and quiet or to get away from stress.

Hester's recommended solution to this dilemma is that educational resources in places where people go for relaxation also be quiet, not anxiety-provoking. By contrast, thought-provoking revelations should be situated in places where the public chooses to go, rather than must go. Those spots should be selected strategically so their message will be best heard.[55]

That does not mean that there should be no interpretation—it means that it should be an invitation not a compulsion.

Saunders-Monticello Trail users appreciate the tree identification labels and would be interested in more information about the landscape. (Peter Krebs)

54 Hester, 339.
55 ibid.

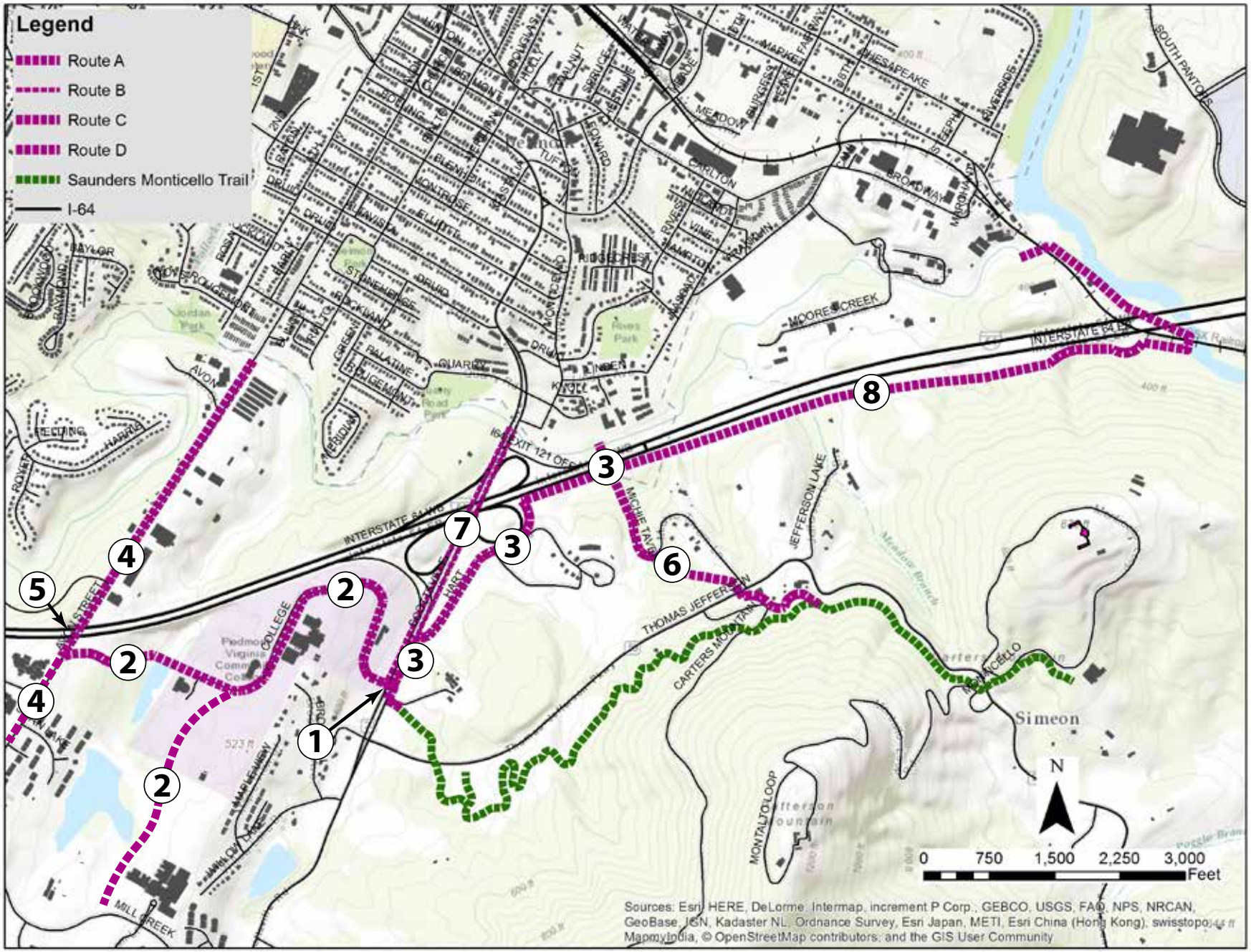
Recommendations

Build the Whole Network with a Phased Approach

Our investigations have led us to conclude that the best approach is to build the full network. Each route offers its own opportunities and challenges and they are not directly comparable. We cannot judge, for example, whether it's best to pass close to a community college (Routes A and B) or through a beautiful ecosystem (Route C) or whether it's best for the route to be flat (B), hilly (A), or direct (C). That diversity of choice is not only what trail users want, it is also a characteristic of sound, resilient planning.

A wider network will also mitigate or eliminate the only significant note of caution we have heard thus far: that more people could detract from the Saunders-Monticello Trail's tranquility. However, more connections spreads usership across the whole network and eliminates bottlenecks such as the parking lot.

The City and the County have already identified the Monticello connections in their planning maps, but they are too important to remain on paper only. Working in concert with stakeholders and the public, the localities need to make demonstrable progress toward this regionally significant goal.



Proposed phasing diagram

Project Phasing Recommendations

The complete network is not likely to be built all at once, although multiple parts could proceed simultaneously. Funding sources and cycles will play a large part, but listed below is a suggested strategy based on difficult/benefit:

1. **Saunders-Monticello Trail to Stultz Center Crosswalk at College Drive**, foot bridge over creek and trail to parking lot and informal trail up the hill to the main campus. Rationale: Potential to add parking and safer but informal link to PVCC, Monticello High School, and beyond. High payoff with relatively small investment.
2. **Stultz Center to Main PVCC Campus,** Formalize Trails to Avon and Monticello High School. Rationale: Adds more parking, formalizes link to PVCC, Monticello High School, and Southern Neighborhood Area.
3. **Route C Tunnel and bypass trail along NW corner of Blue Ridge site to lower Saunders-Monticello Trail Parking lot** (western portion of Route D). Rationale: Bypasses dangerous interchange and connects City to Saunders-Monticello Trail and PVCC. Potential VDOT Funding through I-64 exit 121 redesign. (Temporary fix for Route B)
4. **Avon corridor from Charlottesville border to I-64 and from Cale Elementary School to I-64.** Rationale: Connects Charlottesville to Fifth Street Station shopping center and then to 5th Street. Improves arterial connectivity through Southern Neighborhood.
5. **Route A footbridge over Interstate 64.** Rationale: Connects major bi-directional commuter route and connects city low-income areas to PVCC and general connectivity to Monticello. (Completes Route A)
6. **Route C to VA 53; Route C footbridge, connect to Saunders-Monticello Trail.** Rationale: Most direct, natural connection to Monticello from Downtown Mall. Opens new entry point to Saunders-Monticello Trail, spreading users through network. (Completes Route C)
7. **VA-20 from Charlottesville border to College Drive/ Saunders-Monticello Trail.** Rationale: The preferred expression of Route B includes bicycle and pedestrian facilities on both sides of VA-20 to match the Charlottesville portion of that route. Potential VDOT Funding through I-64 exit 121 redesign. (Completes Route B)[56]
8. **Route D from Woolen Mills to Route C.** Rationale: Provides alternative access point from Woolen Mills. Provides loop opportunity and stem for future connections to Monticello, should their approach to access change. (Completes Route D and entire network)

56 This phase is listed separately from #3 because we do not think making the VA-20 corridor safe need be contingent upon the interchange being redesigned--which also needs to happen eventually.

Match Saunders-Monticello Trail Characteristics

The Saunders-Monticello Trail is the network's most important segment and it therefore sets the standard to which the rest of the network should aspire. Whenever possible, the connector should be built to match the characteristics outlined in the Survey Implications subsection.

However, the connectors will not serve exactly the same purposes as the Saunders-Monticello Trail and should not be built exactly the same way. For example, several of the corridors are important commuting routes, so the 10 mph speed limit might not be appropriate (or respected) by everyone. Planning literature suggests (and survey users confirm) that the best solution is to create multiple parallel or braided routes through the corridor for users with different abilities and goals.

In any case, the connectors should employ best practices for accessibility and safety.

Seek Funding Leverage from Diverse Sources

These trails can be built with funding from a variety of sources. They should fare well in competitive review processes because they will serve a variety of well-articulated goals and audiences, align with local and regional plans, and reflect a well-vetted and well-expressed design standard in the Saunders-Monticello Trail. They have the additional advantage of a compelling socio-cultural narrative that few can match.

We recommend seeking a combination of Federal, State (especially SmartScale), University, local, and private funding sources. Like everything else about the project, they are stronger in combination and can be used to leverage one another. For example, based on the survey's strong performance, it might be worth considering a local fundraising campaign to seed the project and provide an undeniable demonstration of public support.

Because each funding request will be connected to specific sub-goals, each segment might tap a different mix of funding sources. For example, the tunnel/bypass/connector combination we describe above (phase 3) might actually be tied to a highway interchange project. The bicycle/pedestrian facility would strengthen the highway project's SmartScale score. Synergies like that will make our ambitious recommendations much more feasible. See Appendix for more about funding.

Work with Local Businesses

There are multiple existing businesses in the study area whose product is aligns with trails, heritage, and the outdoors. Three enterprises (Michie Tavern, Carter Mountain Orchard, and Jefferson Vineyard) serve products that appeal to trail users. Moreover, they could each unlock significant, connective segments and provide access points, further improving the network's distributive effect.[57] There are many more sites along several of the corridors where trail-friendly businesses could thrive.

57 Michie Tavern is an important partner for Route C and it can help with their parking; Carter Mountain Orchard sits between the Saunders-Monticello Trail and Highland (pedestrian access currently blocked only by a fence); Jefferson Vineyard sits in the land between Monticello and Highland. Developer Brian Roy has also proposed a development at Woolen Mills and his participation is essential to Route D.

Add Parklet/Parking with Facilities at the Routes C/B Trailhead

Parking is an issue for the Saunders-Monticello Trail, and although the survey indicates that a large number of trail users would leave their car at home, a significant number also said that they would park at a new trailhead. There is existing surface parking along several of the routes, but there is a prime opportunity for a new parklet with parking at the head of Route C (the foot of Monticello Road), which is in a floodplain. This site is ideally situated next to a major commuter route (VA-20), an Interstate interchange and Route B. Such a lot could pivot between park-and-walk-or-bike and a similar role (plus park-and-transit) for in-bound commuters, reducing city traffic.

Parking could also be available at PVCC and Monticello High School. [58]Charlottesville Area Transit promotes a park-and ride lot at its bus depot on Avon Street.

Trailhead facilities should include restrooms, water, and orientation signage.

58 These institutions probably already have plans for all of their parking capacity. Nothing should be assumed but it is worth a conversation.

Enhance Transit

Transit is an important part of the multimodal transportation mix, but the current transit network does not include Monticello, even though it is the main tourist destination and an important local resource. Other important destinations in the study area also merit improved transit access, including PVCC, Avon Extended, and Monticello High School. Charlottesville Area Transit's 2012-2017 Transit Development Plan underlines this recommendation.[59]

People who use the connective trail(s) could benefit from bus service too; it is significantly less daunting to make the trip in one direction than the round trip--especially given the number of hills. Charlottesville Area Transit buses already include bike racks, which would open the option to cyclists as well as walkers.[60]

Synergistic Educational Partners

There are many local non-profit organizations whose missions fit well with both the cultural and ecological opportunities that this connection will create. Look to them to help build coalition support, champion the project going forward, and play active roles in programming and stewardship.

59 The Plan states, "The Avon Street Extended/VA-20 area is the third area in Albemarle County that has been identified as an area with increasing population densities. This area includes new subdivisions, Monticello High School and a neighborhood shopping center. Piedmont Virginia Community College (PVCC) is also located in this corridor. Service is currently provided to PVCC six days a week, including evening service. But, there is no service along Avon Street Extended or to Monticello High School. This corridor warrants consideration of expanded local route service." Charlottesville Area Transit 2012-2017 Transit Development Plan http://www.drpt.virginia.gov/media/1482/charlottesville-area-transit.pdf

60 Currently two bikes per bus. Shuttle businesses have been established along precedent trails (e.g. Virginia Capital and Virginia Creeper). See case studies.

Moving Forward

Project Ownership

The Pre-Assessment recommended a collaborative master planning process that involves the multiple jurisdictions and stakeholders as well as the public. Our research and experience working through the issues has only confirmed that finding. It is a complicated question that no one can solve alone. Happily, there is broad enthusiasm and desire to work together and a well of untapped community resources.

Most, if not all, sources and case studies have also indicated that projects of this kind require some kind of champion or convening body. This group would act as central point of contact and an advocate in order to keep the process moving forward and true to its founding values. It would be logical for the TJPDC, which sponsored this report, to continue the work performed by the practicum team.

Many trail projects have designated non-profit organizations that champion their creation in collaboration with stakeholders and lead the programming and maintenance after completion. That is how the Virginia Capital Trail, for example, came to be.[61] Because the Saunders-Monticello Trail is the real resource, and it already has a "friends-of" organization, such a new entity would be duplicative. Furthermore, this project is not about creating a new resource--it is simply strategically connecting existing nodes along existing rights of way.

That kind of connectivity is usually the responsibility of local government, which points back to the City and County, perhaps coordinated by the TJPDC--especially given its regional perspective and its championing of the 76 Bike route, which shares similar issues and uses the same corridor.

Besides coordination, the champion is also an advocate. The status quo can be difficult to overcome and a persistent voice is necessary. That advocacy could come from a citizen group with support from non-governmental stakeholders--likely a larger group than present. This coalition would exist long enough for the connector to be built, then it and can either dissolve or move to a related project.[62]

The typical situation seems the likeliest: trail(s) is/are built by the localities with support from the Commonwealth and diversified funding.[63] Whether they should be a single or multiple projects is still to be determined. Once operational, the connector(s) will be the responsibility of the locality or foundation that owns the land or easement on which it sits.

Working Group

Regardless of who manages the project, it will be a group effort that will need an advisory body similar to the one that supported this project. In fact, that group was assembled with an eye toward this next phase and should be retained if they are willing. That group will need to expand as new issues and opportunities are identified. We can already see, for example, that a representative from PVCC should be included.

61 See case study.

62 Candidate organizations include, among others, the Piedmont Environmental Council, RIvanna Trail Foundation, running and cycling organizations, neighborhood organizations and others.

63 Local funds, VDOT matching, private and foundation sources. Because of its unique narrative, this project is likely to have unusual funding opportunities.

Partner with VDOT

As issues become more technical and more capital-intensive, we recommend working directly with the local VDOT Office. They support projects of this kind as a matter of policy.[64] We are fortunate that the Virginia Transportation Research Council—and their library—is headquartered in Charlottesville. Virginia also has a Commonwealth Bike/Pedestrian Coordinator.

Public Participation

To date, this project has mostly been the work of university students, with guidance from faculty, agency, and foundation staff with occasional input from individual citizens and groups. We did not want to speak too widely about issues we do not own or could not do so without sufficient facts. But now that this report has been completed, it will provide enough information on which to base a rich public dialogue.

The project's next phase must include much more outreach and public participation and that does not only mean getting the word out but also authentically listening, to facilitate informed decision-making and just outcomes. The public interactions we have had to date revealed an enthusiastic and knowledgeable citizenry that is ready to help.

Planning Continuum

The VDOT Community Trail Development Guide describes a process similar to the one we have been following. It divides the process into three phases combine that with ours to chart a rational and inclusive planning approach.

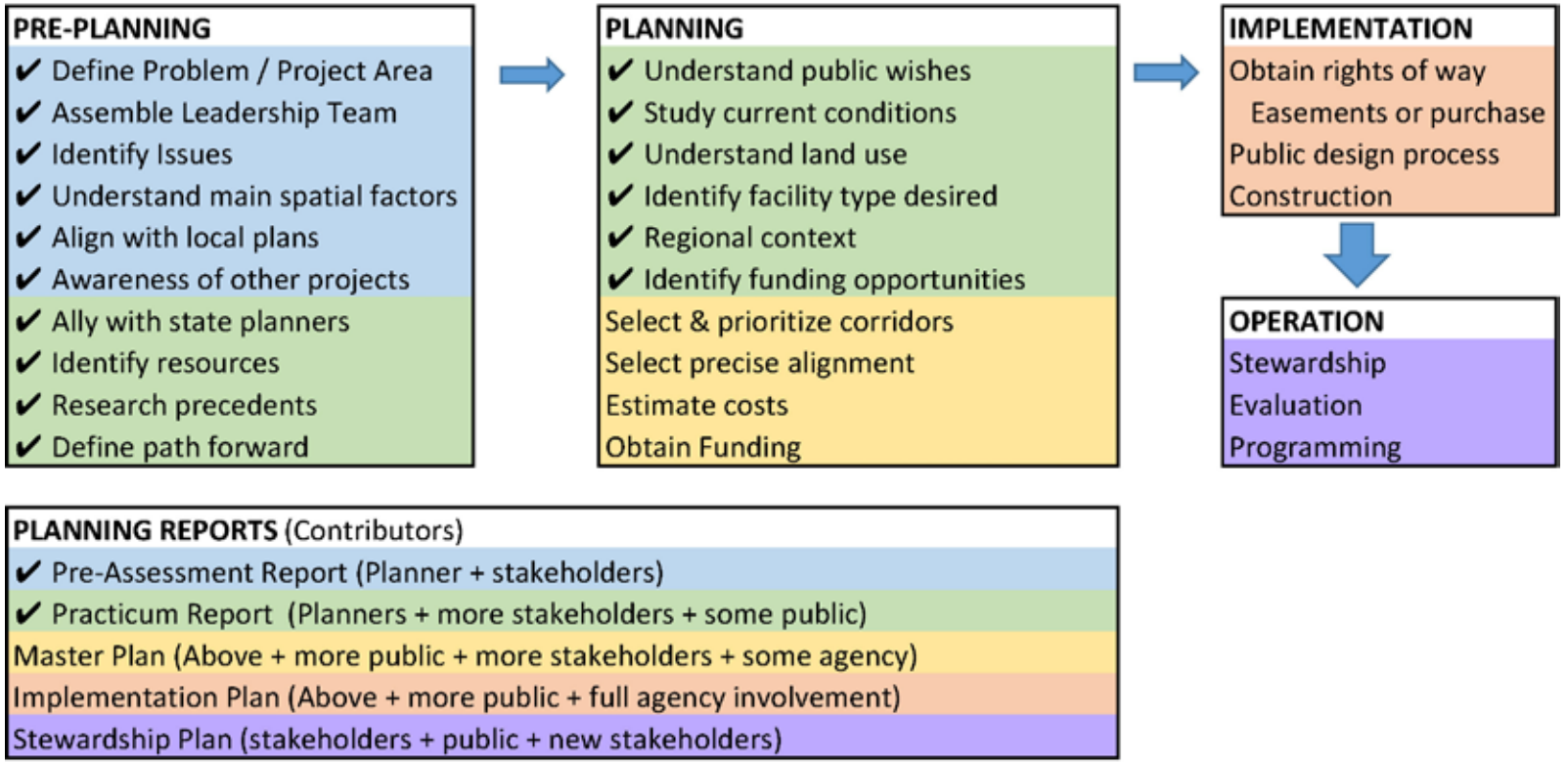
Pre-planning defines the problem, assembles a leadership team, identifies issues and resources, acquires funding for planning and defines a process forward. The Pre-assessment and this report accomplish most of that.

The Planning process has two iterative subcycles of exploring current conditions, priorities, desired facility types, destinations, land-use implications, and funding opportunities. This cycle feeds a second iterative cycle that develops options, typologies, priorities, and costs. This report discovers and develops options that can be used, with public participation, to develop an actual plan.

Only after a collaborative and public planning process, does VDOT recommend proceeding with Implementation: design, acquisition of right of way, and construction.

64 For example, VDOT Instructional and Informational Memorandum re. Bicycle and Pedestrian Accommodations. #IIM-TMPD-1.0 (Feb. 23, 2017) states: "Projects along existing and/or planned tourism, recreation corridors such as U.S. Bicycle Routes 1, 76 and 176 shall include bicycle and pedestrian accommodations."

MONTICELLO TRAIL CONNECTIVITY PLANNING PROCESS



Adapted from Virginia Department of Transportation Community Trail Development Guide.

Next Steps

- Convene the stakeholders to either establish a lead entity for the comprehensive project or divide the problem and make commitments to implement pieces of it with a mechanism for mutual accountability.
- Once a project steward has been established, we will pass on our research materials--which were more vast than we could even summarize for this report.[65] For now, they will go to TJPDC.
- Create an actual road map to implementation including a timeline. Identify missing elements and update localities' planning documents accordingly.
- Broaden the Advisory Group as needed. Be sure to include PVCC's leadership in the process. Their role is more important than originally imagined.
- Communicate with key private landowners.
- Update the public on the project's status and its trajectory.
- Open a channel for ongoing public participation. As students, we had to be careful about collecting email addresses and the like, though several members of the public wanted to join the effort. At a minimum, compile an email list.
- Partner with organizations on opportunities related to education, tourism, recreation, economic development (especially existing businesses in and adjacent to the study area), and transit.
- Letters of support from local governments, nonprofit, and partner organizations can be very helpful.
- Certainly seek transportation funds, but also look to non-traditional sources. This is one reason why the programmatic elements are as important as the usual efficiency and efficacy concerns.
- Do additional research on the demographics of trail users. This will help planners know if the trail is serving those who need it most and it will also be useful in building a case for local businesses to get involved.
- Approach this as aspirational (as opposed to transactional) planning. Be forward-looking, interdisciplinary, and cross-jurisdictional. It is about connecting the region to a better version of itself.
- This is not the end. This study examines a piece of a much larger network. Continue exploring new connections—even within this study area. We heard about many exciting possibilities that did not match the specific parameters of our project but are extremely compelling. Pursue them all.

65 For example, one enthusiastic source passed us over 100 case studies.

Sources

Bibliography

Note: Sources for case study reports are contained within those individual reports. See Appendix.

Social, Economic and Health Factors

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Local Planning Documents

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Albemarle County. 2015. *Southern and Western Urban Neighborhoods Master Plan*.

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City of Charlottesville. 2015. *Bicycle and Pedestrian Master Plan Update.*

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Resource Documents

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Data Sources

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ESRI Business Analyst Online Demographic Data.https://doc.arcgis.com/en/bao/help/data.htm

Thomas Jefferson Foundation, Inc.

Maps

County of Albemarle, Office of Geographic Data Services (downloaded 9/5/2016)

City of Charlottesville

Charlottesville Land Company Map (1890): Special Collections Library, University of Virginia via Scholars' Lab [http://scholarslab.org/digital-humanities/charlottesvilles-street-car-system-in-gis/]

GIS Base Maps: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,, NRCAN, METI, ESRI China, Swisstopo, MapmyIndia

Strava Global Heatmap. http://labs.strava.com/heatmap/

Virginia Department of Transportation

Appendices

Interview Log

Funding Resources

Case Studies

Crashes in Study Area

Shared Use Path Level of Service (LOS) Lookup Table

Interview Log

Date	Time	Interviewee	Affiliation	Location	Who	Subject
12/16/16	15:00	Will Cockrell	TJPDC	County Office Building	PK	Practicum Topics, Theory of Change
1/17/17	8:00	Full advisory group	Various	Moose's Restaurant	All	Get acquainted
2/3/17	14:00	Jon Cannon Rip Verkerke	UVa Law School	Law School Faculty Lounge	CH, PK	Law course on trails
2/11/17	12:00	Niya Bates, Andrea Douglas	TJ Foundation, Jefferson School	Jefferson School (Saving Family Heirlooms Event)	PK	Gauging interest: Descendant community? Partnership w Jefferson School?
2/13/17	9:30	Julie Roller, Jack Robertson, Danielle Loleng	TJ Foundation, Morven	Jefferson Library	JL	Historical and existing trail/park documents, maps, user counts, surveys, general data, needs.
2/13/17	17:00	Will Cockrell	TJPDC	TJPDC	All	Project Updates and guidance
2/15/17	14:00	Carly Griffith	Center for Cultural Landscapes	Peyton House	PK	Spatial expression of social linkages
2/16/17	14:00	Beth Weisbrod	VA Capital Trail Foundation	Telephone	PK	Case Study Follow-Up
2/17/17	14:00	Will Rieley	Rieley & Assoc.	His office--601 E. Market st	PK, JM	Monticello Trail background
2/21/17	16:30	Peter Ohlms	Virginia Transportation Research Council	Campbell Hall	All	Corridor analysis & Econ Dev strategies
3/2/17	18:45	Bike/Ped Advisory Committee	City of Charlottesville	NDS Conference Room	PK, JL	Project Updates and guidance

Date	Time	Interviewee	Affiliation	Location	Who	Subject
3/6/17	10:00	Rex Linville	Piedmont Environmental Council	Office (410 E. Water Street)	PK	Regional Network; Implementation Strategies
3/6/17	13:30	Mary Hughes	UVa Office of the Architect	O'Neil Hall	PK	Programmatic Connections between sites
3/9/17	10:15	Neal Halvorson-Taylor	Morven	Sweet Haus (Ix)	PK	Update, Programmatic Connections
3/9/17	14:00	Matthew Reeves	Montpelier	Montpelier	PK	New Trails, Connection to Orange
3/1/17	10:30	Kurt Burkhart	Charlottesville Albemarle County Visitors Bureau	Office (410 E. Water Street)	PK	Intro, visitor #s, economic impact
3/10/17	11:00	Michael Barnes	Rivanna Trails Foundation	Mudhouse	CH, PK	Intro, Implementation strategies, Route D
3/15/17	15:00	Sara Bon-Harper	Highland	Highland	PK	Site visit--new trail network
3/15/17	19:00	Belmont/ Carlton Neighborhood Association		Clark School	CH, PK	Introduce Project, survey
3/15/17	19:00	5th&Avon Advisory Committee		Cale School	MH, JL	Introduce Project, survey
3/21/17	15:30	Julie Roller	TJ Foundation	Jefferson Library	All	Original Saunders-Monticello Trail proposal
3/21/17	15:30	Julie Roller	TJ Foundation	Jefferson Library	All	Original Saunders-Monticello Trail proposal
3/22/17	14:00	Jon Cannon Rip Verkerke	UVa Law School	Law School Faculty Lounge	PK	Updates, Paths forward

Date	Time	Interviewee	Affiliation	Location	Who	Subject
4/3/17	8:00	Liz Russell	TJ Foundation	La Taza	PK	Updates, Deadlines for approvals
4/10/17	8:00	Advisory Group		TJPDC	All	Updates
4/20/17	10:00	Fred Missel Audrey Gould Chris Schooley Annette Tamblyn	UVa Foundation	Boar's Head	PK	Updates; Parking for Saunders-Monticello Trail
4/25/17	15:30	Peter Ohlms	Virginia Transportation Research Council	Campbell Hall	JL	Discuss data analysis
4/27/17	18:30	Chris Gensic	City of Charlottesville	Moose's parking lot	PK, JL	Walked potential Route C/B connector corridor

Funding Resources

Charlottesville Bicycle & Pedestrian Master Plan - (Update 2015)

Funding Strategies and Sources (p. 88)

http://www.charlottesville.org/home/showdocument?id=40461

VDOT Community Trail Development Guide

http://www.virginiadot.org/programs/bicycling_and_walking/asset_upload_file915_58111.pdf

U.S. DOT Transit, Highway, and Safety Funds: Pedestrian and Bicycle Funding Opportunities

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Virginia SmartScale

http://vasmartscale.org/

Pedestrian and Bicycle Information Center (U.S. DOT funded resource)

Non-government Funding: http://www.pedbikeinfo.org/planning/funding_non-government.cfm

Government Funding: http://www.pedbikeinfo.org/planning/funding_government.cfm

Case Study: American Tobacco Trail

Durham, Wake, and Chatham Counties, NC

Description of trail: Quoted from website: "The American Tobacco Trail is a 22+ mile rails-to-trails project located in the Triangle Region of North Carolina. The route crosses through the City of Durham; Durham, Chatham, and Wake counties; the planning jurisdictions of the Towns of Cary and Apex; and passes through the Lake Jordan project land of the U.S." The railroad that this trail follows was formally abandoned in 1979 (due to consolidation among rail companies and new lines) and use unofficially as a hiking trail in the following years."

Trail status: Complete, history of effort here: http://www.triangletrails.org/att/history

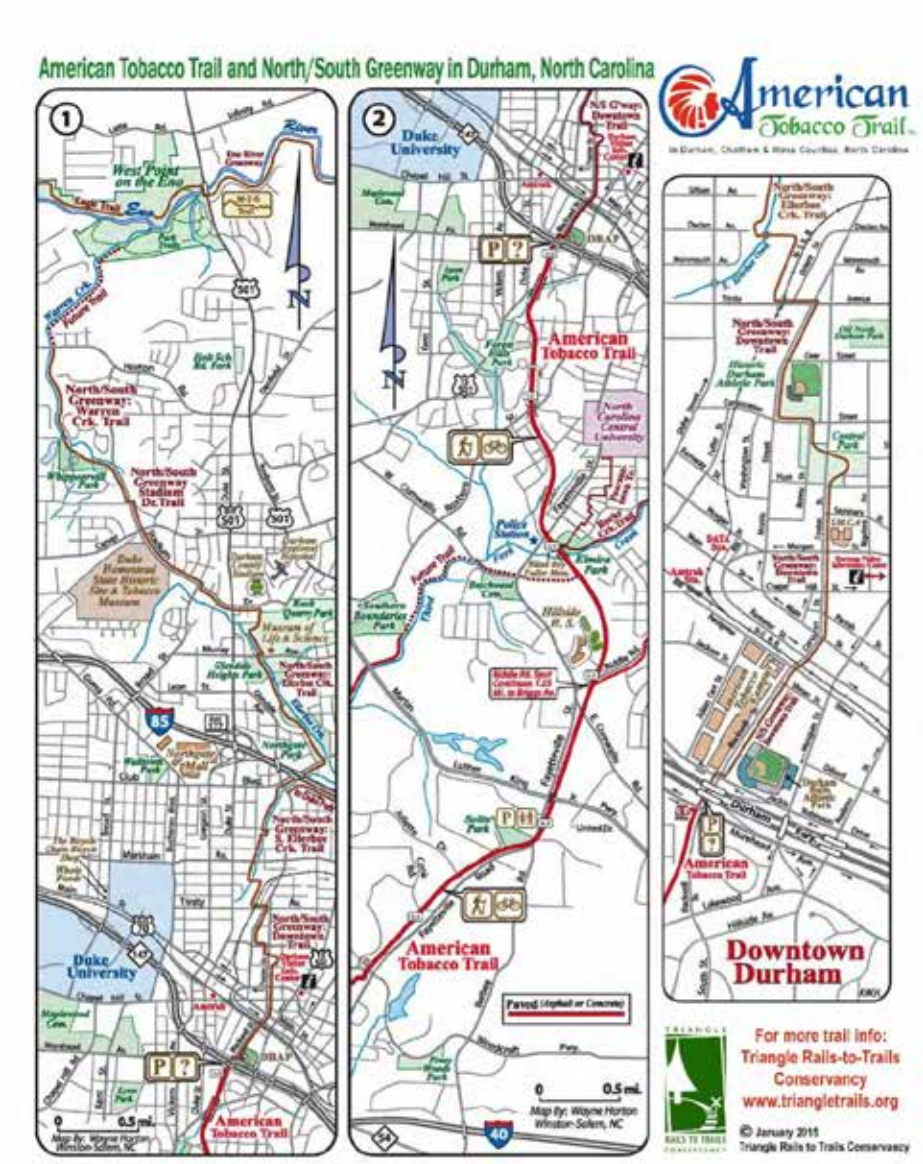
Trail length: 22+ miles, connects to over 70 miles of trails throughout the triangle

Dates: Planning effort 1992-1998 across several jurisdictions, first section opened in 2000, continual extension and new spurs

Notes: The trail crosses a wildlife zone that allows hunting. Trail users are advised to be mindful of hunters.

NCDOT was a huge player in helping get access to the trail and work around highways, even agreeing to install a tunnel under a major highway.

Historic or cultural ties: Mainly follows an abandoned railroad line, old Durham & South Carolina trail. Named in honor of American Tobacco manufacturing district in the city of Durham which drove the economy for many years.



Map: www.triangletrails.org

Funding sources: Quoted from website : "$2500 grant from the Durham Urban Trails and Greenways Commission and Wake Co. Parks to fund a Trail Conversion Master Plan for the American Tobacco Trail (ATT)." - complete in 1992

"Initial funding for the ATT was approved in 1995 utilizing funds from the Inter-Modal Surface Transportation Efficiency Act (ISTEA) and administered by the North Carolina Dept. of Transportation (NCDOT) Bicycle-Pedestrian Division."

Oversight/Authority/Maintenance: Multi-jurisdictional effort... "In mid 1993, the first of a series of "Management Team" meetings were organized and held to bring together the many agencies, municipalities, and organizations that had a role in the development of the ATT."

Sources :

http://www.triangletrails.org/american-tobacco-trail
(extended history of planning effort across several jurisdictions)

Notable Take-Aways:

- **Trail crosses three separate jurisdictions and was developed along different time tables in each jurisdiction, while maintaining as continuous a route as possible. Managed by an inter-jurisdictional "Management team" coordinating between the various county agencies.**
- **NCDOT installed a tunnel under a major highway for the trail.**

Photo: Julie Murphy

Case Study: Atlanta's BeltLine

Atlanta, GA

Description of trail: A multimodal transit network, spearheaded by the old rail line that runs in a circle around Atlanta, but the trail network extends beyond the railroad to encompass many parks, historical sites, and economic centers as well.

Trail status: Sections complete, slated for full completion in 2030. Larger transit operation than just a rail-to-trail initiative - includes streetcar expansion, new parks, and economic development projects, as well as housing.

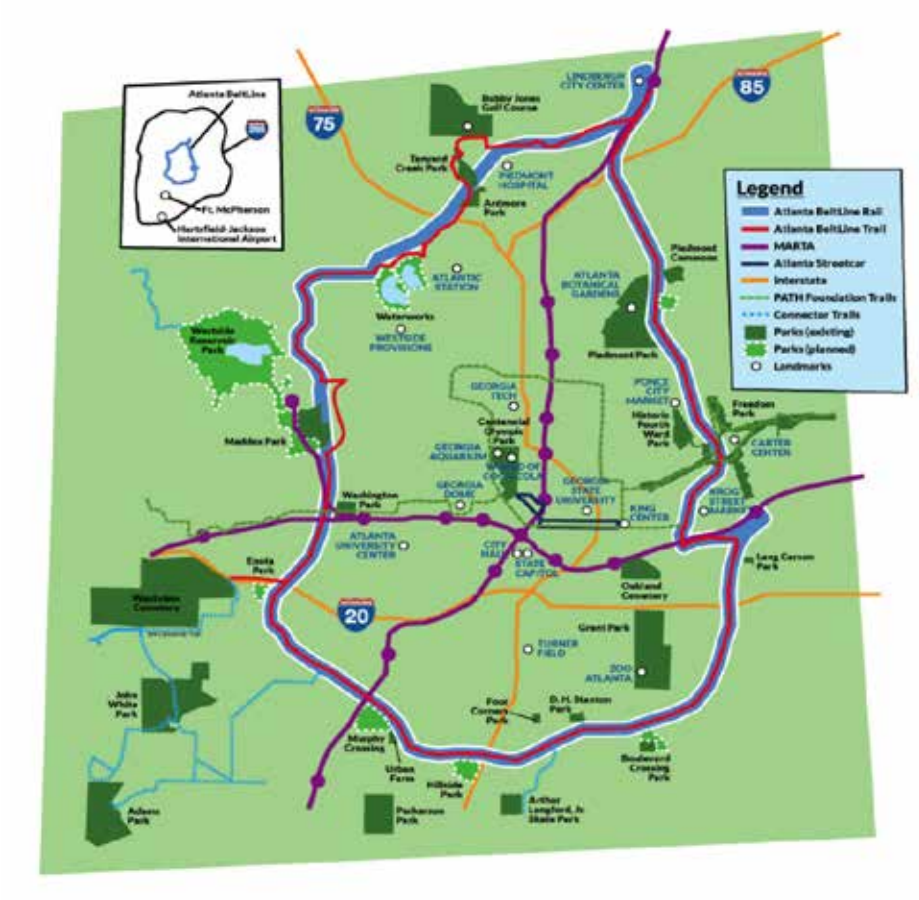
Trail length: According to the website, "The plan for the Atlanta BeltLine includes the introduction of a 22-mile transit system, 33-mile trail network, 1,300 acres of new and 700 acres of restored greenspace, public art, historic preservation, 28,000 new and 5,600 affordable housing units, 30,000 permanent and 48,000 construction jobs, and up to $20 billion in total projected economic development."

Dates: Graduate student thesis idea in 1999, Atlanta BeltLine Partnership formed in 2005, federal funding grants in 2007, construction from 2008-2012, with opportunities for more sites. Full completion is slated for 2030.

Notes: The project boasts over 225 meetings and 5,000+ citizens engaged. They have also pledged to remain transparent in their progress. They (being the Atlanta BeltLine Inc. or ABI) have advisory boards and a board of directors to help them in this process, as they recognize that the project is for Atlantans first and foremost. http://beltline.org/progress/progress/community-engagement/

Funding sources: From website: Diverse funding sources.

http://beltline.org/about/the-atlanta-beltline-project/funding/



Map: http://beltline.org/

Oversight/Authority/Maintenance: Atlanta BeltLine Inc. is responsible for coordination and construction, the PATH Foundation is responsible for new trails, Atlanta Police Department Path Force Unit patrols the trail. Maintenance authority unclear, but assumed to be the City of Atlanta.

Sources:

Extensive amount of information on their website - http://beltline.org/

Camrud, Natalie. 2017. "Race, Class, and Gentrification Along the Atlanta BeltLine." Scripps Senior Theses. 947. http://scholarship.claremont.edu/scripps_theses/947

Fausset, Richard. 2016. "A Glorified Sidewalk, and the Path to Transform Atlanta" New York Times. September 11.

https://www.nytimes.com/2016/09/12/us/atlanta-beltline.html?_r=0

Notable Take-Aways:

- **Coordinated by an independent partnership – the Atlanta BeltLine Partnership**
- **Process involved extensive community engagement**
- **Diverse funding sources**
- **Multi-faceted project involving transit, art projects, and other new development projects.**

Case Study: Columbia BikeAbout (community event)

Columbia, MD

Description: Every year in September, Columbia, MD organizes a large community bike ride along their extensive network of multi-modal trails. The 2016 ride had more than 400 participants who followed a planned itinerary (it changes from year to year) through sites of historic or community significance.

The ride is simultaneously social and educational, with the following purposes:

- The build a sense of community
- To introduce the community to the trail system (which is expanding)
- To teach local history--for example, there is always a unit on the origins of the street names.
- Fitness
- To promote bicycle safety

Riders are given a map, a page of interpretive information and a bike safety sheet. In addition, there are guides and directional signage. There is a community picnic and designated bathroom locations. The event runs from 9:30 a.m. until 1:00 p.m.

"The post-event survey revealed that 93 percent felt the event raised their awareness of Columbia history; 100 percent felt the event raised the awareness of the pathway system; 99 percent said they saw new pathways; and 66 percent said they were more likely to consider using their bicycles for errands, visiting places or commuting." [website]

Photo: Columbia Association

Sources:

Columbia Association. BikeAbout. Accessed on April 20, 2017 from: https://www.columbiaassociation.org/facilities/columbia-archives/bikeabout/

Notable Take-Away:

- **Bikeabouts are fun ways to simultaneously promote health and fitness, camaraderie and place knowledge, while introducing more people to the resource, and encouraging them to be more frequent users (in service of the other goals)**

Case Study: Danville Riverwalk Trail

Danville, VA

Description of trail: The Danville Riverwalk Trail runs on both sides of the Dan River near downtown Danville. It is connected to several parks and historic downtown Danville. At the eastern end, it is also connected to an extensive network of mountain bike trails. While mostly following the river, it does break away and veers north away from the river on the eastern end, connecting to The Institute for Advanced Learning and Research. This right-of-way may be interesting and more relevant to study/learn from. The trail is surfaced with asphalt and is shared between cyclists, pedestrians, and potentially equestrians. Unclear if there are any tunnels under major roads, or if the crossings are done at-grade or beneath existing bridges.

Trail status: The core of the trail is complete, with plans for further extension along the river on the west side of downtown, and a connector link to make the trail a loop on the south/east side of town. The city is actively, currently constructing these expansions, including paving new sections of trail and installing a pedestrian bridge over a tributary to the Dan River.

Trail length: Currently, 9 miles, more to be added.

Dates: First funding received in 1997. Ongoing construction to present.

Historic or cultural ties: the trail passes by industrial buildings that are related to the initial founding and growth of Danville, including tobacco warehouses and factories. In the Civil War, several of the factories were used as prisons, and the city was the last capital of the Confederacy after Richmond was conquered.

Funding sources: From website:

Photo: Julie Murphy

1997 - Present

1998 - Present

2005 - 2008

Virginia Department of Conservation and Recreation, Recreational Trails Program; funded by the Federal Highway Administration

Virginia Department of Transportation, SAFETEALU Program; funded by the Federal Highway Administration

Riverview Rotary Club

Also, the most recent extension under construction 2016-2017 was funded through V DOT, Duke Energy, multiple grants and a city grant match.

Oversight/Authority/Maintenance: Danville Parks and Recreation

Property Rights/Easements:

Property contributions (as listed on website):

2001 Norfolk Southern Railway 2001 Abercrombie Oil Company

2001 Dan River, Inc. (2)

2002 Wayne Terry

2003 MCD Investments, LLC.

Property easements (as listed on website):

2004 Danville - Pittsylvania County Regional Industrial Facility Authority

2005 Pepsi Bottling Group

2005 Wayne and Margie Johnson

2005 American National Bank and Trust Co. 2005 Star Laundry Company

2005 Donald and Lisa Jones, Short Sugars

2005 Robert Woodall Chevrolet (2)

2006 Martinizing Dry Cleaning (2)

2007 Libby Hill Seafood

2007 Coldwell Banker Wayne Johnson Realty

2007 BV Associates, Biscuitville

2008 Harris, Harvey and Neal

2008 Dave McCormack

2009 Landon Wyatt

2011 Ruby Crane, Crane Tire. Co. 2011 CED/All Phase Electric

2011 Jerry R. Davis

2011 Eanes and Wyatt Auto Sales 2011 Jerry's Auto Sales

2011 RWD, LLC

2011 Iron Guard/Riverside Storage

2013 Thrifty Tire

2013 Kenneth and Bonnie Richardson, Kenny's Body Shop

Sources : http://www.playdanvilleva.com/264/Riverwalk-Trail

Emily Ragsdale

ragsdes@danvilleva.gov

http://www.wdbj7.com/content/news/Danville-expands-River-Walk-Trail--379986971.html https://www.traillink.com/trail/riverwalk-trail-(va)/#trail-detail-about

Notable Take-Aways:

- **Trail is a source of tremendous community pride and becoming source of identity**
- **The trail has had a wide variety of funding sources, property donations, and easements – practical demonstrations of the widespread support.**

Case Study: Freedom Trail

Boston, MA

Description of trail: Connects historical sites in Boston, MA. Clearly marked on sidewalk, works its way through city streets along sidewalks, no "nature" element . From website: " A 2.5-mile, red-lined route that leads you to 16 historically significant sites — each one an authentic treasure. Explore museums and meetinghouses, churches, and burying grounds. Learn about the brave people who shaped our nation. Discover the rich history of the American Revolution, as it began in Boston, where every step tells a story."

Trail status: Complete

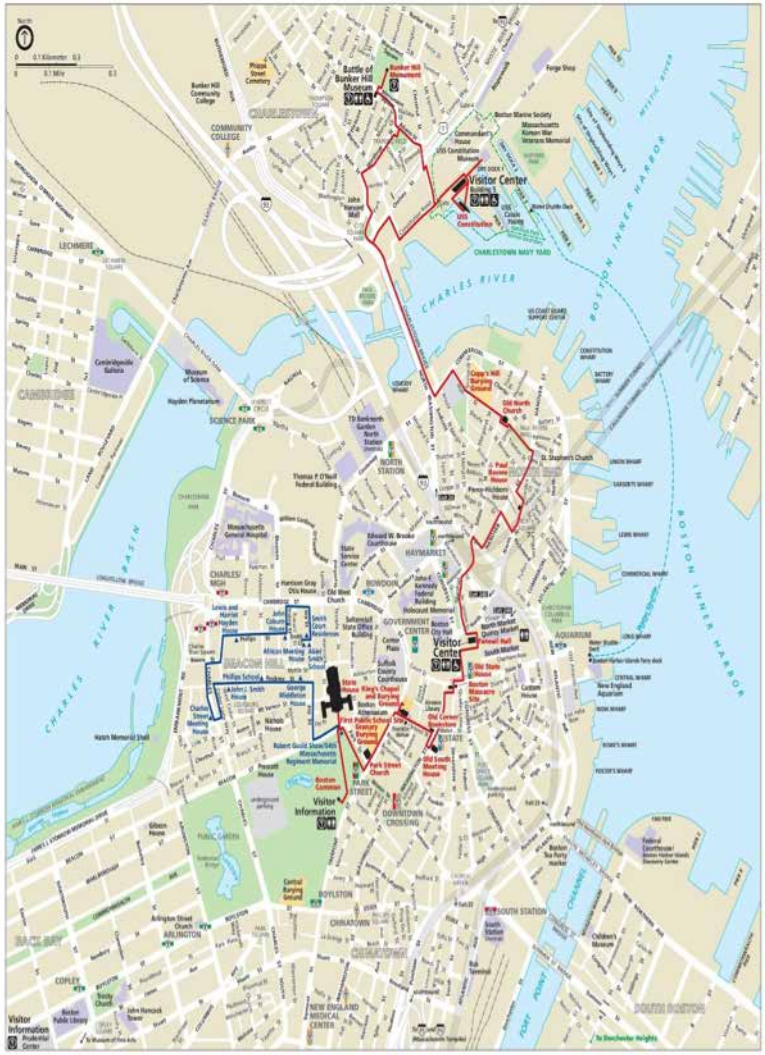
Trail length: 2.5 miles, with spurs to other sites

Dates: Dedicated in 1951 with wayfinding signs, red paint strip added in 1958, extended in 1972

Historic or cultural ties:

Sites along the trail:

- Boston Common
- Massachusetts State House
- Park Street Church
- Granary Burying Ground
- King's Chapel
- King's Chapel Burying Ground
- Benjamin Franklin Statue & Boston Latin School
- Old Corner Book Store
- Old South Meeting House
- Old State House



Map: www.thefreedomtrail.org

- Site of Boston Massacre
- Faneuil Hall
- Paul Revere House
- Old North Church

- Copp's Hill Burying Ground
- Bunker Hill Monument
- USS Constitution

Funding sources: Mayor John B. Hynes dedicated the trail in 1951, but there are no citations about how the signs or paint was funded.

Oversight/Authority/Maintenance: Upkeep is on public sidewalks and is most likely maintained through the City of Boston. Historic preservation and educational efforts are funded through donations and the Freedom Trail Foundation.

"The Freedom Trail Foundation is the fifty-year-old non-profit organization whose mission is to promote and market Boston's Freedom Trail and help with preservation of the 17th, 18th, and 19th century historic sites of the Freedom Trail.

"The Freedom Trail Foundation relies on the generosity of individuals, foundations, and corporations for support. The three primary areas of work include: retelling the story of the American Revolution as it began in Boston through costumed guided tours and regular communications and marketing; Freedom Trail Scholars program, an in-school history education program for inner-city and low-performing schools; Freedom Trail Foundation Preservation Fund dedicated to funding capital projects at official Freedom Trail sites." [from website]

Sources:

https://www.thefreedomtrail.org/index.html

Notable Take-Aways:

- **Urban trail connecting historic sites in Boston using existing city sidewalks with signage and paving to guide visitors around the trail**
- **Good lesson on how to connect route to historic sites within the urban fabric where there is no room for separated trail systems.**
- **Good lesson on maximizing historic and cultural potential within the city and encouraging visitors to explore a variety of heritage sites**

Case Study: Journey Through Hallowed Ground Partnership

Pennsylvania, Maryland, and Virginia http://www.hallowedground.org/

Description of Partnership: A non-profit partnership supporting a 175-Mile Heritage Area corridor/itinerary stretching from Gettysburg to Monticello along U.S. Route 15 and VA Route 20. JTHG is both an itinerary and a collaboration of member sites.

350 contributing or endorsing institutions, bodies and governments, ranging from Monticello, the National Parks Service to individual landowners

Key partners:

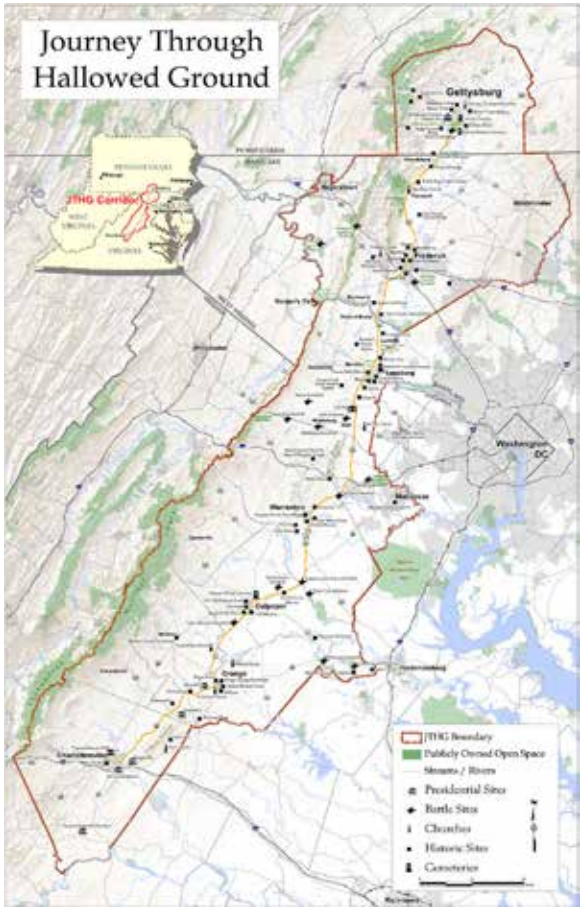
- Scenic America (initial co-organizer)
- Piedmont Environmental Council (co-organizer)
- National Park Service
- National Trust for Historic Preservation
- The Conservation Fund

Background: Originated in 1993 from a [successful] stakeholder effort to block a theme park from being built near the Manassas Battlefield. The stakeholders realized that this threat was not unique and it would be wise to proactively protect the historic region.

Feasibility Study funded privately (Remington International). Provided three options: do-nothing; Federal Program; Private Program. Afterward, a stand-alone non-profit formed in 2004. The feasibility decision matrix in the Feasibility Study (pp 49-51) clearly prefers Federal management, yet the end result is the private non-profit.

Areas of Operation

- Joint Marketing



Map: www.hallowedground.org

- Resources for members: education and marketing tools
- Land conservation efforts

Thematic Organizing Principles:

1. Land of Conflict, Reunification and Rebuilding
2. Land of Leadership
3. Place of National Beauty and Rural Character

Various topical itineraries to choose:

- African American Heritage

- Presidential Journey
- Orchards and Highlands
- Catoctin Scenic Loop
- Potomac Legacy Loop
- Loudoun Loop
- Route 231

Each is a curated experience with recommended stops (many of which are businesses) as well as directions, historic and descriptive texts.

Sources:

Journey Through Hallowed Ground Coalition. http://www.hallowedground.org/

Journey Through Hallowed Ground Coalition. 2005. National Heritage Area Feasibility Study . [https://www.hallowedground.org/Partner-Resources/National-Heritage-Area/National-Heritage- Area-Feasibility-Study]

Contacts:

Email: info@jthg.org (540) 882-4929

William Sellers, President

Shuan Butcher, Director of Communications Phone: 703.999.7579

shuan@jthg.org

Notable Take-Aways:

- **Several of our stakeholders are participating in the JTHG and are familiar with it.**
- **JTHG demonstrates that diverse entities--Federal, State and local agencies, foundations and private landowners can work together on issues of heritage, preservation and tourism. Their economic value is well appreciated.**
- **They do an exemplary job of weaving itineraries for travelers with different interests though the same space and overlapping routes.**
- **It would be smart of JTHG to add a bicycle version. A connection from Charlottesville to Monticello and Morven appears quite feasible. Extending to Montpelier (via low-stress roads) should not be ruled out. Similarly for points south.**

Case Study: Liberty University Tunnels and Bridge

Lynchburg, VA

Description: Liberty University is situated in Lynchburg Virginia. The campus of the private institution is divided by Richmond Highway (US 460), a limited access freeway. The western edge is paralleled by a major Norfolk Southern rail line and Wards Road (Bus. 29). For more than a decade, Liberty University has been working with the City of Lynchburg to increase access across these access barriers. One of the first projects, a tunnel for pedestrians and bicycles under Richmond Highway, was completed in 2004 as part of a larger campus expansion plan.

More recently, the City of Lynchburg and the university have worked together to complete the construction of a pedestrian bridge over US 460 and a bicycle/pedestrian tunnel under the Norfolk Southern rail line. The two projects are less than 100 feet apart, creating a link for pedestrians to cross both the railroad line and Wards Road without the need for an at-grade crossings. Both projects are part of the larger Wards Road Area Pedestrian & Bicycle Concept Plan, which provides "a vision and a blueprint for improving the pedestrian and bicycle facilities in the Wards Road retail corridor from Wards Ferry Road to Harvard Street." The plan was adopted by the City of Lynchburg in September 2009.

A bicycle and pedestrian tunnel under the Norfolk Southern rail line opened in 2012. It is approximately 200 feet in length. The tunnel accommodates a 7-foot walkway. The total cost of the tunnel was $2.2 million, according to Charles Spence, the director of planning and construction for the university, as quoted in the News & Advance newspaper.

An accessible bicycle and pedestrian bridge over Wards Road opened in 2011. It is 8 feet wide, 104 feet long, and includes stairs and an elevator. According to the Wards Road Pedestrian/Bicyclist Bridge

Image: Proposed pedestrian and bicycle tunnel under railroad tracks, from the Wards Road Area Pedestrian & Bicycle Concept Plan.

Memorandum of Understanding, the City of Lynchburg agreed to contribute up to "$1.35 million as reimbursement to Liberty University toward the Bridge Project costs." According to the Liberty University News Service, the bridge project was estimated to cost $1.5 million.

In addition to the active transportation facilities, in 2014 the city and university completed two new vehicular tunnels under the Norfolk Southern rail line, eliminating an at-grade crossing. The tunnels include pedestrian facilities. The project involved the use of the "jacked box construction method," the first use of this tunneling technology in the United States according to Tunnel Business Magazine.

Sources:

Innovative Tunnel Project Pulls Into Place. Accessed on April 23, 2017 from http://www.asce.org/magazine/20131210-innovative-tunnel-project-pulls-into-place/

Liberty University opens pedestrian tunnel to Wards Road. Accessed on April 23, 2017 from http://www.newsadvance.com/news/local/liberty-university-opens-pedestrian-tunnel-to-wards-ro ad/article_9c7d4555-ba35-5fbe-9f10-56125aecdde1.html

Pedestrian tunnel begins finishing stage. Accessed on April 23, 2017 from http://www.liberty.edu/news/index.cfm?PID=18495&MID=40086

Road Tunnel for Liberty University Includes U.S. First. Accessed on April 23, 2017. http://tunnelingonline.com/road-tunnel-liberty-university/

Timeline and Important Dates of Liberty University. Accessed on April 23, 2017 from http://digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=1064&context=lib_fac_pubs

Wards Road Area Pedestrian & Bicycle Concept Plan. Accessed on April 23, 2017 from: http://www.lynchburgva.gov/sites/default/files/COLFILES/Community-Development/Planning/Wards_Road_Study_-Final%5B1%5D.pdf

Wards Road pedestrian bridge officially open. Accessed on April 23, 2017. http://www.liberty.edu/news/index.cfm?PID=18495&MID=42507

Wards Road Pedestrian/Bicyclist Bridge Memorandum of Understanding. Accessed on April 23, 2017. http://lynchburg.granicus.com/MetaViewer.php?view_id=2&clip_id=1103&meta_id=15188

Notable Takeaways:

- **Demonstrates how public and private entities in Virginia worked with VDOT and Norfolk Southern to improve bicycle, pedestrian, and automobile accessibility as part of a larger transportation plan.**
- **Public and private funding used to construct an accessible bicycle and pedestrian tunnel and bridge, and vehicular tunnel with pedestrian facilities.**
- **Illustrates the potential for innovative construction technologies in tunnels and bridges to overcome challenging circumstances**
- **Is a precedent for how to construct a bike and pedestrian tunnel beneath Interstate 64.**

Case Study: Minuteman Commuter Bikeway

Bedford, Lexington, Arlington, and Cambridge, MA

Description of trail: The Minuteman Commuter Bikeway is a Rails-to-Trails commuter route connecting four municipalities in the greater Boston area. The trail is composed of a 12 foot wide, asphalt surface. It is a multi-use trail for biking, walking, in-line skating, and cross-country skiing. The trial connects at the end in Cambridge to the Alewife T station so that commuters may use subway and bus lines within the Boston metro area. It is one of Boston's busiest and most popular trails, and has won numerous awards. The bikeway also connects other regional trail networks within the municipalities.

Trail status: Complete.

Trail length: Approximately 11 miles

Dates (from website):

1974 - initial proposal to convert the railway to a trail

1977 - passenger rail service ended

1981 - all rail service ended

1991 - final rails-to-trail conversion plan approved & construction began 1992 - Bikeway dedicated

1993 - Bikeway completed

1998 - Bikeway extended

2000 - "Minuteman Bikeway recognized as a Millennium Trail by the White House and Rails-to-Trails Conservancy. (The Millennium Trails program recognizes, promotes, and supports trails as a means to preserve open space, interpret history and culture, and enhance community recreation and tourism.)"

2000's - further trail amenity improvements, repaving, signage & user information improved via Massachusetts Department of Conservation and Recreation grant.

Photo: freedomsway.org

Background: It appears the trail was championed by several local citizens as well as several community officials. The Bikeway website contains the following dedication: "In Lexington in 1992, the Minuteman Bikeway was dedicated to the memory of Jack Eddison, who served many years as a Selectman and worked to champion the bikeway project. In Arlington in 2000, the bikeway was dedicated to Donald Marquis, who served 34 years as Town Manager and was also instrumental in the bikeway's completion. Twenty years in planning, the Minuteman Bikeway might still be a dream if not for the tireless efforts of two community advocates: Tom Fortmann of Lexington and Alan McClennen, Jr., of Arlington. Tom and Alan, we thank you for making your dreams of a bikeway come true. We gratefully dedicate this website to you. We also applaud the efforts of Cathy Buckley Lewis at Central Transportation Planning Staff (CTPS) for her efforts in the design and construction of the Minuteman Bikeway."

Historic or cultural ties: Located in the corridor where the American Revolution began in April, 1775, and passes near the site where the first shots were fired by the Minutemen. It connects/passes nearby many historic sites and museums. It doesn't appear to have extensive historic or cultural interpretation installations along the trail.

Funding sources: unlisted.

Oversight/Authority/Maintenance: Each municipality maintains the portion within their jurisdiction: Bedford, Lexington, Arlington, and Cambridge, MA

Other information: The trail is part of an interesting commuting incentive program called Park & Pedal, which encourages commuters to drive most of the way, park within 1-3 miles of their destination (in designated parking areas) and bike the rest of the way to their destination. The goal is to reduce "last mile" congestion.

Sources :

http://minutemanbikeway.org

http://www.parkandpedal.org

http://www.minutemanbikeway.org/Pages/BikewayBasics.html
http://www.massvacation.com/blog/2012/10/driving-route-the-minuteman-trail/

https://www.traillink.com/trail/minuteman-bikeway/

"Navigating the Minuteman Commuter Bikeway" Report prepared for the towns of Arlington, Bedford, and Lexington MA, by Toole Design Group http://minutemanbikeway.org/wp-content/uploads/2015/12/Navigating-the-Minuteman-Commute r-Bikeway_July_20141.pdf

Webmaster of Minuteman Bikeway website: Stephan Miller. Only a contact form is listed, not phone or email. http://minutemanbikeway.org/contact-2/

Notable Take-Aways:

- **Demonstrates practicality of a commuter trail crossing between and managed by multiple jurisdictions**
- **Demonstrates how a trail can be about commuting as well as cultural and historic heritage and recreation, and that those goals are not mutually exclusive, even on a very well-used and busy trail.**

Case Study: Richmond Slave Trail

Richmond, VA

Description of trail:

Richmond Slave Trail is a walking itinerary through existing byways that chronicles the history of the trade of enslaved Africans from Africa to Virginia until 1775, and away from Virginia, especially Richmond, to other locations in the Americas until 1865.

3-Mile walking tour with

- 17 interpretive signs
- Plaques embedded in the street
- Statues

Stops include

- Docks where slave were shipped
- Lumpkins Slave jail (which will become a museum)
- Burial ground
- Church prominent in pre-Civil War
- African-American life

Trail status: Complete

Trail length: 3 miles

Dates: The Richmond Slave Trail Commission was est. 1998) Started 2009; Opened April, n2011

Oversight/Authority/Maintenance: Individual and institutional owners of the sites. Signage funded by special City appropriation.

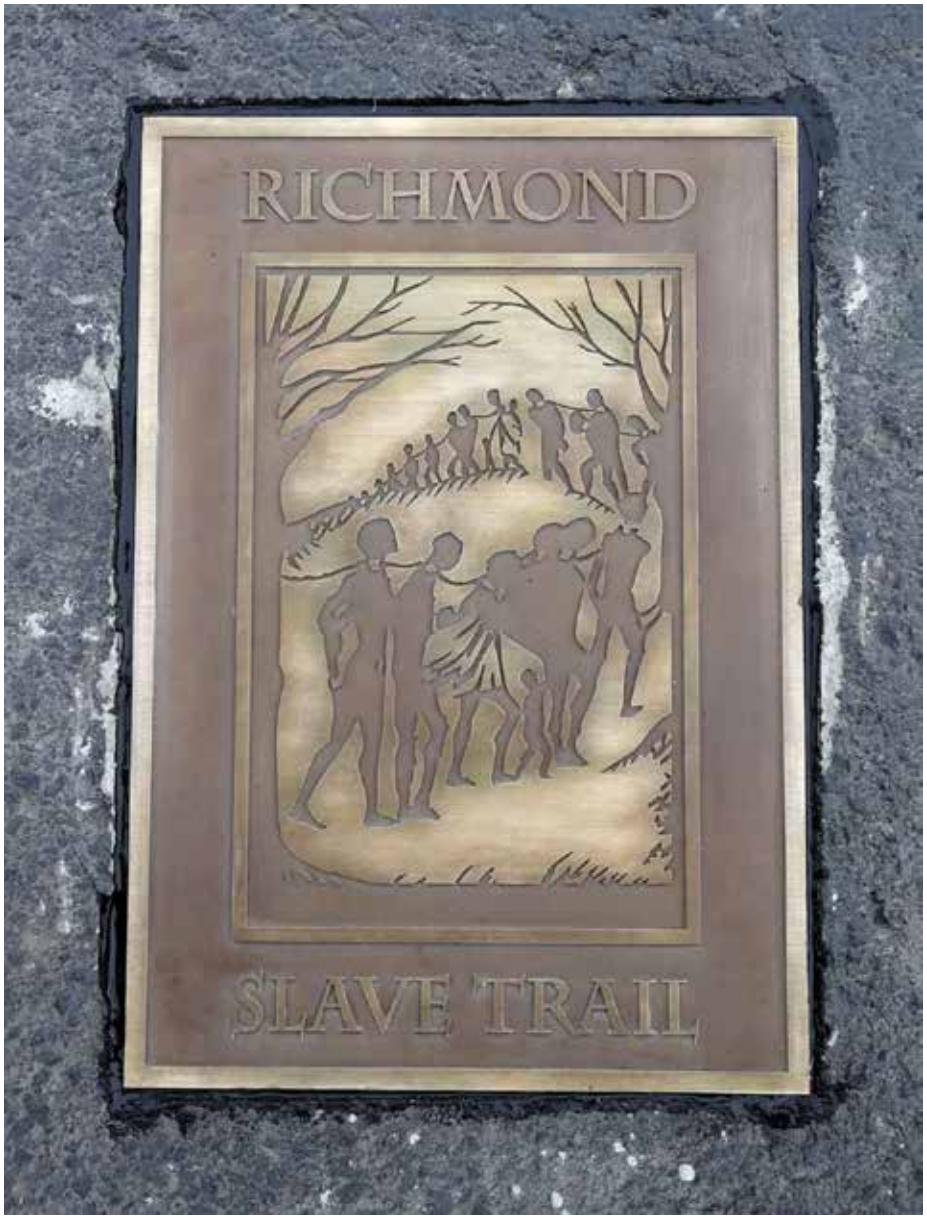


Photo: Bob Brown, Richmond Times Dispatch

Sources:

Oliver, Ned. 2016. "Richmond poised to hire co-designer of National Museum of African American History to plan Lumpkin's memorial." Sept. 30 [http://www.richmond.com/news/local/city-of-richmond/article_c5e752ae-7624-5d16-9bfc-e373af 706391.html]

Selbert, Pamela. 2011. "Walk in the footsteps of Richmond's slaves." Saint Louis Post-Dispatch. Feb. 5.n [http://www.stltoday.com/travel/walk-in-the-footsteps-of-richmond-s-slaves/article_3a1f0c94-5881-5912-b126-c173afc698b4.html]

http://www.richmondgov.com/CommissionSlaveTrail/ https://www.facebook.com/RichmondSlaveTrail/

Contacts:

Richmond Slave Trail Commission (804) 698-1070

Notable Take-Aways:

- **It would be perfectly viable to extend interpretation of the journey from Monticello into the City of Charlottesville with low-key but beautiful markers. That are available for those who are interested but in no way distract from daily life.**
- **The slavery trail does not do a good job of orienting curious and casual visitors. It would be better if the signage had some kind of call to action with additional material for discovery or even an easily accessible online map.**

Case Study: Rivanna Trail

Charlottesville, VA

Description of trail: The trail is approximately 20 miles and circumnavigates Charlottesville. It passes by several key landmarks: Riverview Park, Norfolk-Southern RR, Emmet Street/Barracks Road, Azalea Park, Jordan Park, Quarry Park, Rock Creek, Moore's Creek, and Woolen Mills. The trail is mostly a dirt path.

Trail status: Complete, some sections are closed until further notice. Some sections include treacherous river crossings or pass near railroads.

Trail length: 20 miles Dates: Broke ground in 1992

Background: Rivanna Trail Foundation Mission: "The mission of the Rivanna Trails Foundation is to create and protect footpaths, trails, and greenways within the Rivanna River watershed. We are a volunteer organization supported solely by tax-deductible contributions, and believe that community-wide trails serve as a resource for nature-related recreation and environmental education." [from website]

"The Rivanna Trail is a system of citizen-led, -funded, and -maintained rustic footpaths and multi-use trails encompassing the City of Charlottesville and extending into parts of Albemarle County. The entire Rivanna Trail has been designated as a National Recreation Trail since 2002 due to its importance in providing outdoor recreational opportunities for residents in the Charlottesville-Albemarle urban area. Portions of the Rivanna Trail have been incorporated into the Virginia Birding and Wildlife Trail system since 2004." [From 2012 Newsletter]

Historic or cultural ties: The trail utilizes several historic Native American trails and fisherman trails.

Funding sources: From website : The Rivanna Trail Foundation is a 501(c)(3) foundation, and solicits donations from its members.

Oversight/Authority/Maintenance: Rivanna Trail Foundation hosts Saturday work parties and citizens can become "Trail Adopters", responsible for a section of the trail and it's regular maintenance and observation.

Partners include University of Virginia, VDOT, Private property owners, and the Rivanna Trail Foundation.

Property Rights/Easements: "Gensic was hired in 2006 and one of his tasks has been to tighten up the right-of-way work the RTF started by acquiring secured access to the parcels of land the trail crosses. ("I love the RTF's pirate attitude," said Dan Mahon, Gensic's county counterpart. "But Chris and I have to go behind them and clean up.") Armed with a trail development budget and a land acquisition budget (both of which the city funds to the tune of about $100,000 a year), as well as $1 million in grants over the past five years for land, trails and bike/pedestrian work, Gensic has been able to pay for easements (landowners typically receive between $500 and $1,000 for a one-time payment) as well as purchase select available lots. For instance, Gensic has targeted the contested path on the south side by buying one parcel at the end of the McElroy cul-de-sac and has acquired permanent permissions for five of the eight parcels the trail crosses." [From Charlottesville Tomorrow article: http://www.c-ville.com/Twenty_years_after_it_was_created_the_Rivanna_Trail_comes_to_a_crossroads/#.WL7-VxIrL-Y]

Sources:

http://www.rivannatrails.org/Resources/Documents/RTF%20newsletter%202012.pdf http://www.rivannatrails.org/

Notable Take-Aways:

- **The Rivanna trail's success demonstrates the power of citizen advocates and volunteers**
- **It also demonstrates the desire and commitment the people of the Charlottesville area have for trails**

Case Study: Heritage Arts Trail

Santo Domingo Pueblo, NM

Description of trail: The Heritage Arts Trail extends two miles between The Village and Domingo, and runs parallel to Indian Service Route 88. The trail connects two new affordable-housing developments to the Rail Runner station, which allows pedestrians to safely walk to commute on the train to surrounding cities such as Albuquerque and Santa Fe for employment, education, groceries, medical appointments, etc. On eight nodes along the trail, Santo Domingo Pueblo artists such as Thomas Tenorio will showcase their work in the form of larger-than-life sculptures of traditional jewelry and pottery. The historical tribal artistry on the trail will hopefully increase pedestrian traffic to Domingo, and improve health conditions in the Santo Domingo Pueblo Tribe. This trail is interesting to learn from due to its emphasis on heritage and history, which are plentiful in the Charlottesville and Albemarle County area.

Trail status: Complete

Trail length: 2 miles

Dates: First funding received in 2014. Construction completed in 2016.

Historic or cultural ties: This is a historic trail tied into Santo Domingo Pueblo's tribal culture. It features local tribal artists, and ancestral pieces. The trail links to the tribe's longstanding Village to its historic Trading Post, where residents have long sold and traded goods to tourists and one another.

Funding sources: From website: http://www.artplaceamerica.org/funded-projects/santo-domingo-heritage-trail-arts-project

2014 - 2016 SANTO DOMINGO TRIBAL HOUSING AUTHORITY, $478,500
2014-2016 ArtPlace America/NEA grant

Oversight/Authority/Maintenance: Santo Domingo Tribal Housing Authority, Santo Domingo Department of Planning

Property Rights/Easements: This trail belongs to the Santo Domingo Pueblo Tribe.

Sources: https://www.arts.gov/exploring-our-town/sites/arts.gov.exploring-our-town/files/1302200_PR_13 1120_Heritage%20Walk%20Report%20_%20single%20page_sm.pdf

Santo Domingo Department of Planning Mailing Address

PO Box 99

Santo Domingo Pueblo, NM 87052 Phone: (505) 465-2214/2215

Fax: (505) 465-2688

Notable Take-Aways:

- **Demonstrates a trail that connects heritage, art, history, and is being leveraged as a means of increasing tourism and economic development in Santo Domingo tribal lands.**

Case Study: Saunders-Monticello Trail

Albemarle County, VA

Photo courtesy of Julie Murphy

Description of trail: The Saunders-Monticello trail extends along Route 53 as a part of the Thomas Jefferson Parkway on the approach to Monticello from the west. It is a pedestrian and cycling route, surfaced with fine crushed stone and boardwalk. Cycling is prohibited when boardwalks are wet, and dogs are prohibited on the boardwalk. The trail includes a pedestrian underpass at the beginning, beneath Route 53, and runs parallel to car traffic along a stone bridge across Route 53 as it approaches Monticello.

Trail status: Complete.

Trail length: approximately 2 miles

Dates: Construction began in 1996. The parkway opened in 2000. The trail was dedicated in 2002.

Background: The trail was the result of some complicated negotiations about the use of the property at the base of Route 53, initially owned by UVA and subsequently purchased by a benefactor and donated to Monticello. The parkway and trail were developed as a scenic entryway to Monticello and as a gift of public recreation and open space to local residents and visitors alike.

Historic or cultural ties: to Monticello. Also includes an interpretive arboretum with tree identification signage, an amphitheater, and a network of rustic hiking trails as a part of Kemper Park at the southwest end of the trail.

Photo: Julie Murphy

Funding sources (quoted from website): " A combination of public and private funding supported the project. Federal highway grants from the ISTEA (Intermodal Surface Transportation Efficiency Act) program totaled $3.4 million, while private donations provided $3.1 million. Among the donors were Mr. and Mrs. Thomas A. Saunders III, the Crosby Kemper family of Kansas City, the Robert Carter family, the Perry Foundation, State Farm Companies, Sprint Corporation, Dominion Virginia Power, the Helmerich Foundation, the Richard Gwathmey and Caroline T. Gwathmey Memorial Trust, and numerous local garden clubs."

Oversight/Authority/Maintenance: Thomas Jefferson Foundation, Inc.

Sources:

https://www.monticello.org/site/visit/saunders-monticello-trail https://www.monticello.org/site/visit/overview-saunders-monticello-trail

Rieley and Associates for the Thomas Jefferson Memorial Foundation. 2004. A Conceptual Plan for the Thomas Jefferson Parkway. 1994.

Rieley, Will. 2017. Personal interview by Peter Krebs and Julie Murphy, on February 17.

Notable Take-Aways:

- **The overwhelming success of the beloved trail demonstrates the need for even more high quality trails in the area**
- **The 5% average slope – even up the side of a mountain – demonstrates potential for design solutions to the physical challenges a connector trail may face**
- **The trail has been safer than anticipated. Initially a security officer patrolled the trail, but that position was ended once it became clear the trail did not need it.**

Photo: Peter Krebs

Case Study: September 11 National Memorial Trail

New York, Pennsylvania, Maryland

Description: The concept is a triangular cycling route connecting New York City memorial to Pentagon Memorial (via East Coast Greenway) and Pentagon to Flight 93 Memorial (Somerset County, PA) via the existing C&O Canal and Allegheny Passage trails, plus a 25-mile extension to the site. They would like to complete the triangle by adding a trail spanning Pennsylvania between Somerset and Jersey City. Includes walking tours of participating memorials. They have a pretty cool virtual "Story Map" on their web site.

Trail length: It will total 1,100 miles.

Oversight/Authority/Maintenance: They have a board of champions and an agency advisory board. Seemingly no staff.

Funding sources: Significant funding from Dominion Power

Contacts:

https://www.911trail.org/

September 11th National Memorial Trail Alliance P.O. Box 6986, Woodbridge, Virginia 22195 Tele: (703) 628-5007

911trail@comcast.net

Notable Take-Aways:

- **Their interactive map is worth replicating for regional trail routes**
- **A powerful narrative can motivate significant projects: such as including bike/pedestrian facilities on Amtrak's future bridge over the Susquehanna River.**

Map: September 11th National Memorial Trail Alliance

Case Study: Virginia Capital Trail

Richmond, VA to Jamestown, VA

Description of trail: Buffered two-lane asphalt trail with some major bridges and boardwalk segments. Segments range from fully urban to fully rural. There are many historic markers, wayfinding, bike-racks, fix-its, picnic areas, some businesses along route.

Trail length: 51.2 miles; multi-use. Follows VA Route 5.

Dates: Conceived 1996; completed October, 2015 10 years of planning and construction.

Funding sources: Funded by VDOT, Dominion Power, Federal Enhancements Funds, "Open Container" funds, donations

Cost: $75 million ($1.5M / mile) A summer intern located the funding sources.

Background: Trail identified as compelling option in VDOT's Rt. 5 Corridor Study (which was triggered by route's designation as a scenic byway). Gov Mark Warner's Transportation Secretary (Wit Clemon) championed trail after seeing Dan River Trail and potential for economic development in Peninsula.

Property Rights/Easements: Land acquisition (many private properties were needed) took the longest and cost the most ($20M). Eminent domain only needed in a few cases (4?).

Oversight/Authority/Maintenance: Virginia Capital Trail Foundation (VCTF) is a nonprofit, 501 (c)(3) organization with two employees.

VDOT owns most of the trail. Above-ground amenities maintained either by the localities or VDOT. VCTF constructed some amenities for localities without budget. Those are maintained by VDOT.

Photo: Peter Krebs

Notes:

- 2000+ trail users per day (VCTF)
- 600,000 users in first 14 months (and most popular segment was not open whole time)
- Fourth most visited attraction in Richmond after one year
- Virginia Capital Trail Foundation produces an annual Capital-to-Capital bike ride fundraiser (May 13)
- VDOT was lead. VCTF supported, fund raised, community engagement
- Crosses under I295 via legacy horse trail underpass (making a significant detour to do so). Weisbrod recommends avoiding the cloverleaf if at all possible.
- Public expectations were mixed--esp in rural Henrico--but it has quickly become popular with locals.
- Actively promotes businesses along the route.
- New bike-related businesses have opened.
- Most historic markers were simply traditional VDOT markers moved from road to more visible location on trail.

Sources:

www.virginiacapitaltrail.org

Brown, David 2015 On the Virginia Capital Trail, bike through 400 years of history in 52 miles The Washington Post . Sept 22. https://www.washingtonpost.com/lifestyle/travel/on-the-virginia-capital-trail-bike-through-400-years-of-history-in-52-miles/2016/09/22/f906a1e4-79ea-11e6-bd86-b7bbd53d2b5d_story.html

Virginia Capital Trail Foundation (http://virginiacapitaltrail.org/blog/) Weisbrod, Beth. Telephone interview by Peter Krebs, February 16, 2017.

Contacts:

Virginia Capital Trail Foundation (VCTF) has 2 employees. Beth Weisbrod, Executive Director beth@virginiacapitaltrail.org

(804) 788-6455

info@virginiacapitaltrail.org

Notable Take-Aways:

- **Trails are popular. This one was Richmond's 4th largest attraction in its first year.**
- **Trails can be major economic drivers. This one had multiple new businesses sprout up in its first year. Amenities and partnerships with local business are important.**
- **Once VDOT was committed to the project--and gubernatorial backing was helpful for that--it was relatively easy to obtain funding.**
- **This trail is large and multi-jurisdictional. The Foundation provides unifying planning, oversight, promotion and programming. Localities and VDOT handle maintenance.**
- **Localities that had been lukewarm about the concept fully embraced it once it was built.**

Case Study: Virginia Creeper Trail

Abingdon, VA to the NC Border

Description of trail: The Virginia Creeper Trail is a 34.3-mile rail-to-recreation trail starting in Abingdon, Va., traveling through Damascus, Va. and ending just past Whitetop Station at the Virginia-North Carolina border.

The surface is predominantly fine crushed stone. It crosses 47 trestles.

Bicycles, horses, and hikers permitted, Dogs are allowed on leash less than 6' long. The trail has 100,000+ users per year

Trail length: 34.3 miles

Dates: Completed in 1984.

Oversight/Authority/Maintenance: Governed by Trail Owners and Community Members Council:

- Trail owner- Town of Abingdon
- Rail owner- Town of Damascus
- Rail owner- United States Forest Service
- Jurisdictional partner- Washington County, VA
- Adjacent landowners
- Nonprofit organization- Virginia Creeper Trail Club
- Volunteers organized by the Virginia Creeper Trail Club (a private non-profit).

Economic Impact: The Virginia Creeper Trail is an oft-cited economic development engine for the surrounding communities. Here are some highlights from a well-respected report from Virginia Tech about the trail's impact on Damascus:

- The Trail is a significant driver of economic activity in Damascus. More than half of the businesses surveyed reported that more than half of their revenue is attributable to the trail.
- Approximately $100k directly-attributable tax revenue for FY 2010-11.
- Damascus' economy (pop ~1000) is not large enough to fully capitalize the trail's potential (e.g. insufficient local lodging) and revenue is lost to larger neighbors like Abingdon.
- The trail draws from local, regional and national markets, with the largest groups from Tennessee and North Carolina (remember SW Virginia's unusual shape).
- The trail can be very crowded in nice weather. Study recommends diversifying local touristic offerings so usership will be more staggered
- There is desire for a coordinated regional tourism/economic development strategy.

Photo: virginiacreepertrail.org

From a Tourism Economics journal article about a 2005 study (Bowker,

Bergstrom and Gill, 2007):

- Regression analysis shows that users are attached and return frequently, even over great distance (averaging 260 miles)
- Total economic impact for full trail in 2005: $1,600,000 in economic activity; $670,000 in new income.
- They calculate about $2/visit spend for local users
- Non-local users tend to be affluent (remember: this is a destination trail)

Notes:

- Supports many local businesses, including shuttle services, restaurants, outfitters, bike shops and lodging
- 3 visitor centers; Several trailheads with bathrooms
- Interpretive signage along the way funded by Virginia Department of Conservation and Recreation
- Multiple foot races take place there every year including the Virginia Creeper Marathon each year, usually in March.
- Surrounded by public and private land. Corridor RoW minimum 80' wide.

Sources:

Virginia Creeper Trail Club http://www.vacreepertrail.org/

Photo: virginiacreepertrail.org

Bowker, J.M., John Bergstrom and Joshua Gill. 2007. "Estimating the Economic Value and Impacts of Recreational Trails: a Case Study of the Virginia Creeper Rail Trail." Tourism Economics. 13(2): 241-260. http://www.vacreepertrail.org/sites/default/files/page_attachments/Bowker_VA%20Creeper.pdf

Virginia Tech Economic Development Studio. 2011. Building Connectivity Through Recreation Trails: A Closer Look at New River Trail State Park and the Virginia Creeper Trail. http://www.vacreepertrail.org/sites/default/files/page_attachments/FinalReport_Impact%20of%2 0Trails_Fall2011Studio.pdf

Contact:

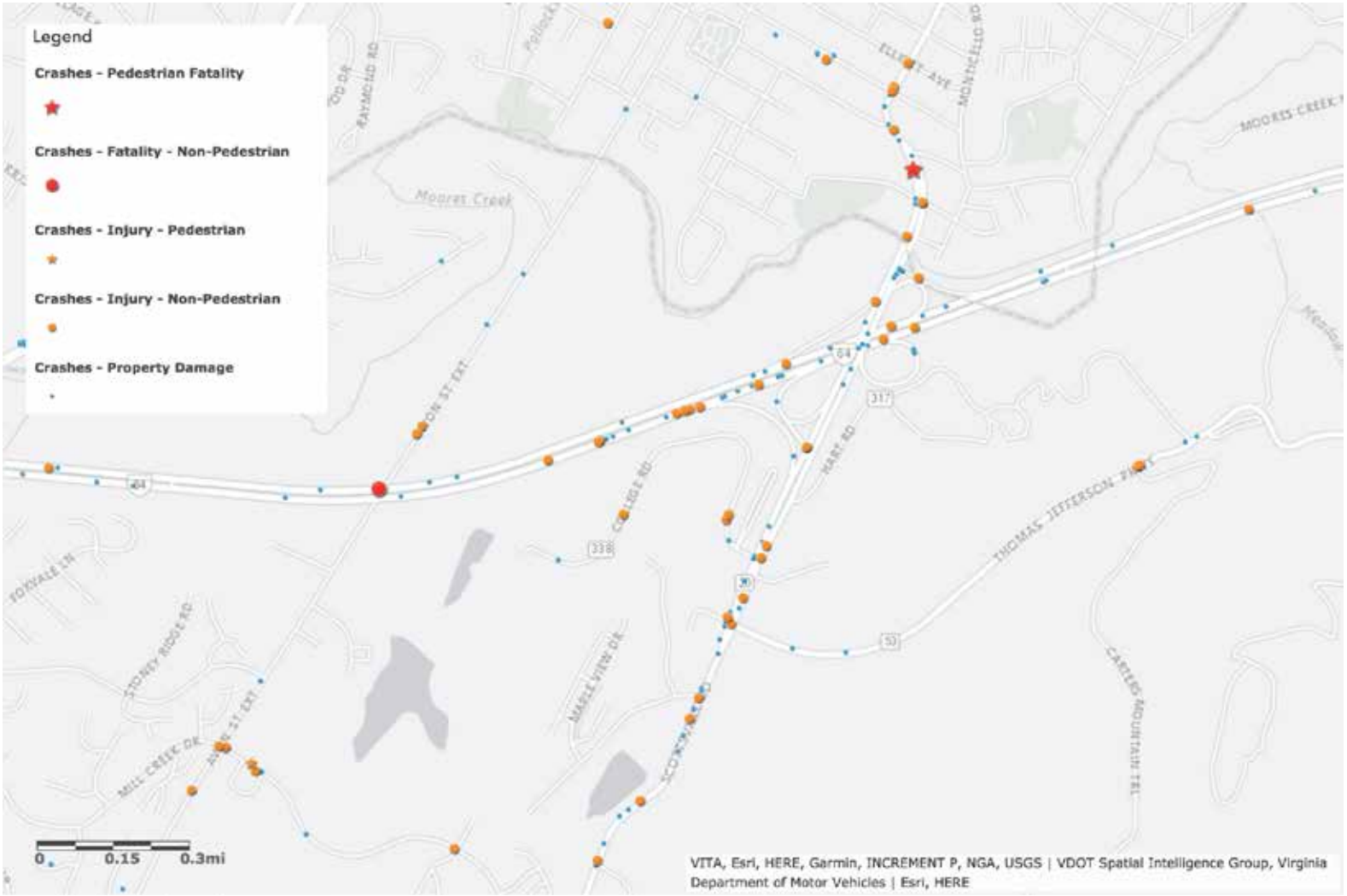
VirginiaCreeperTrailClub@gmail.com

Notable Take-Aways:

- **The trail is a major economic driver in Southwest Virginia, generating millions in economic activity and tax revenue. Businesses have formed and clustered around the trail.**
- **The trail is popular and users return over and over, despite its remote location.**
- **The $2/visit spend for local visitors is interesting and likely directly applicable to our users as a minimum. Damascus does not have the tourist infrastructure to meet its business opportunities; Charlottesville does.**
- **If a connector is built, there are sites for businesses similar to those that serve Creeper Trail users.**
- **It is smart for localities to work together on trail infrastructure.**
- **The experience one has on the Creeper Trail is actually quite similar to the Saunders Trail--but the Saunders Trail (and its connector) are right next to a city.**

Crashes in Study Area

Safety for all road users is an important aspect of all transportation project. As noted in this report, most of the corridors studied present numerous safety risks for the pedestrians and cyclists who use them today. This map illustrates reported crashes in the study area, with fatal and injury crashes separated by pedestrian and non-pedestrian incidents. The map includes crashes from December 2014 to March 2017, as provided by the VDOT Spatial Intelligence Group and the Virginia Department of Motor Vehicles.[1]



1 VDOT Spatial Intelligence Group Crashes Map
http://services.arcgis.com/p5v98VHDX9Atv3l7/arcgis/rest/services/Crashes/FeatureServer

Shared Use Path Level of Service (LOS) Lookup Table

Table 17. Shared-use path service volume look-up table, high pedestrian mode split.

		Trail Width (feet)						
		8	10	12	14	16	18	20
Level of Service	A	13	13	13	13	35	51	62
	B	26	26	57	77	95	105	114
	C	26	52	105	120	140	149	156
	D	58	82	143	156	179	187	194
	E	87	110	177	189	215	223	229
	F	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table shows maximum trail volume (one direction per hour) in each LOS category

1 ft = 0.3 m

Table Assumptions

Mode split is 25% adult bicyclists, 50% pedestrians, 15% runners, 7.5% in-line skaters, and 2.5% child bicyclists.

An equal number of trail users travel in each direction (the model uses a 50%/50% directional split).

Trail volume represents the actual number of users counted in the field (the model adjusts this volume based on a peak hour factor of 0.85).

Trail has a centerline.

Source: Shared-Use Path Level of Service Calculator: A User's Guide

https://www.fhwa.dot.gov/publications/research/safety/pedbike/05138/05138.pdf