freshwater
LAND TRUST

RED ROCK TRAIL SYSTEM®

ACTION PLAN

ACKNOWLEDGMENTS

THANK YOU to the engaged leaders and residents of the Birmingham, Homewood, Irondale, and Fairfield communities and representatives from Jefferson County for their participation in this planning process and for their commitment to furthering the efforts of this study. Photos in this Action Plan donated by Crestwood Resident Allison Bains.

STEERING COMMITTEE

Amelia Muller	City of Birmingham
Darrell O'Quinn	City of Birmingham, Council
Ed Fields	City of Birmingham, Mayor's Office
Kelvin Datcher	City of Birmingham, Mayor's Office
Amy Zari	City of Birmingham, DOT
Josh Yates	City of Birmingham, Public Works
Shonae Eddins-Bennett	City of Birmingham, Parks + Recreation
Barakas Taylor	City of Fairfield, Council
Eddie Penny	City of Fairfield, Mayor's Office
James D. Stewart Jr.	City of Irondale, Mayor's Office
Michael 'Kaz' Kaczorowski	Regional Planning Commission of Greater Birmingham
Jennifer Andress	City of Homewood, Council
Emily Wykle	UAB President's Office
Amelia O'Hare	Lakeshore Foundation
Carlee Sanford	Ruffner Mountain
TC McLemore	Red Mountain Park
Darlene Negrotto	Vulcan Park + Museum
Jane Reed Ross	GMC, Senior Landscape Architect
Cheryl Morgan	At-Large, Retired Auburn Studio Director

TASK FORCE

Sheila Tyson	Jefferson County Commission, District 2
Dr. Mark Wilson	Jefferson County Department of Health
Brian Mishkin	Birmingham-Jefferson Convention Complex
David Fleming	REV Birmingham
Dr. Carlos Aleman	Hispanic Interest Coalition of Alabama
Dr. Rich Embrey	Blue Cross + Blue Shield of Alabama
Teresa Shufflebarger	UAB Live HealthSmart
Jonathan Stanton	Jefferson County Department of Health
Gus Heard-Hughes	Community Foundation of Greater Birmingham
Ivan Holloway	Urban Impact
J. John Oros	Greater Birmingham Convention + Visitors Bureau
Mashonda Taylor	Woodlawn Foundation
Estes Hughes	Economic Development Partnership of Alabama
Ryan Parker	Health Action Partnership
Dr. Olivia Affuso	UAB Minority Health Disparity Group

"RED ROCK TRAIL SYSTEM® IS MUCH MORE THAN A PLAN TO CREATE recreational trails, though that is one of the major goals and perks of the plan. Red Rock Trail System® speaks to a grander vision that addresses how people move and interact with their communities. Creating safe areas for people to walk and bike in their communities makes living a healthy lifestyle easier for people to achieve, but it is also an important consideration to ensure equitable access to resources for our residents that do not have access to a car or reliable transportation."

Jefferson County Health Officer,
Dr. Mark Wilson

CONTENTS

Action plan provided by:

alta

DYNAMIC CIVIL SOLUTIONS
CIVIL & TRANSPORTATION ENGINEERS

Alta Planning + Design prepared this report upon the request of Freshwater Land Trust with support from the Jefferson County Department of Health.

01 | INTRODUCTION

project background

In 2010, Freshwater Land Trust, under the Jefferson County Department of Health and the Health Action Partnership, received funding through a Centers for Disease Control "Communities Putting Prevention to Work" grant to develop a trail master plan for Jefferson County, Alabama. The purpose of this plan was to develop a feasible and "ground-truthed" master plan for trails and bicycle and pedestrian infrastructures that would promote active and healthy living, use of alternate modes of transportation, and protect regional waterways. The planning process was given the name "Our One Mile," and it exemplified the indispensable value of individual input in a plan designed to serve the public. The original planning effort laid the groundwork for future plans, including the 2019 B-Active and 2020 Jefferson County Active Transportation Plans (see map on the page 5 for a network summary and recommendations from previous plans). Since the 2010 trail plan was developed, 127 miles of trails and on-street bike facilities have been constructed in both Birmingham's downtown core and adjacent municipalities and neighborhoods. Notable and iconic projects include Rotary Trail, High Ore Line Trail, and Hugh Kaul Trail.

Red Rock Trail System® presents an inclusive "roadmap" for a regional greenway (off-street) and street-based trail system to connect communities across Jefferson County. The master plan proposes over 200 miles of trails along six main corridors, as well as over 600 miles of street-based bicycle and pedestrian pathways that will connect the corridors with surrounding areas. Upon implementation of the plan, citizens will be able to walk, run, and ride bicycles for routine transportation and recreation, which will improve the quality of life of the people of Jefferson County and attract new residents and businesses, which will sustain future economic growth in our communities.

Red Rock Trail System® Action Plan aims to advance the community vision of Red Rock Trail System®. With this effort, Freshwater Land Trust can **evaluate the feasibility of future trail corridors to design in conjunction with their currently identified Priority Projects** (see map on page 5). The seven corridors identified in this document will promote the development of a **continuous loop trail around the Greater Birmingham Metropolitan Area.**

goals + project vision

This Action Plan sought to evaluate existing conditions of Red Rock Trail System®, gather data and stakeholder input, and develop a strategy to **provide a future loop trail around the Greater Birmingham Metropolitan Area in a feasible and equitable manner.** With input from stakeholders, Freshwater Land Trust identified the following three goals to support this study:

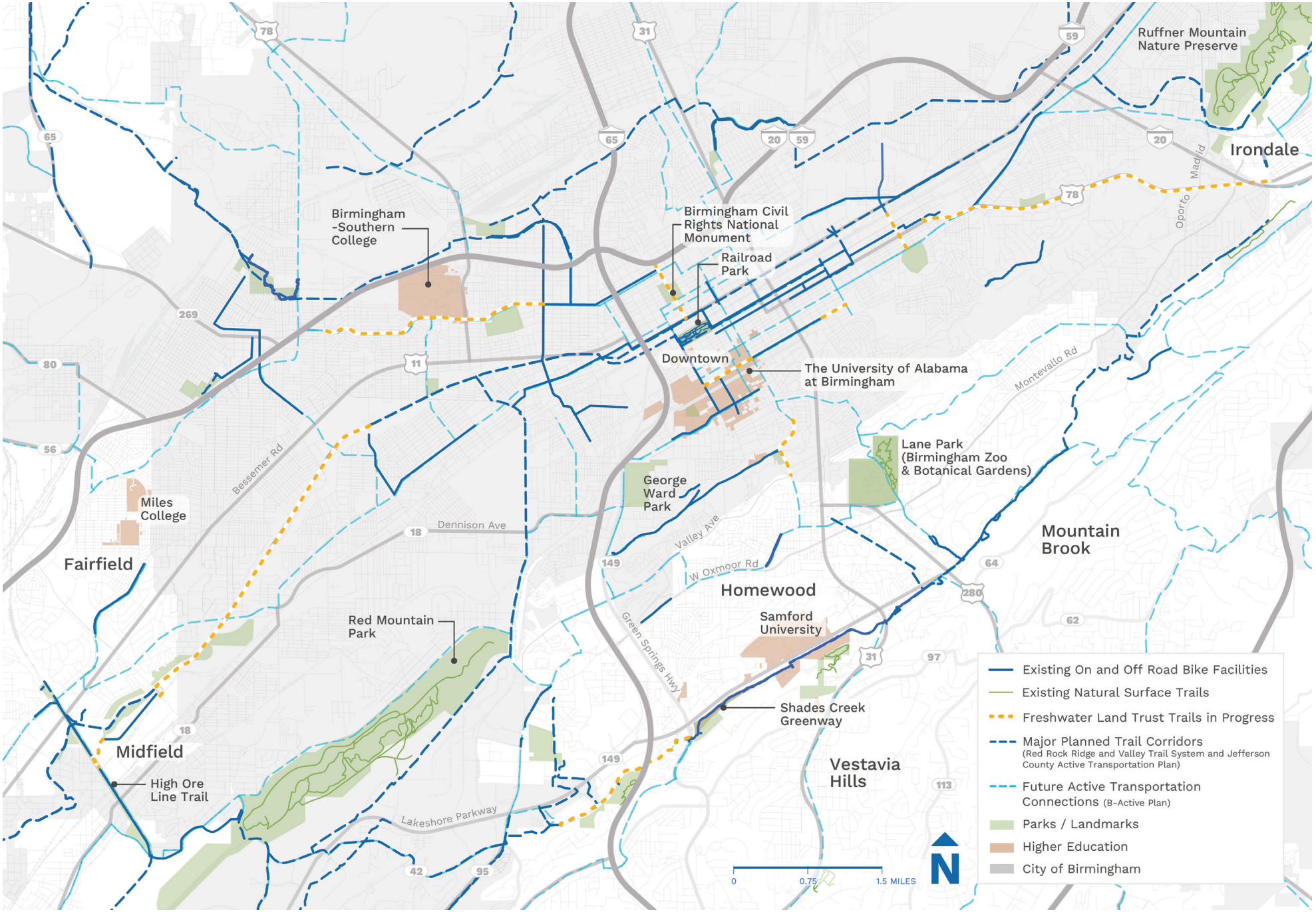
GOAL 1:
Identify up to seven priority trail corridors that maximize user comfort, safety, and experience, ultimately creating the backbone for a trail loop around Jefferson County for people of all ages and abilities.

GOAL 2:
Focus implementation on providing equitable connections to active transportation options in historically disadvantaged communities.

GOAL 3:
Provide anchor points for local neighborhoods to connect to Red Rock Trail System® in the future.

These three goals guided the study process and informed the recommendations contained in this document.

EXISTING CONDITIONS + PREVIOUS PLANS MAP



planning efforts to date

The Red Rock Action Plan builds on numerous prior plans to provide a comprehensive and detailed review of opportunities and constraints for Red Rock Trail System®, informed by extensive stakeholder outreach and current best practices in trail and active transportation design.

In 2010, Freshwater Land Trust and the Jefferson County Department of Health joined forces to develop **The Red Rock Ridge + Valley Trail System Master Plan** to protect the region's waterways, while promoting active modes of transportation and healthy lifestyles for the people of Jefferson County, Alabama. The purpose of the master plan was to provide a guide for developing a regional trail system to connect communities within the county with a new active transportation network. Over 200 miles of trails were identified through the planning process, with over 600 miles of additional connector routes identified, in addition to the major corridors. While the plan was an excellent starting point to establishing a comprehensive trail network in Jefferson County, the scale of the original Master Plan did not provide a detailed feasibility analysis of proposed corridors. **The Red Rock Action Plan provides deeper planning and design guidance on how to fill in the gaps within the existing network in order to build a circuit of trails around the Greater Birmingham Metropolitan Area** (see page 15 for the proposed loop).

= indicates that goal is part of this Action Plan

PLAN NAME	YEAR	PROJECT GOALS + KEY TAKEAWAYS
red rock ridge + valley trail system	2010	• Develop a meaningful network of trails and paths that links people with important destinations both locally and regionally • Provide a safe environment for people to walk and cycle • Stimulate economic growth via new jobs in construction, increased tourism, new industries related to active use, decreased healthcare costs, improved property values, and the recruitment of new businesses to our community
alabama statewide bicycle + pedestrian plan	2017	**GOAL A:** Improve safety for bicyclists and pedestrians of all ages and abilities 1. Identify and address high priority safety locations and corridors 2. Educate users on safe interactions among motorists, bicyclists, and pedestrians 3. Implement laws and regulations consistently **GOAL B:** Develop complete and connected bicycle and pedestrian systems 1. Expand and improve bicycle and pedestrian networks along state highway corridors 2. Incorporate bicycle and pedestrian needs in all phases of project development, routine maintenance, and system preservation 3. Coordinate state improvements with local and regional goals and objectives

= indicates that goal is part of this Action Plan

PLAN NAME	YEAR	PROJECT GOALS + KEY TAKEAWAYS
alabama statewide bicycle + pedestrian plan (cont.)	2017	**GOAL C:** Support state, regional, and local economic development 1. Link bicycle and pedestrian systems with other modes of transportation 2. Promote bicycle and pedestrian connectivity in major employment and activity centers **GOAL D:** Increase travel options for all transportation system users and protect the natural environment 1. Expand and improve bicycle and pedestrian access to basic goods and services such as food, education, health care, parks, and transit 2. Encourage walking and bicycling for shorter everyday trips (e.g., school, shopping, social) 3. Preserve and protect the natural environment
b-active: active transportation plan for the greater birmingham region	2019	**1. CONNECT:** *The Greater Birmingham Area is connected through a network of low-stress bicycle facilities.* • Build connected bicycle facilities • Remove gaps in the sidewalk network • Provide active transportation linkages to existing transit routes and stops • Provide users the choice to make trips to key destinations on a bike or walking **2. ACCESS FOR ALL:** *The future network of facilities improves (1) access to active transportation routes for the entire region, and (2) access for more ages and abilities to use the system.* • Provide infrastructure access points all around the region • Provide guidelines to designing facilities that are safe enough for any type of active transportation user • Provide users the choice to make trips to key destinations on a bike or walking **3. PROTECT USERS:** *Implementation of the plan decreases the number of bicycle and pedestrian crashes.* • Record and analyze yearly crash data. • Implement countermeasures at key intersections and streets that have high-density of bike/pedestrian crashes **4. MORE USERS:** *The number of people using active transportation grows as the system is implemented.* • Implement system for measuring the number of people using the existing active transportation system • Create yearly progress reports in tandem with new active transportation infrastructure **5. POLICY SUPPORT:** *The network of infrastructure is supported by policies that encourage safe travel for all road users.* • Adoption of Complete Streets ordinances and policies by municipalities within the region • Create design guidelines for facility construction • Identify funding mechanisms for implementation **6. EDUCATE:** *Residents of all types—students, families, children, etc.—have opportunities to learn about the benefits of active transportation and associated laws and safe practices.* • Host annual safety and encouragement event supporting all modes of transportation • Implement biking and walking safety training in schools within the region **7. PRIORITIZE, IMPLEMENT, + MAINTAIN:** *Key connections in the network of facilities are strategically prioritized to create a smooth path to implementation. A variety of different funding mechanisms are identified to implement and maintain the network.* • Identify "low-hanging fruit" projects and highly prioritized projects to implement first • Provide a general timeline for implementing identified projects • Encourage municipalities to include a maintenance schedule in annual budgets

a trail system for everyone

Corresponding with the goals of the Statewide Bicycle and Pedestrian Plan and the B-Active Plan, this Action Plan makes recommendations to provide safe, comfortable, and equitable trails for all ages and abilities. **All Ages and Abilities users include children, seniors, women, people riding bike share, people of color, low-socioeconomic status riders, people with disabilities, confident cyclists, people delivering goods or cargo via cycling, as well as all types of walkers and runners.** Based on NACTO's Designing for All Ages + Abilities: Contextual Guidance for High-Comfort Facilities, bicycle facilities were chosen based on the adjacent roadway context including Target Motor Vehicle Speed, Target Motor Vehicle Volume (average annual daily traffic), Motor Vehicle Lane Count, and Key Operational Considerations.

Based on these contextual factors, a combination of the following facility types were utilized to ensure access for all:

- Bicycle boulevards
- One-way buffered bike lanes
- Two-way cycle tracks
- Sidepaths and greenways

By utilizing facility types based on the context at hand, we can ensure the greatest number of people will feel safe on the trail system.

DISPLACEMENT + GENTRIFICATION

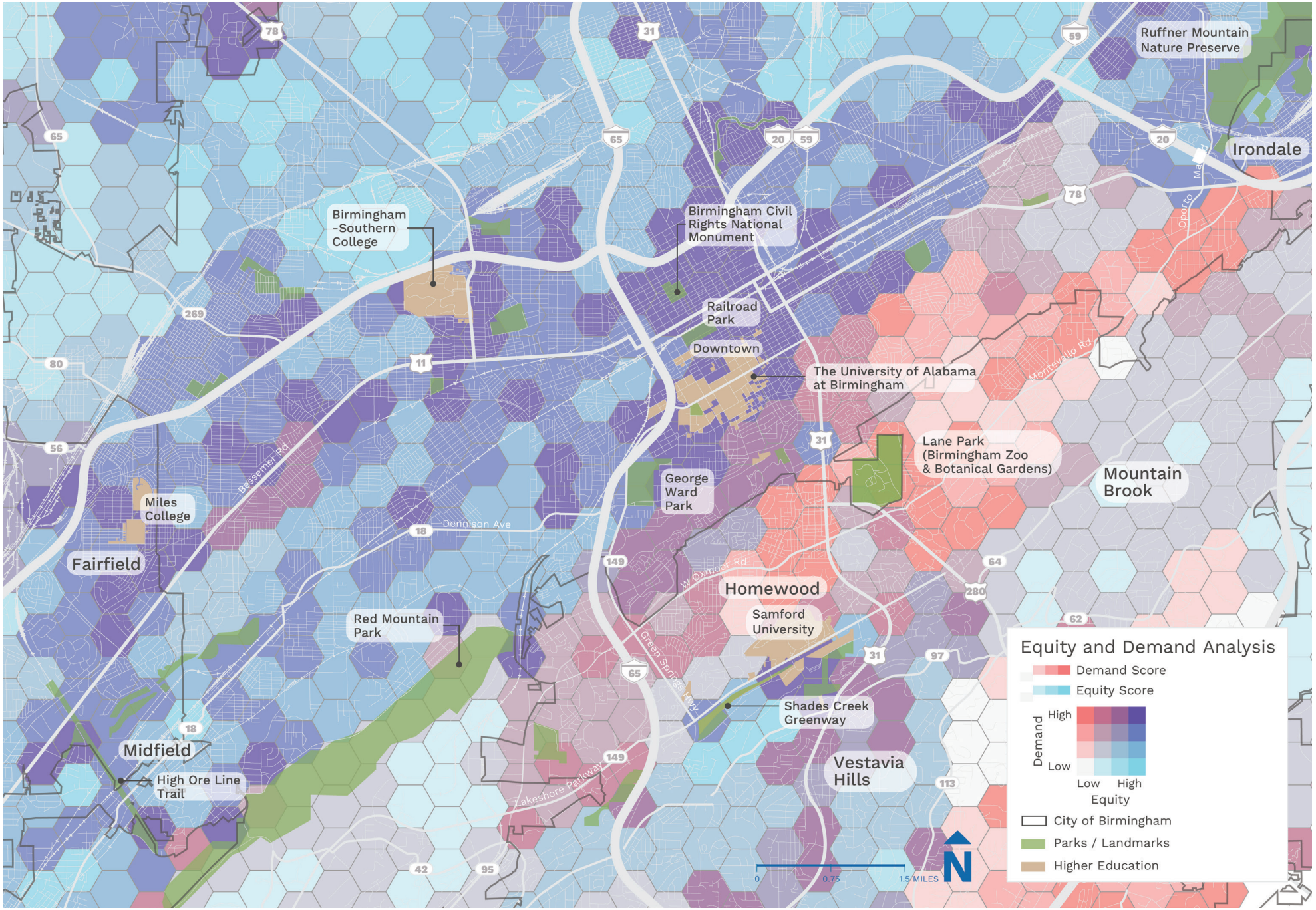
Speculation around active transportation infrastructure benefits and affordability are very common when new investments are being made within communities. Residents may voice concerns that trails and bikeways will contribute to displacement, gentrification, and housing cost increases. At the same time, these transportation facilities can help reduce household transportation costs or provide safe places to bike for those who cannot afford to own a vehicle. In the past, investment has not been made in some neighborhoods at the same rate as other parts of Birmingham. Working in partnership with community facilitators, efforts to promote a transparent and collaborative decision-making process will ensure that active transportation and other investments in the community serve existing and long-term residents and their mobility needs.

For the Red Rock Action Plan, priority corridors were determined using a comprehensive equity demand model. This tool is valuable for understanding where service is most needed during planning. Once the priority corridors advance to the design stage, outreach strategies should be created that use community-led approaches to create infrastructure and programs tailored to neighborhood needs. By engaging residents in creating a shared vision for active transportation and greenspace, projects become a part of the existing community fabric. Project partners should work closely with municipalities to pursue a comprehensive approach to housing and transportation affordability since they are not mutually exclusive.

EQUITY + DEMAND ANALYSIS

The map on the facing page, page 9, identifies the highest areas of equity need and demand. Equity was assessed by five socioeconomic factors (age, income, access to a vehicle, race, and limited English proficiency) to estimate where there are higher concentrations of people who are dependent on active transportation modes and would benefit most from active transportation infrastructure improvements. Demand was tabulated by where people live, work, play, shop, learn, take transit, and access community services.

EQUITY + DEMAND ANALYSIS MAP



02 | STUDY

study process

In pursuit of the project goals, three stages of work were completed and are documented in the remaining sections of this report.

PHASE 1: STUDY

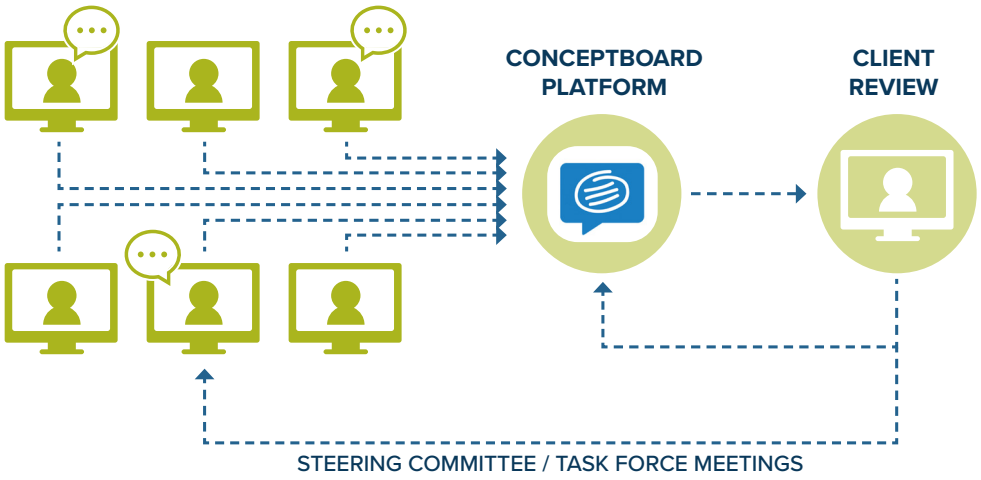
The first project stage, documented in Section 2, included research, stakeholder outreach, and field investigation to learn about conditions along the corridor, understand community needs and preferences, and identify corridor alignments that would meet applicable design standards, while minimizing costs and negative impacts to the environment and communities.

PHASE 2: DESIGN

The second stage of work, documented in Section 3, focuses on detailed design concepts for seven trail corridor alignments. Design solutions were developed to overcome constraints and capitalize on opportunities within each proposed corridor.

PHASE 3: IMPLEMENTATION

To guide Red Rock Trail System® from vision to reality, the third stage of work created a strategy for funding and implementation of the conceptual designs. Section 4 includes order-of-magnitude cost estimates for trail construction, recommendations for a phased strategy to build the trail segments, identification of funding sources, and recommendations for local, state, and federal partnerships.



steering committee

As part of Phase 1 of this process, a diverse group of stakeholders gathered from the Jefferson County region as a Steering Committee to guide and provide feedback on the proposed trail corridors. The Steering Committee members were selected for their ability to help guide overall plan development and support big picture context for Red Rock Trail System®. This group was vital in helping the planning and design team with the implementation portion of the report and with understanding local compliance issues important to facilitating the long-term build out of the trail system.

- City of Birmingham, Council
- City of Birmingham, Mayor's Office
- City of Birmingham, DOT
- City of Birmingham, Public Works
- City of Birmingham, Parks + Recreation
- Regional Planning Commission of Greater Birmingham
- City of Homewood, Council
- City of Fairfield, Council
- City of Fairfield, Mayor's Office
- City of Irondale, Mayor's Office
- UAB President's Office
- Lakeshore Foundation
- Ruffner Mountain
- Red Mountain Park
- Vulcan Park + Museum
- GMC
- At-Large, Retired Auburn Studio Director

How do local and regional stakeholders envision the trail meeting the needs of the many people who currently walk and bicycle within Jefferson County - and the many more who do not? What existing trail design standards can be applied to meet the unique conditions of Red Rock Trail System®? How can data be used to identify and evaluate opportunities and constraints along the proposed corridors? These questions were used to determine the most community-supported alignments with the highest level of technical feasibility and the biggest impact to equity.

task force

Task Force members were selected based on their expertise within key subject matter areas including the following: Community, Health, and Economic Development / Tourism. This group was instrumental in confirming the importance of the selected corridors and providing essential feedback on criteria (Phases 2 and 3). **The Task Force provided big picture guidance for ensuring that the priority corridors help to achieve local goals as they relate to those key subject matter areas.**

- Jefferson County Commission, District 2
- Jefferson County Department of Health
- Birmingham-Jefferson Convention Complex
- REV Birmingham
- Hispanic Interest Coalition of Alabama
- Blue Cross + Blue Shield of Alabama
- UAB Live HealthSmart
- Community Foundation of Greater Birmingham
- Urban Impact
- Greater Birmingham Convention + Visitors Bureau
- Woodlawn Foundation
- Economic Development Partnership of Alabama
- Health Action Partnership
- UAB Minority Health Disparity Group

meetings + interviews

Stakeholder engagement for the Red Rock Trail System® Action Plan began in November 2021 with a virtual kick-off meeting where the planning team shared the vision for this project and began to engage both the Steering Committee and Task Force to help understand the needs of the trail network ten years after the development of the original Red Rock Trail System® Master Plan. Committee Members and Task Force Members shared their vision through interactive Mentimeter surveys, online ConceptBoard mapping, and open discussion. This engagement guided the planning team in the selection of the initial 11 corridors for analysis - shown on page 13.

After the planning team conducted remote and on-site analysis of the 11 potential corridors, the seven priority corridors were selected and discussed with the Steering Committee in a series of three small group meetings in March of 2022.

Following these Steering Committee meetings, the Task Force was split into two small groups to meet virtually in April 2022 to confirm the selected preferred corridors and discuss criteria that can be used to establish a possible phasing strategy for implementation of each corridor moving forward.

In May 2022, the planning team reviewed the seven selected corridors with Freshwater Land Trust's Board to ensure transparency in the process and confirm that the plan was meeting organizational expectations.

corridor analysis

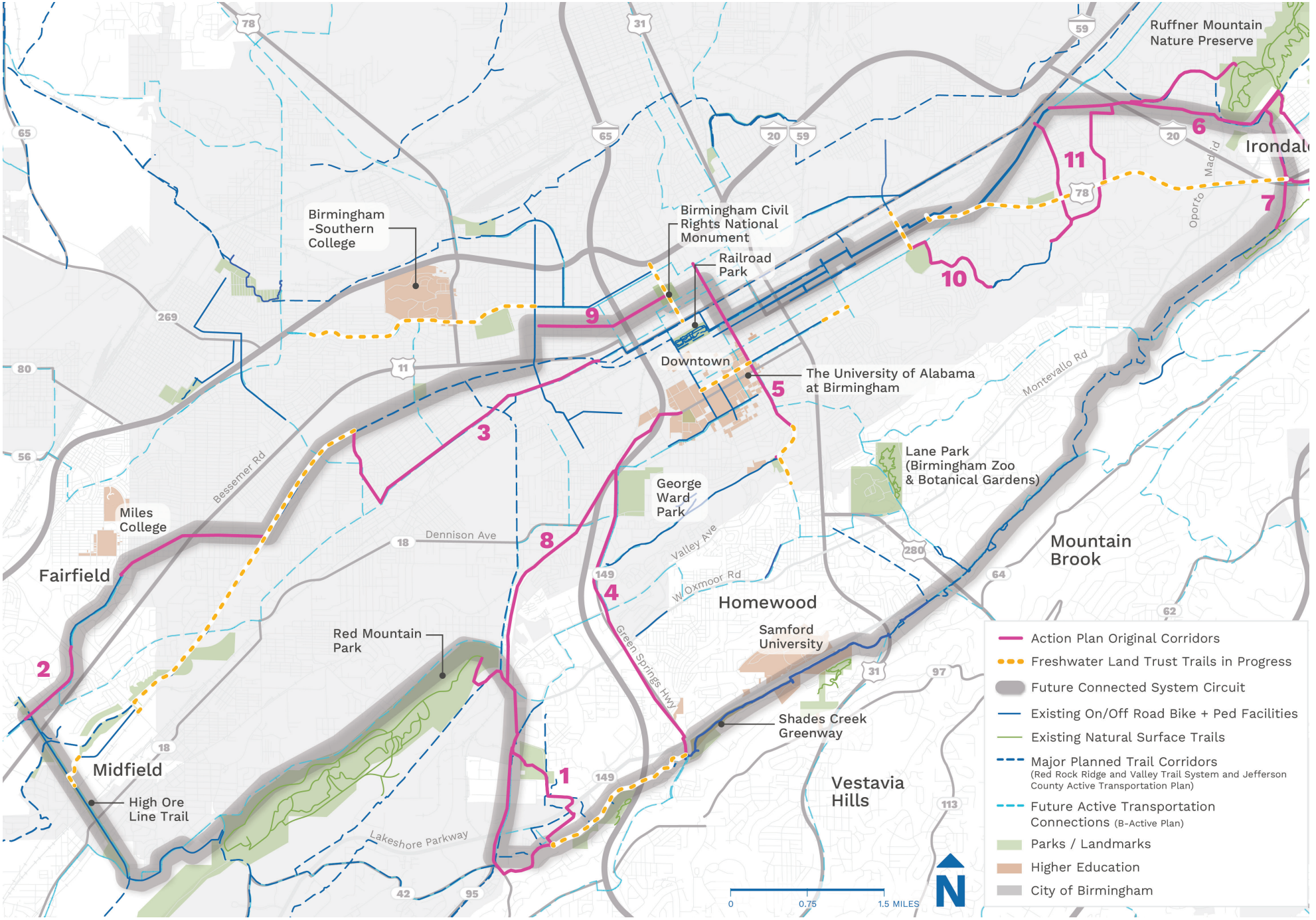
Based on Steering Committee and Task Force input in the kickoff meeting, the corridors shown in pink in the map on page 13 illustrate the routes considered for inclusion in this Action Plan. Those corridors are listed below (in no particular order):

1. Shades Creek Greenway to Red Mountain Park
2. MLK: High Ore Line to Valley Creek Rails-to-Trails
3. 4th Ave / 1st Avenue / Tuscaloosa Avenue
4. Green Springs Highway: University to Valley Avenue
5. 20th Street: 2nd Avenue S to 16th Avenue S
6. Georgia Road Diet / Ruffner Mountain Rail Trail
7. Flora Johnston Nature Park to Ruffner Mountain
8. Red Mountain Rail-with-Trail
9. 4th Avenue Downtown to Smithfield
10. Avondale Park to Clairmont Avenue Walking Trail
11. Clairmont Avenue Walking Trail to Woodlawn

These corridors were then analyzed using GIS mapping, Google Earth, and site reconnaissance to determine which routes best accomplished the goals established by the Steering Committee, the Task Force, and Freshwater Land Trust. **Some of the potential corridors were combined, and some shifted as feasibility analysis dictated.** While all of these routes would provide additional connectivity, several were removed based on the availability of more desirable routes to make similar connections and avoid areas with limited right-of-way and challenging topography. Some segments were chosen or affected by trails that are already in development (such as the Valley Creek Rails-to-Trails and the future extension of the Kiwanis Vulcan Trail to 20th St). Another example would be Green Springs Highway, which was removed from this Action Plan after the planning team engaged with Homewood representatives and discovered that new bicycle and pedestrian infrastructure projects were already in progress. These segments are noted as “FLT Trails in Progress” on the map on page 13.

The corridors of focus in the Action Plan provide the best **fit within the context of the goals for this Action Plan.**

RED ROCK TRAIL SYSTEM® CORRIDOR ANALYSIS MAP



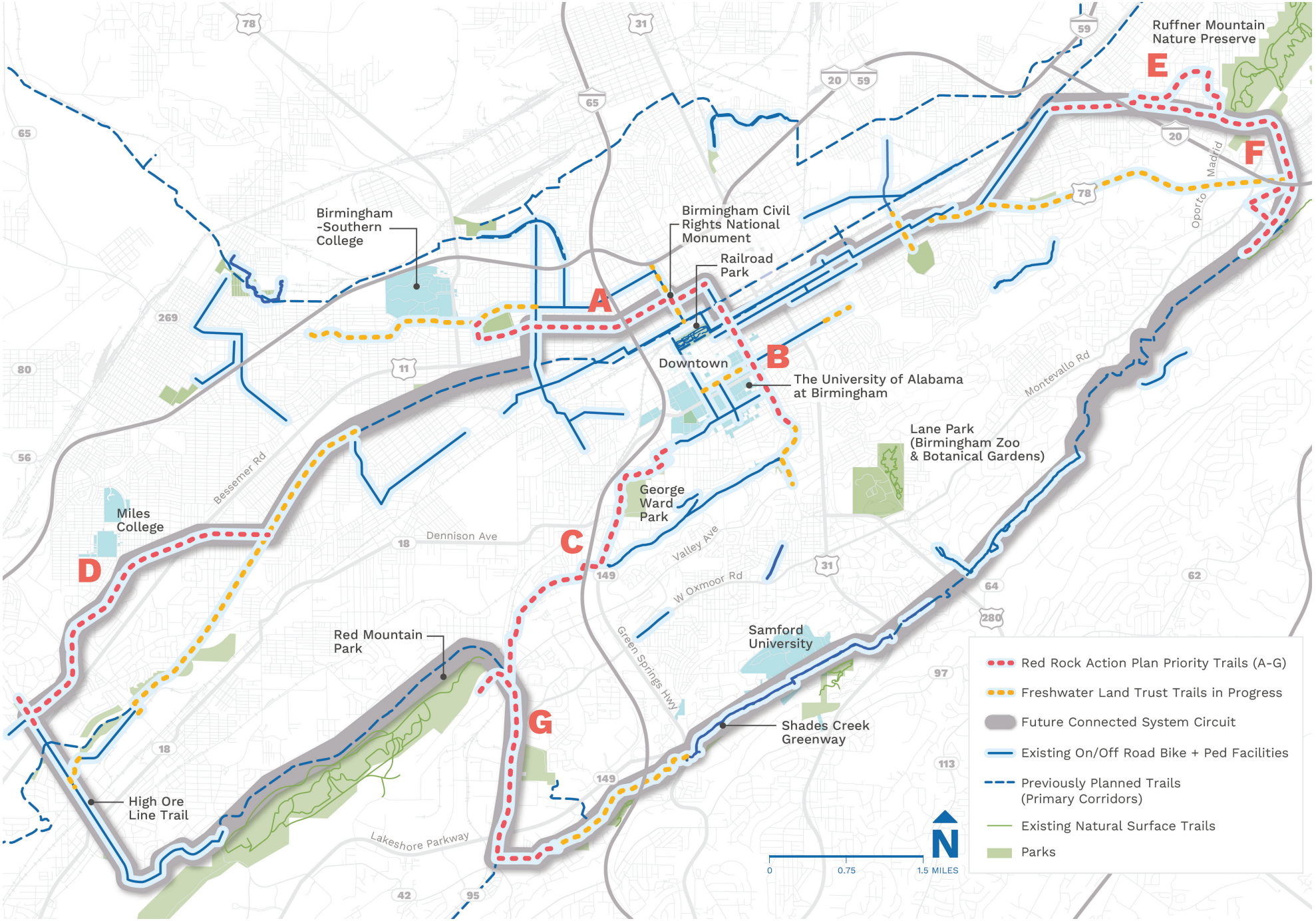
seven action plan priority corridors

After a thorough remote and on-site analysis of the 11 potential priority corridors, seven projects (illustrated on this page) were chosen for the following reasons:

- Their **contribution to the overall trail loop** around Jefferson County
- Their **ability to create equitable connections**
- Their **potential to provide anchor points for future spur connections** to other neighborhoods and local destinations

The corridors represent an equitable distribution around Jefferson County and begin to make essential connections in complex urban / suburban contexts that would not necessarily emerge as the obvious routes, but through comprehensive analysis, stand out as **the best available corridors to accomplish desired connections in Jefferson County.**

RED ROCK TRAIL SYSTEM® MAP - FUTURE TRAIL LOOP



03 | DESIGN

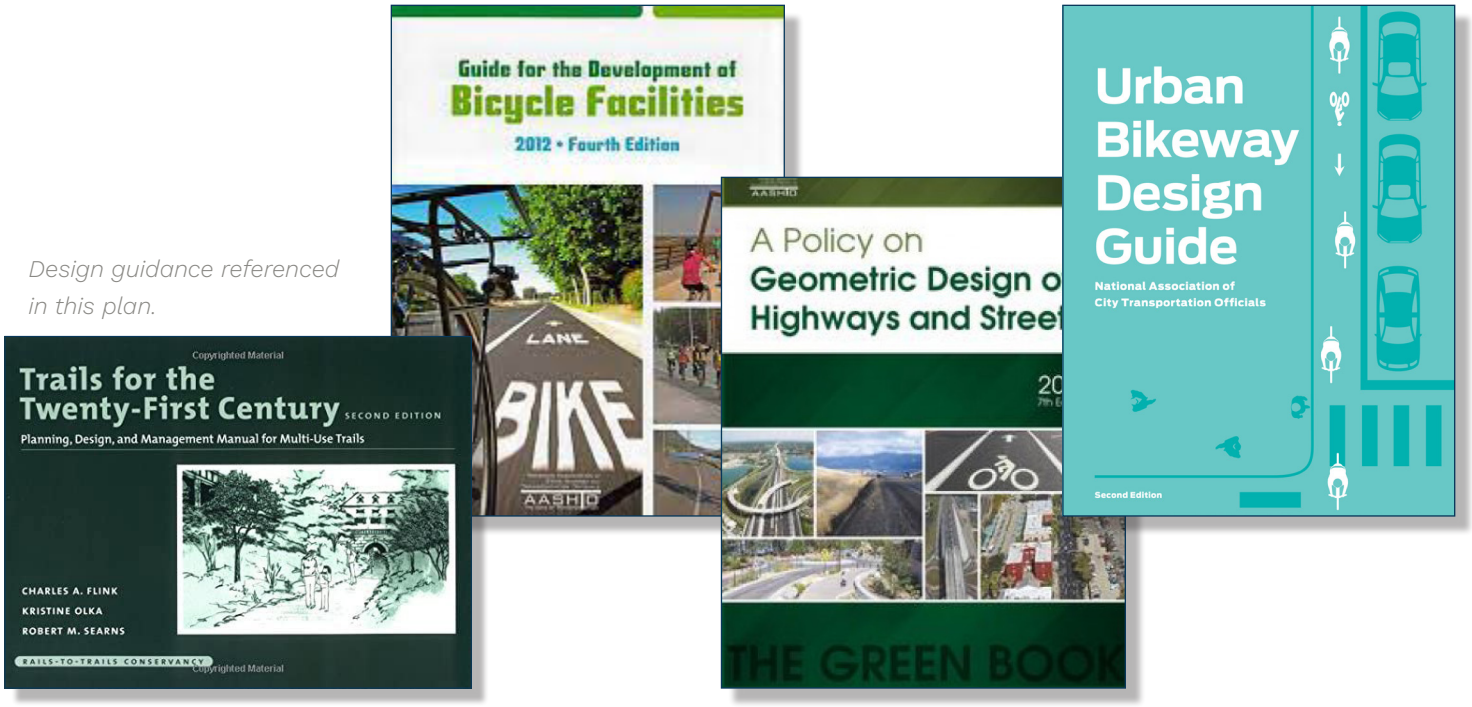
trail design guidance

The vision for a continuous trail loop around Jefferson County has guided the development of the proposed trail corridors in this section. Where appropriate, alternative alignments have been provided to illustrate the flexible spectrum of potential facilities within the overall Red Rock Trail System®.

Red Rock Trail System® designs in this plan utilize engineering judgment based on local context and conditions, incorporate best practices for bikeway facilities, and reference the following design guidance:

- American Association of Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (2012)
- AASHTO Policy on Geometric Design of Highways and Streets (2018)
- National Association of City Transportation Officials' (NACTO) Urban Bikeway Design Guide, Second Edition (2014)
- Trails for the Twenty-First Century, Second Edition (2001)

Design guidance referenced in this plan.



design objectives

Freshwater Land Trust is committed to ensuring that all Jefferson County residents have equitable access to the benefits that trails provide the community within one mile of their home. The following design objectives for Red Rock Trail System® were drawn from discussions with Freshwater Land Trust staff, the Steering Committee, and the Task Force. These objectives will ensure the best corridor selection to provide connections to the incredible assets of the Jefferson County region.

DEMAND

Trails should be designed in areas of high demand, i.e. areas where people live, work, recreate, shop, attend school, and access public transportation.

EQUITY

Trails should be designed in areas of high equity need:

- Areas with young or aging populations
- Areas with low-to-moderate median income
- Areas with high concentrations of limited English proficiency
- Areas with large percentages of non-white residents
- Areas with residents that do not have access to a motorized vehicle

CONNECTIVITY

Trails should be designed to connect with existing bicycle/pedestrian facilities, to Freshwater Land Trust projects, and to existing parks and destinations. **The ultimate vision for this Action Plan is to create a 36.25-mile loop that connects Railroad Park to Ruffner Mountain to Red Mountain Park, with spurs to other regional destinations.**

USER EXPERIENCE

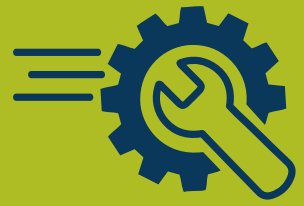
Trails should be designed to provide the best possible user experience, measured by facility type and posted speed limits of adjacent roadways.

PROGRAMMING / EVENTS

Trails should be designed to facilitate local and regional walking, running, biking, and other outdoor recreation events and programming.

SAFETY

Trails must be designed with user safety in mind, which includes separation from motor vehicle traffic and safety-oriented design features.



FEASIBILITY

Trails must be designed such that they can be reasonably constructed without major cost or engineering concerns where possible. Public property availability, existing topography, and cost per mile are major factors.

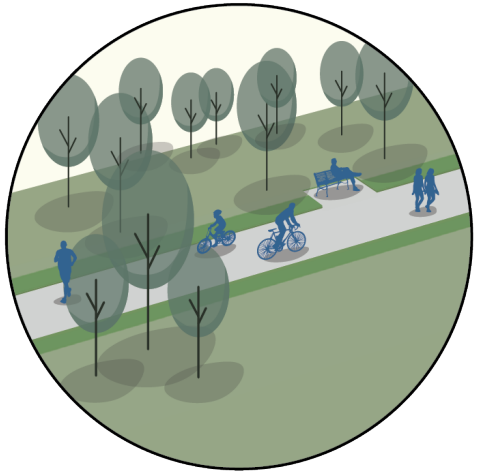
design vision

Seven trail typologies are recommended for Red Rock Trail System® priority corridors. Trail typologies were developed to increase comfort and encourage use from people of All Ages and Abilities (see page 8).

Priority corridors have a combination of these facilities to create broader connections to Jefferson County destinations and the greater bicycle and pedestrian network. **Well-designed and navigable transitions between these facility types and proper wayfinding signage will be critical** to ensure that the corridor feels seamless as the context changes.

See the following pages (20-47) for site-specific facility recommendations, implementation challenges, and opportunities for each priority corridor.

FACILITY TYPOLOGIES



GREENWAY

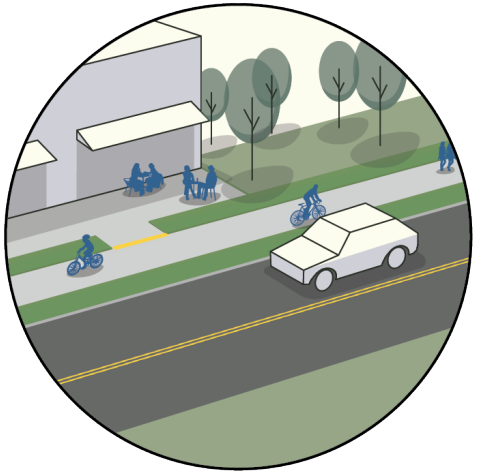
Greenway facilities create bicycle and pedestrian connections through utility easements, park / public-owned properties, and conservation areas.

Applicable Corridors

- C, D, E, F, G

Design Considerations

- 10-12’ width recommended (width should increase in corridors of high demand)
- 2’ min. mowed shoulder required on both sides of trail
- Rest areas recommended every 300’ where feasible
- Maintenance agreements and easements will need to be coordinated with property owners



SIDEPATH

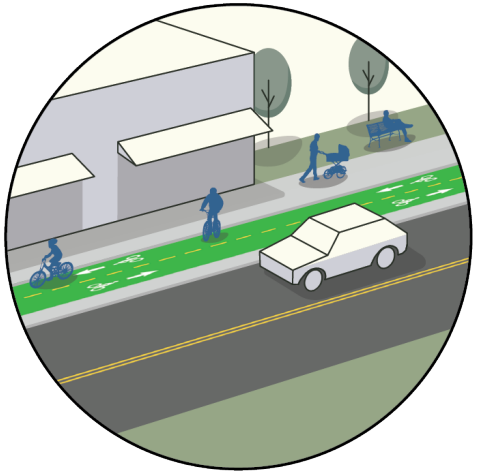
Sidepaths are trails directly adjacent to roadways and are applicable on segments with enough right-of-way to accommodate sidewalk widening.

Applicable Corridors

- A, C, D, E, F, G

Design Considerations

- 10-12’ width recommended (width should increase in corridors of high demand)
- 6-8’ min. planting strip buffer between travel lane and facility recommended where feasible
- Separation or buffer from frontage zones of buildings recommended where feasible



TWO-WAY CYCLE TRACK

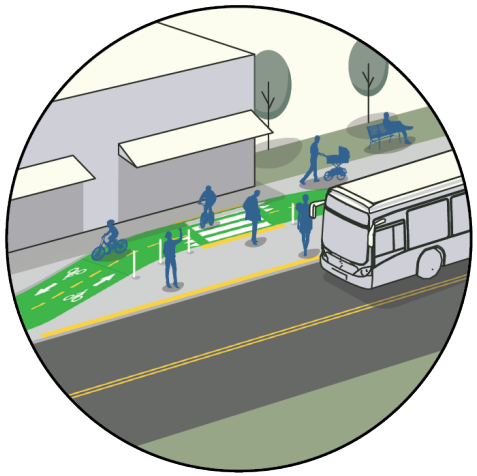
Two-way cycle tracks are applicable in areas of high demand where it may not be desirable to have a shared facility for bicyclists, pedestrians, and runners. Cycle tracks can be constructed through a lane width reduction / taking the parallel parking lane or travel lane.

Applicable Corridors

- A, B, C, D, F, G

Design Considerations

- 8-10’ width recommended for two-way bicycle travel
- 2’ min. width recommended for cycle track buffer
- Parking-separated cycle track will require 3’ min. buffer between parking lane and facility (door zone)
- Furniture zones are desired between the sidewalk and cycle track where space allows to minimize conflicts



FLOATING TRANSIT ISLAND

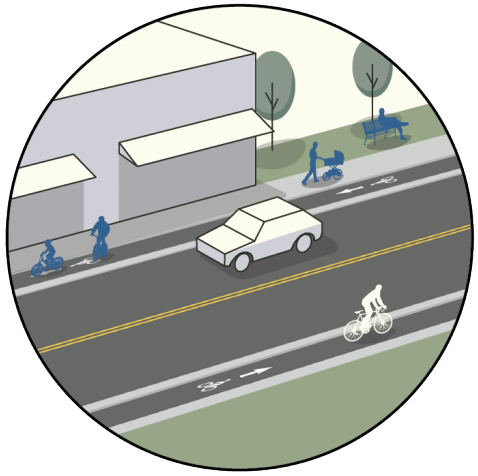
Floating transit islands are applicable at bus stops along segments where a cycle track is proposed in order to minimize conflicts between transit riders, buses, and bicyclists. This configuration creates space for transit riders to wait, board, and alight next to the travel lane while maintaining continuous throughput for bicyclists.

Applicable Corridors

- A, B, C

Design Considerations

- 8’ min. width for transit island platform
- Bollards / fencing, detectable warning strips, and crosswalk markings recommended where the bikeway is at-grade with the transit platform to channelize pedestrian crossings



ONE-WAY SEPARATED BIKE LANE

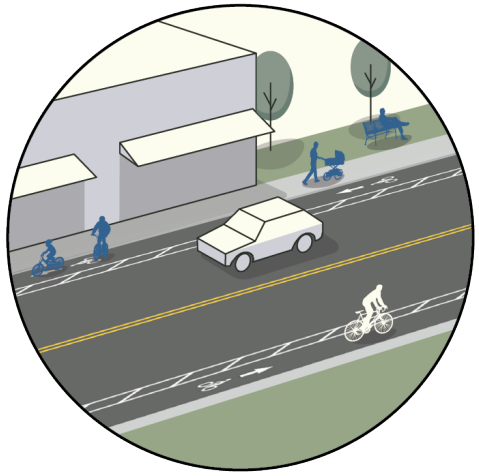
One-way separated bike lanes can be constructed with a raised curb (concrete or planting strip) or buffered with a parallel parking lane. Separated bike lanes can be constructed through a lane width reduction / taking the parallel parking lane or a travel lane.

Applicable Corridors

- B

Design Considerations

- 4’ min. width recommended for bike lane with a 2’ min. width for buffer (6-8’ width recommended for planting strip where feasible)
- Parking-separated bike lane will require 3’ min. buffer between parking lane and facility (door zone)
- Furniture zones are desired between the sidewalk and sidewalk-level bike lane where space allows to minimize conflicts



BUFFERED BIKE LANE

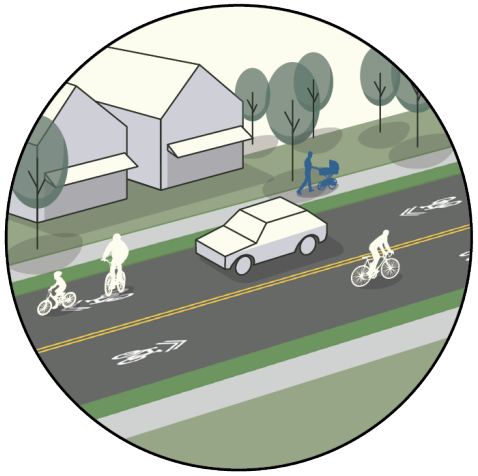
Buffered bike lanes offer more separation from vehicles than a conventional bike lane but do not require new curb construction. Buffered bike lanes can be constructed through a road diet / taking the parallel parking lane.

Applicable Corridors

- C

Design Considerations

- 4’ min. width recommended for bike lane
- 3’ min. width recommended for painted buffer (can include flex posts or movable planters if desired)
- Parking-separated bike lane will require 3’ min. buffer between parking lane and facility (door zone)



BIKE BOULEVARD

Bike boulevards (sharrows) are recommended on low-speed (<25 MPH), low-volume (<3,000 average annual daily traffic) streets that may not have enough right-of-way, demand, or pavement width for a separated facility.

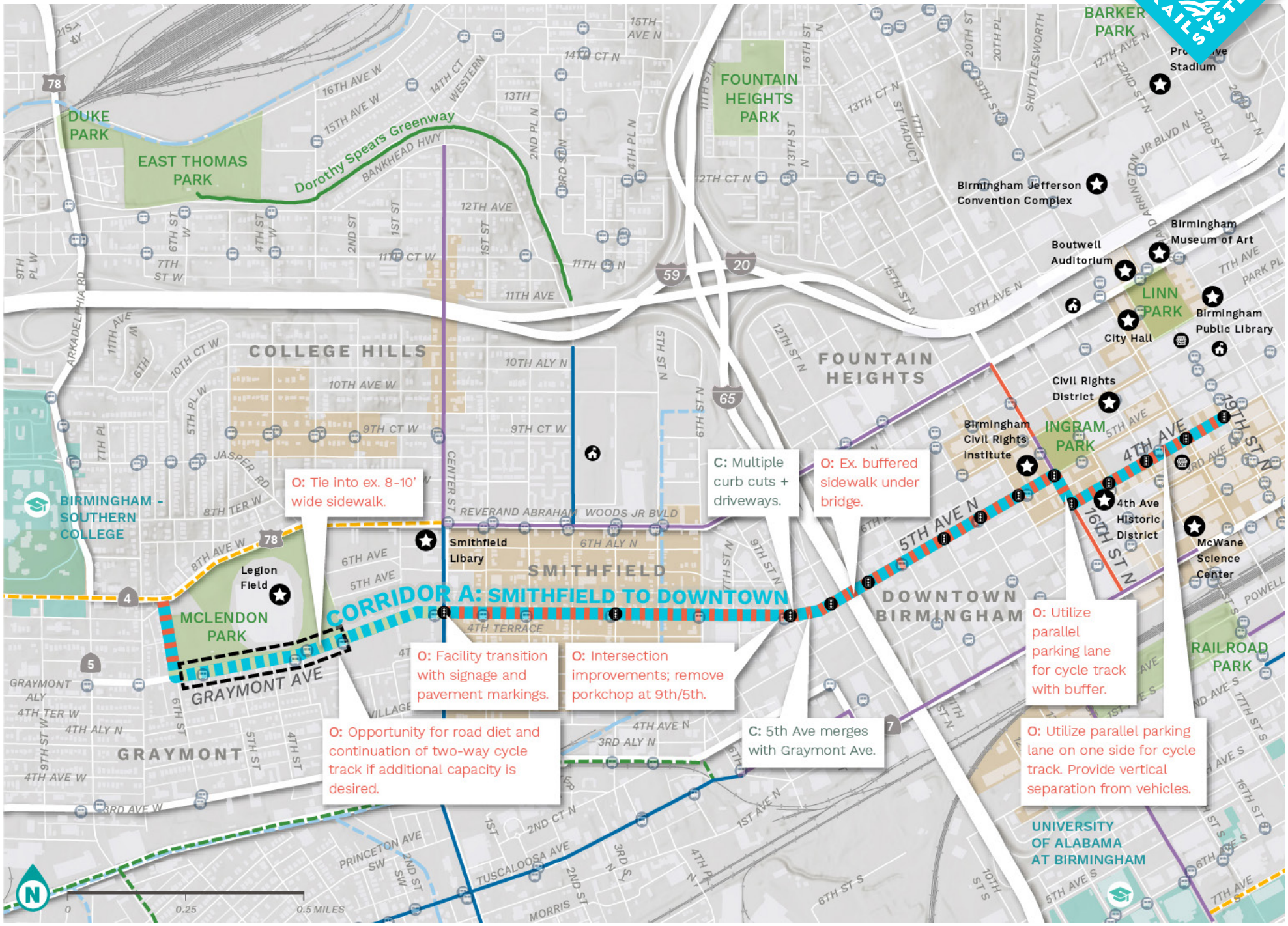
Applicable Corridors

- C, D, E, F, G

Design Considerations

- Traffic calming and raised crossings recommended along bike boulevards
- Sharrow markings should be placed in the middle of the travel lane to encourage bicyclists to use the whole lane (rather than bike on the shoulder)
- Wayfinding signage along these segments is critical to create clear connections

CORRIDOR A | SMITHFIELD TO DOWNTOWN



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Village Creek Corridor
- Two-way cycle track
- Sidepath

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

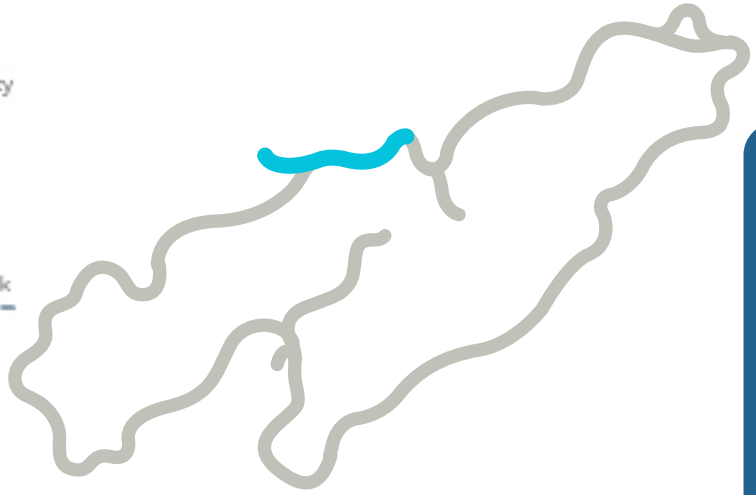
- Two-way cycle track
- Bike lane
- Bike boulevard
- Sidepath
- Natural surface trail
- Greenway
- Alternative Design Option

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Controlled crossing
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

This corridor connects the **Graymont / Smithfield neighborhoods** to important downtown civic and commercial destinations. The corridor begins on 4th Ave, **Birmingham's Historic Black Main Street,** and connects several culturally important landmarks, including **Kelly Ingram Park, the Birmingham Civil Rights Institute, and the AG Gaston Motel.** Heading west along 5th Ave N / Graymont Ave, the corridor connects to **Legion Field** and ties into the future Bush Hills Connector by **Birmingham-Southern College.**

TOTAL MILEAGE

2.57 MI (13,561 Linear Feet)

PROJECT COST (2024 $)

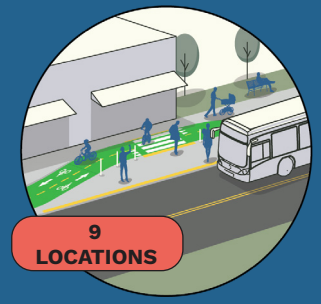
$4,876,425.13

FACILITY TYPOLOGIES FOR THIS CORRIDOR

SIDEPATH

TWO-WAY CYCLE TRACK

FLOATING TRANSIT ISLAND



EXISTING CONDITIONS AT 4TH AVE N

CORRIDOR A | SMITHFIELD TO DOWNTOWN

GRAYMONT AVE N + 9TH STREET N

annual average daily traffic

Graymont Ave: 4,000-5,000
5th Ave N: 4,000-5,000
16th St N: 1,200
4th Ave: 9,000

right-of-way

Graymont Ave: 70-80 Linear Feet (LF)
5th Ave N: 80 LF
16th St N: 70 LF (49 LF curb-to-curb)
4th Ave: 84 LF (54 LF curb-to-curb)

permitting needs

- NPDES General Permit

implementation (west to east)

Two-Way Cycle Track (E side of 6th St W to Graymont Ave)
Convert the four-lane undivided section to one lane in each direction with a two-way left turn lane.

- Assuming an existing pavement width of 40', implement 3-11' travel lanes and a 9' cycle track, no buffer

Sidepath (N side of Graymont Ave to Center St)
Utilize existing wide sidewalk. Add proper signage and pavement markings to incorporate transition to cycle track.

Two-Way Cycle Track (S side of Graymont Ave to 6th St N)
Convert the four-lane undivided section to one lane in each direction with a two-way left turn lane.

- 3-11' lanes leaves 15' from the 48' pavement section, so 12' two-way cycle track on the south side with a 3' vertical buffer
- Remove porkchop island at 9th St/5th Ave/Graymont Ave intersection
- Challenges: Facility transition at Center St intersection will be an important connection

Two-Way Cycle Track (S side of 5th Ave N to 16th St N)
Remove one lane and reduce two other lanes to 11' each. Keep on-street parking on the north side (7'), create a 5' floating transit island on the south side, and install 10' cycle track adjacent to the south side curb. A protected intersection is recommended at the SW corner of 16th St and 5th Ave.

- Challenges: A parking assessment may be required to see if removing a parking lane is feasible

Two-Way Cycle Track (W side of 16th St N to 4th Ave N)
Reduce lane widths and on-street parking areas to incorporate cycle track on 16th St.

- 2-11' travel lanes, 2-7' parking areas, and a 13' cycle track and buffer

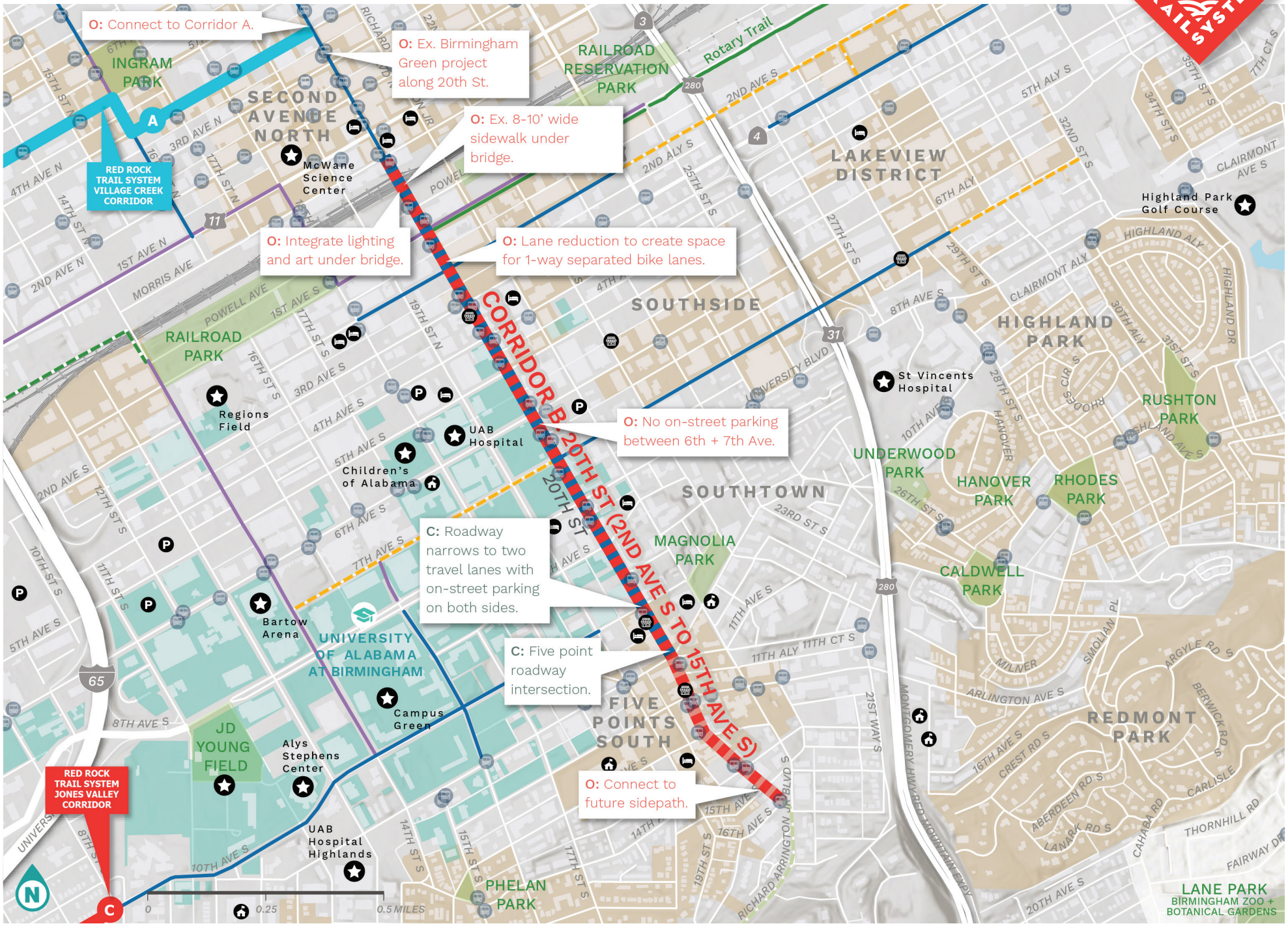
Two-Way Cycle Track (N side of 4th Ave to 19th St N)
Remove one travel lane or one on-street parking area to incorporate cycle track. The cycle track may be at level with traffic or raised at the level of sidewalk. A protected intersection is recommended at all intersections to avoid conflicts with right-turning vehicles.

- 2-11' travel lanes, 2-8' parking areas, and a 12' cycle track, 4' buffer, or;
- 3-11' travel lanes, an 8' parking area, and a 10' cycle track, 3' buffer
- Challenges: A parking assessment may be required to see if removing a parking lane is feasible; a traffic analysis will need to be performed to evaluate the feasibility of a lane removal

COORDINATING AGENCIES

- Parking - Birmingham Parking Authority
- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation
- Maintenance - City of Birmingham Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities (electric, gas, water/sewer, telephone, etc.) - Alabama Power, Spire, Birmingham Water Works + Sewer Board, AT+T, Charter, Brighthouse
- Transit - Birmingham Jefferson County Transit Authority
- Legion Field Stadium - City of Birmingham Parks and Recreation Board

CORRIDOR B | 20TH STREET



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Jones Valley Corridor
- Two-way cycle track
- One-way separated bike lane

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

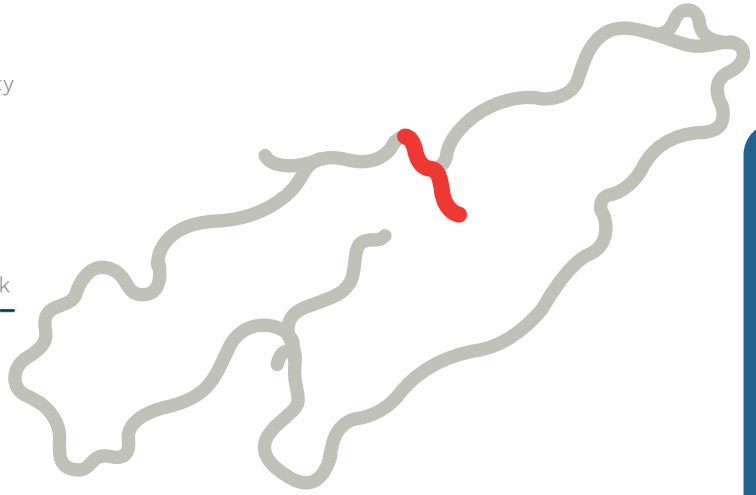
- Two-way cycle track
- Bike boulevard
- Natural surface trail
- Bike lane
- Sidepath
- Greenway

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Lodging
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

Corridor B is one of the most important and challenging corridors, as 20th St is a major commuter route and commercial corridor. The activity on both ends of this proposed corridor, **the Birmingham Green Project and the Kiwanis Vulcan Trail**, indicates the need to bridge the gap between these projects through downtown. Corridor B has the potential to transform the look and feel of the Five Points area by **reallocating right-of-way and prioritizing the trail connection.**

TOTAL MILEAGE

1.39 MI (7,323 Linear Feet)

TOTAL ESTIMATED PROJECT COST (2024 $)

$2,037,658.46

FACILITY TYPOLOGIES FOR THIS CORRIDOR

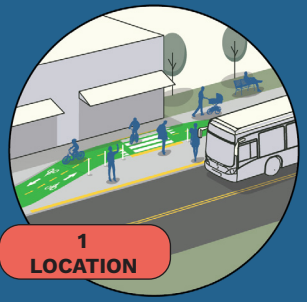
ONE-WAY SEPARATED BIKE LANE

4,923 Linear Feet PROPOSED

TWO-WAY CYCLE TRACK

2,400 Linear Feet PROPOSED

FLOATING TRANSIT ISLAND

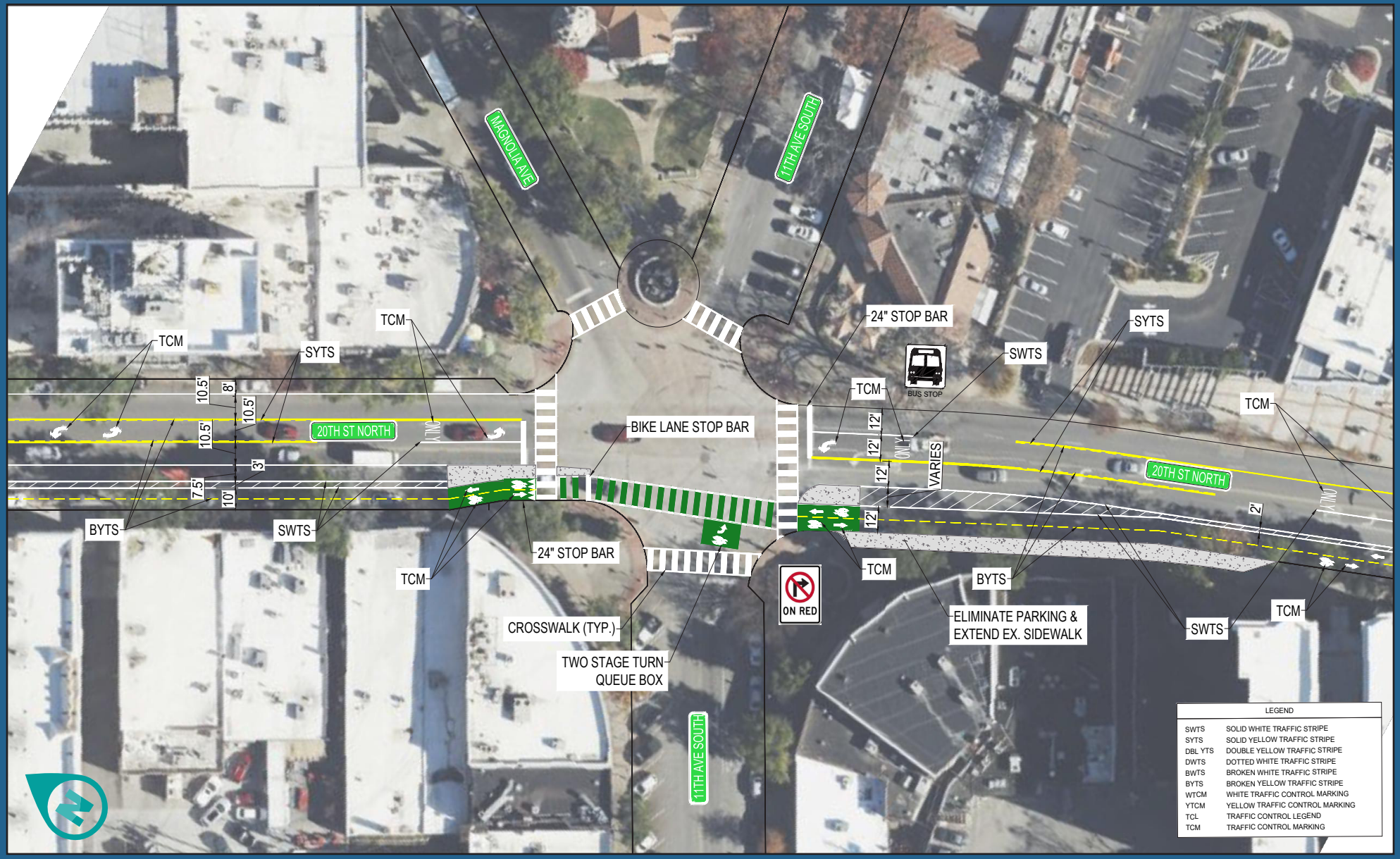


1 LOCATION

EXISTING CONDITIONS AT FIVE POINTS PLAZA

CORRIDOR B | 20TH STREET

FIVE POINTS SOUTH



annual average daily traffic

20th St: 8,000-13,000
10th Ave: 9,000

right-of-way

20th St: 100 Linear Feet (LF)
(~72 LF curb-to-curb)
10th Ave: 70 LF
(48 LF curb-to-curb)

permitting needs

- NPDES General Permit
- Tree removal – may require mitigation

implementation (north to south)

Separated Bike Lane (20th St, Morris Ave to 11th Ave S)

Convert the four-lane undivided section to one lane in each direction with a two-way left turn lane. Maintain on-street parking.

- 3-11' travel lanes, convert on-street parking to one-way, separated bike lane
- Integrate lighting + art under the bridge
- The transition from the wide sidewalk at Morris Avenue up to the bridge should happen by the bridge pier
- Challenges: A traffic analysis will need to be performed to evaluate the feasibility of a lane removal

Two-Way Cycle Track (W side of 20th St 10th Ave S to 16th Ave S)

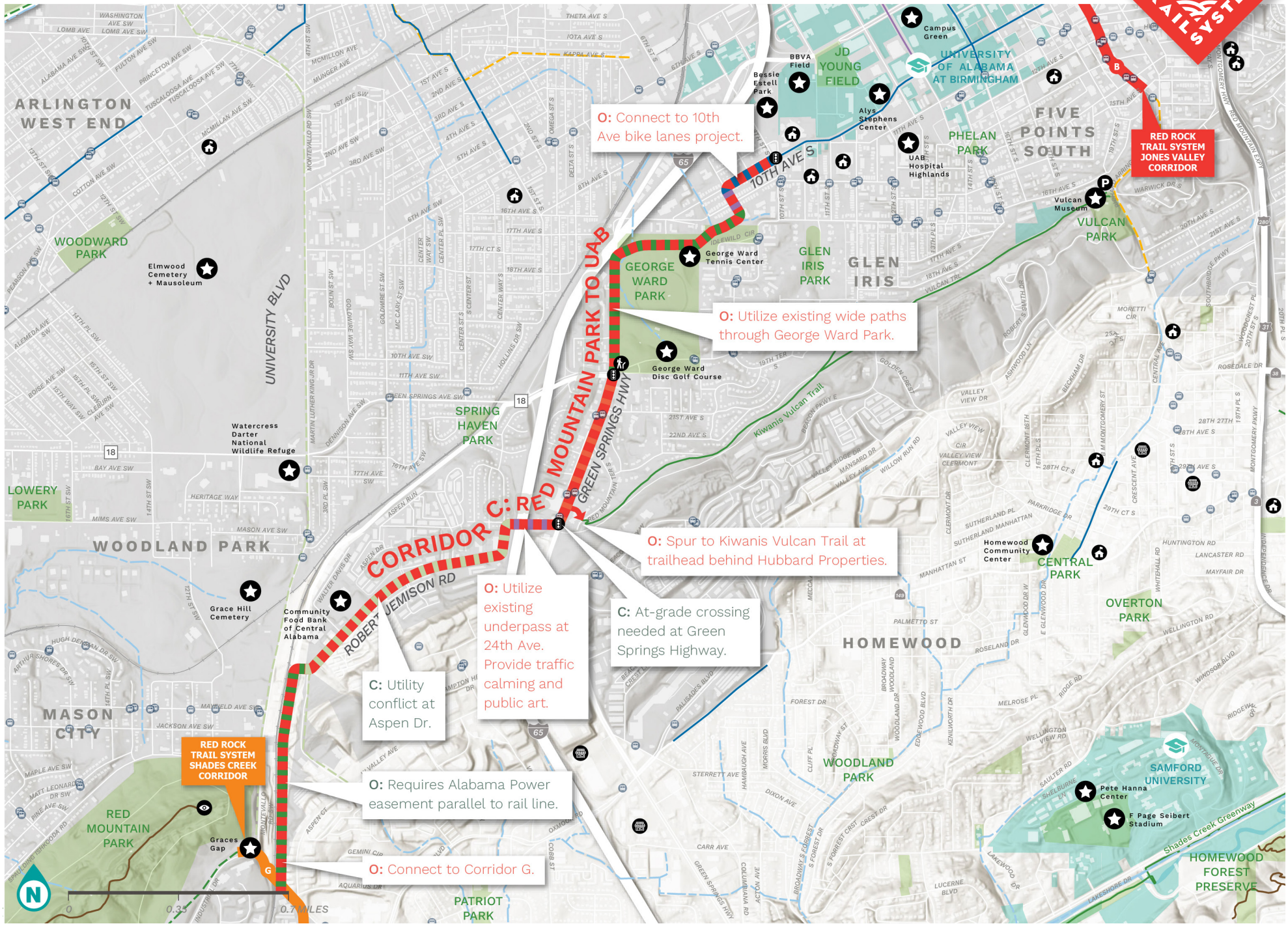
Convert the four-lane undivided section to one lane in each direction with a two-way left turn lane. Maintain on-street parking. Bike lane transitions to two-way cycle track in order to tie into the future sidepath that connects to the Kiwanis Vulcan Trail.

- 3-11' travel lanes, convert on street parking to two-way, separated bike lane
- Roundabout should be considered at Five Points intersection to increase safety. Or, traffic operations can be enhanced to protect turning vehicles with extended crossing time for bicyclists and pedestrians
- Consider streamlining traffic through the intersection by rerouting some of it to other intersections in order to improve safety and reduce delays
- Challenges: Cost of intersection improvements; a network evaluation will need to be performed to avoid congestion spillover if through movements are removed / signal timing altered

COORDINATING AGENCIES

- Parking - Birmingham Parking Authority
- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation
- Maintenance - City of Birmingham Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities (electric, gas, water/sewer, telephone, etc.) - Alabama Power, Spire, Birmingham Water Works + Sewer Board, AT+T, Charter, Brighthouse
- Transit - Birmingham Jefferson County Transit Authority
- Birmingham Green Project - REV Birmingham

CORRIDOR C | RED MOUNTAIN PARK TO UAB



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Jones Valley Corridor
- Two-way cycle track
- Greenway
- Bike boulevard
- Sidepath
- One-way buffered bike lane

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

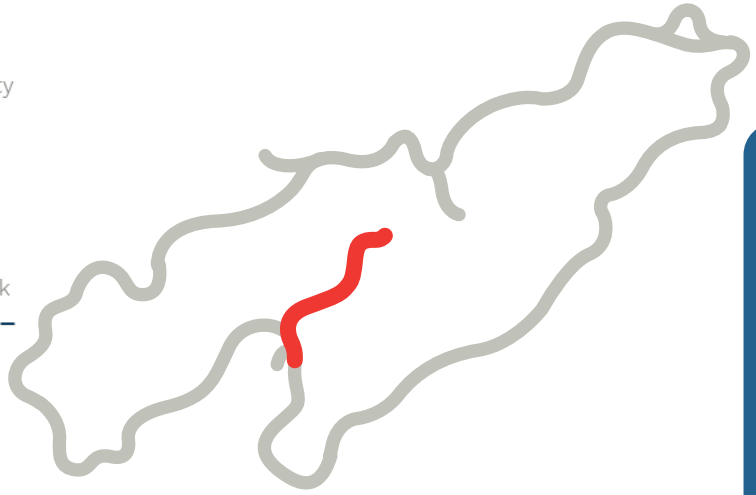
- Two-way cycle track
- Bike lane
- Bike boulevard
- Sidepath
- Natural surface trail
- Greenway

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Controlled crossing
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

As indicated by the numerous typologies necessary to implement this corridor, Corridor C is a complex route to connect **Red Mountain Park, George Ward Park, and the University of Alabama at Birmingham (UAB).** Corridor C will also provide a spur connection to the existing western terminus of the **Kiwanis Vulcan Trail**, providing an alternate route to experience the **sweeping vistas of Red Mountain**. In combination with Corridor G, this corridor will **link Downtown to the Shades Creek Greenway.**

TOTAL MILEAGE

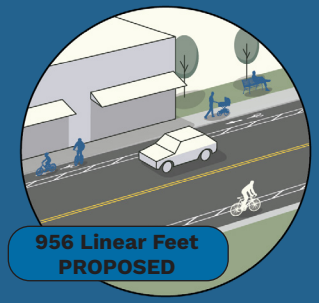
3.41 MI (18,013 Linear Feet)

TOTAL ESTIMATED PROJECT COST (2024 $)

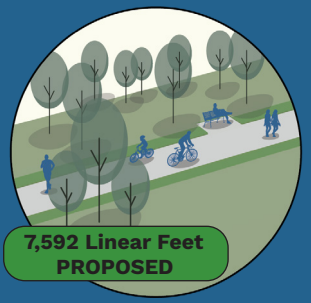
$5,647,150.70

FACILITY TYPOLOGIES FOR THIS CORRIDOR

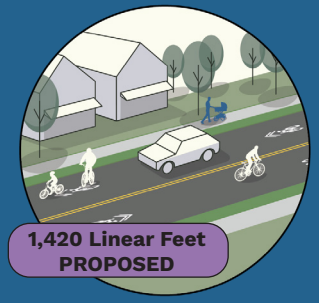
BUFFERED BIKE LANE



GREENWAY



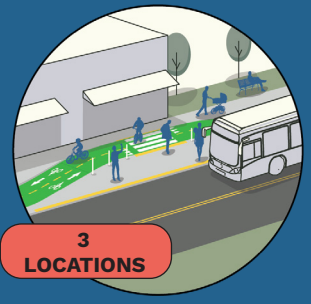
BIKE BOULEVARD



SIDEPATH

TWO-WAY CYCLE TRACK

FLOATING TRANSIT ISLAND



EXISTING CONDITIONS AT 24TH AVE UNDERPASS

CORRIDOR C | RED MOUNTAIN PARK TO UAB

GREEN SPRINGS HWY + GREEN SPRINGS AVE

annual average daily traffic

10th Ave S: 3,000-6,700
Green Springs Hwy: 20,000-26,000
Robert Jemison Rd: 5-7,600

right-of-way

10th Ave S: 80 Linear Feet (LF)
Green Springs Hwy: 125 LF
24th Ave S: 55 LF
Robert Jemison Rd: 55-60 LF

permitting needs

- NPDES General Permit
- Right-of-way occupancy – ALDOT or Local Public Agency (LPA) Agreement
- Environmental (erosion / sediment control)
- Tree removal – may require mitigation
- Utilities

implementation (north to south)

Buffered Bike Lane (10th Ave S)
Remove parking lane to create space for buffered bike lane. Connect to existing 10th Ave S bike lanes.

Bike Boulevard (6th St S, George Ward Park to 10th Ave S)
Introduce traffic calming and sharrows. Street is too narrow for separated bike facilities, and slopes are too steep on both sides of road and going beneath the bridge.

- Chicanes and other traffic-calming features should be considered
- Evaluate potential trailhead location at George Ward Park
- Wayfinding signage recommended along segment
- Challenges: Road must be resurfaced (severe cracking); evaluate drainage conditions (ponding observed)

Greenway (George Ward Park)
Utilize existing pathway. Clear and grub to expand existing trail to 12' wide.

- 12' greenway
- Provide lighting along trail
- Challenges: Plan for driveway / side street crossings; some earthwork will be required to eliminate differences in elevation

Two-Way Cycle Track (W side of Green Springs Hwy to 24th Ave S)
Reduce all five lanes to 11', convert existing wide paved shoulder on west side to a 17' two-way separated cycle track.

- Southbound dedicated right turn lanes along Green Springs Hwy will ideally be removed
- Crossing improvements at Green Springs Ave recommended (pedestrian refuge, signage, and signal phasing evaluation)
- Evaluate possibility of midblock crossings at existing bus stops
- Challenges: Plan for driveway / side street crossings; determine utility conflicts since excavation and compaction will be required

Bike Boulevard (24th Ave S)
Introduce traffic calming and sharrows. Street is too narrow for separated bike facilities and slopes are too steep on both sides of road and going under the bridge.

- All-way stop at Robert Jemison Rd is recommended

Sidepath (S side of Robert Jemison Rd to Alabama Power easement)
Clear and grub corridor to make way for trail construction.

- 10-12' sidepath
- Challenges: Determine utility conflicts since excavation and compaction will be required; substantial earthwork will be required to eliminate difference in slope elevation

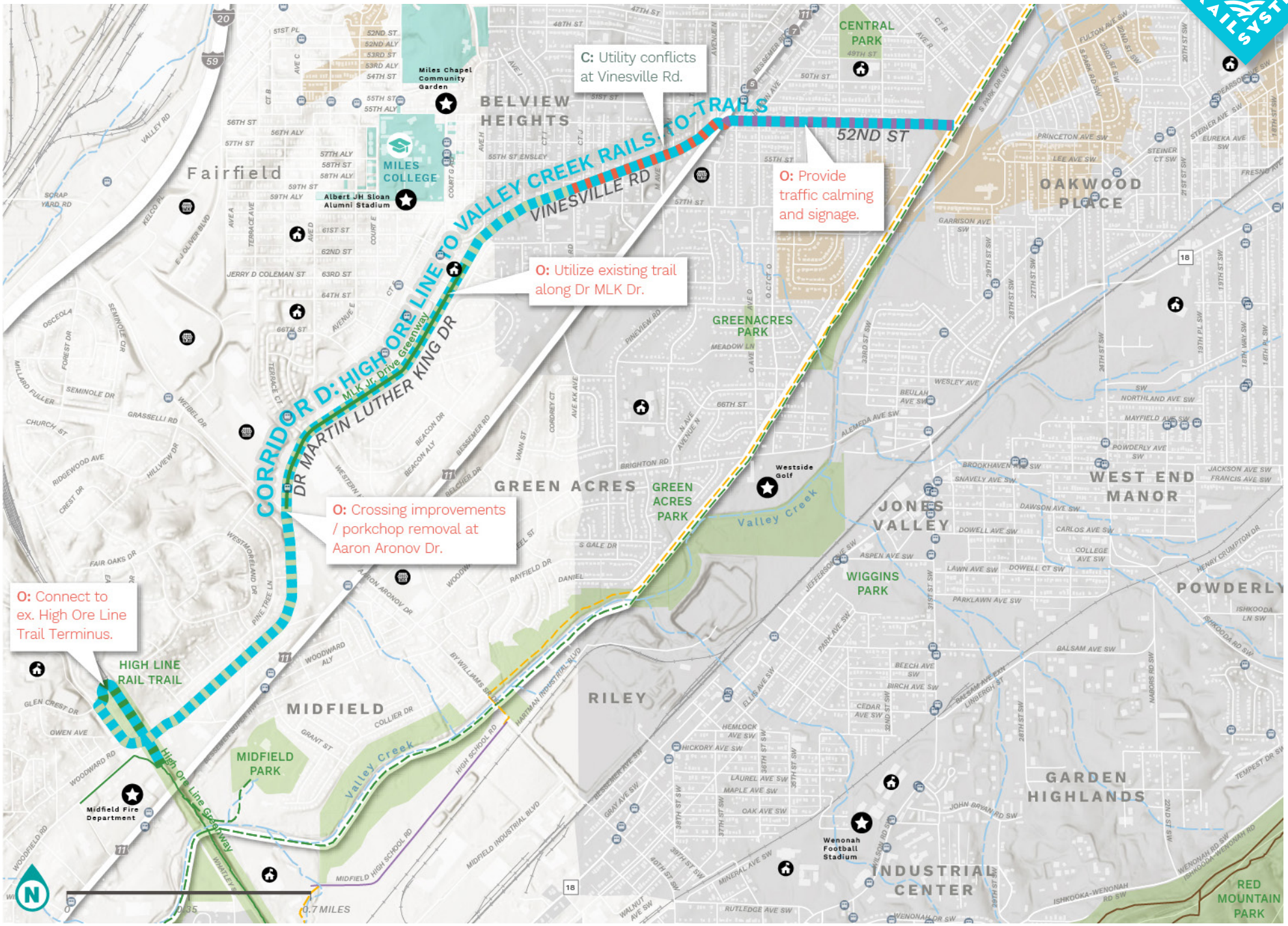
Greenway (Alabama Power easement to Industrial Dr)
Clear and grub corridor to make way for trail construction.

- 10-12' greenway
- Challenges: Maintenance agreement needs to be coordinated with Alabama Power; utility company must have access to maintain power lines

COORDINATING AGENCIES

- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation
- Maintenance - City of Birmingham Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities - Alabama Power
- Environmental
- Alabama Department of Transportation
- City of Birmingham Parks and Recreation
- City of Homewood

CORRIDOR D | HIGH ORE LINE TO VALLEY CREEK RAILS-TO-TRAILS



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Village Creek Corridor
- Two-way cycle track
- Greenway
- Bike boulevard
- Sidepath

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

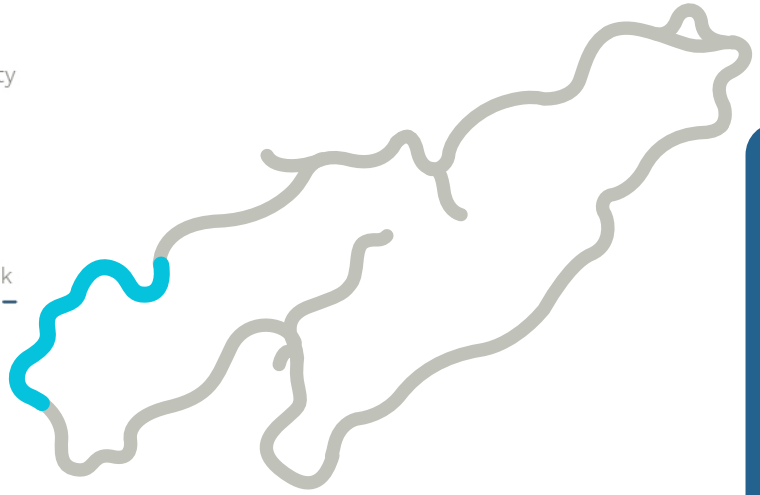
- Two-way cycle track
- Bike lane
- Bike boulevard
- Sidepath
- Natural surface trail
- Greenway

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

Corridor D represents another important connection for Red Rock Trail System®, connecting the **Cities of Midfield / Fairfield** to the **High Ore Line Trail** and the upcoming **Valley Creek Rails-to-Trails** project. This corridor will upgrade the MLK Jr. Drive greenway and provide a shared-use connection to the **Central Park neighborhood**, with a connective spur into **Miles College**. Corridor D will enable residents of these neighborhoods to access the overall Red Rock Trail System®.

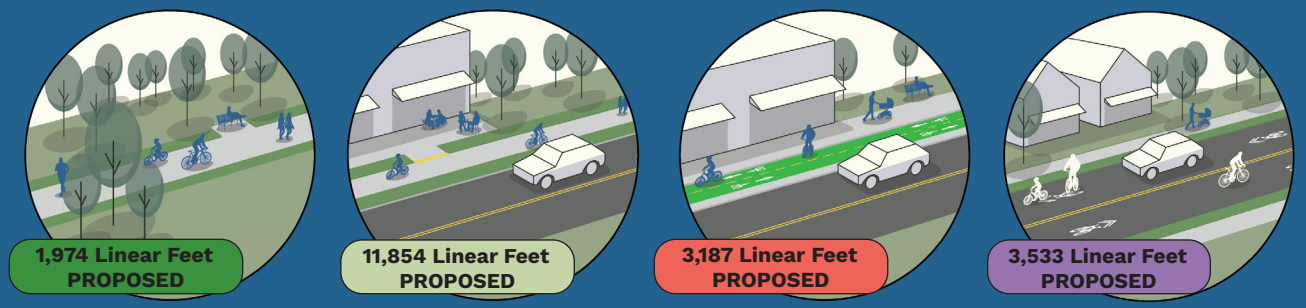
TOTAL MILEAGE

3.89 MI (20,548 Linear Feet)

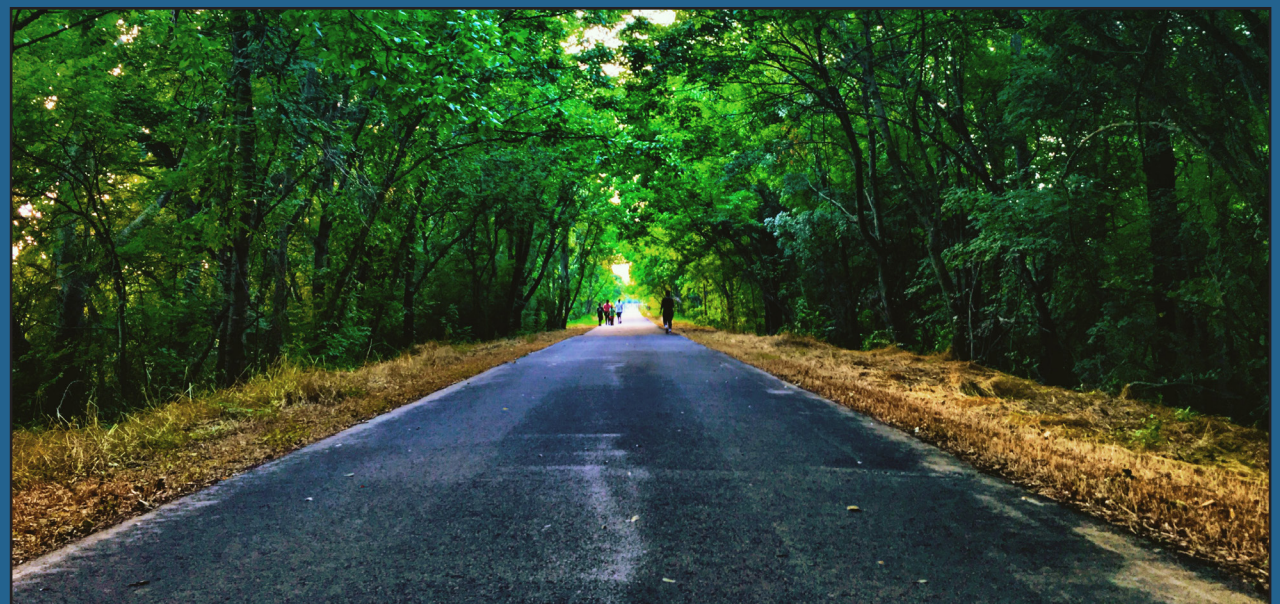
TOTAL ESTIMATED PROJECT COST (2024 $)

$8,537,000.00

FACILITY TYPOLOGIES FOR THIS CORRIDOR



EXISTING CONDITIONS AT HIGH ORE LINE TRAIL



CORRIDOR D | HIGH ORE LINE TO VALLEY CREEK RAILS-TO-TRAILS

DR MLK BLVD + AARON ARONOV DR

annual average daily traffic

Woodward / Milstead Rd: 5,200-5,400
Dr MLK Dr: 15,398
Vinesville Rd: 4,820
52nd St: 2,000-2,500
Bessemer Rd: 15,971

right-of-way

Milstead Rd: 60 Linear Feet (LF)
Dr MLK Dr: 80-100 LF
Vinesville Rd: 50-60 LF
52nd St: 50 LF

permitting needs

- NPDES General Permit
- Environmental (erosion / sediment control)
- Tree removal – may require mitigation
- Utilities

implementation (west to east)

Sidepath (E side of Milstead Rd to Woodward Rd)

Existing pavement width (~40') should accommodate facility.

- 2-11' lanes, 12' sidepath with 6' buffer (landscaping or vertical buffer)
- Challenges: Check drainage conditions to see if improvements will be required

Sidepath (N side of Woodward Rd to Milstead Rd / N side of Dr MLK Dr to Court I)

Clear and grub corridor to make way for trail construction.

- 10' sidepath
- Intersection improvements at Aaron Aronov Dr – new concrete median, curb radii reduction, and other pedestrian / bicycle crossing improvements
- Challenges: Determine utility conflicts since excavation and compaction will be required; drainage improvements may be required (may require a closed drainage system with curb and gutter); may require utility easement at Alabama Power substation parcel; plan for proper driveway / side street crossings. Significant regrading is needed to mitigate steep slopes

Two-Way Cycle Track (N Vinesville Rd to 52nd St)

Reduce lane widths to 11'. Potentially remove one on-street parking lane.

- 10' cycle track with 3' buffer
- Intersection improvements at 52nd St – consider roundabout or removing some movements; regulate left and right vehicular turns
- Challenges: Plan for driveway / side street crossings

Bike Boulevard (52nd St)

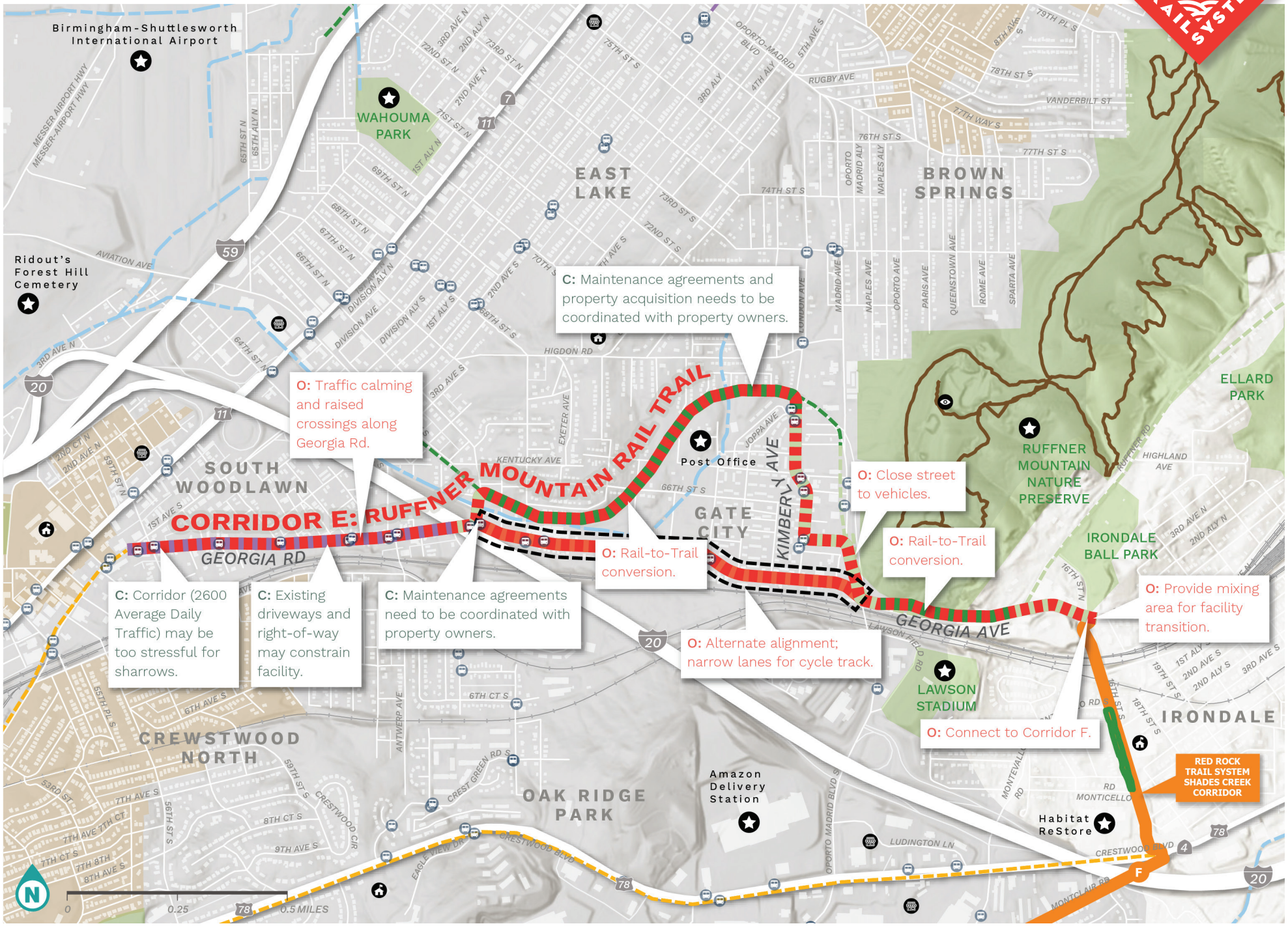
Introduce traffic calming and sharrows. Street is too narrow for separated bike facilities and slopes are too steep on both sides of road and going beneath the bridge.

- Speed tables and other traffic-calming features should be considered
- Evaluate potential trailhead location by Valley Creek Rails-to-Trails entrance
- Wayfinding signage recommended along segment
- Challenges: Road must be resurfaced (severe cracking); evaluate drainage conditions (ponding observed)

COORDINATING AGENCIES

- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation and City of Fairfield
- Maintenance - City of Birmingham Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities (electric, gas, water/ sewer, telephone, etc.) - Alabama Power, Spire, Birmingham Water Works + Sewer Board, AT+T, Charter, Brighthouse
- Transit - Birmingham Jefferson County Transit Authority
- Environmental
- City of Fairfield
- City of Fairfield Fire Department
- Miles College

CORRIDOR E | RUFFNER MOUNTAIN RAIL TRAIL



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Jones Valley Corridor
- Two-way cycle track
- Greenway
- Bike boulevard
- Sidepath

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

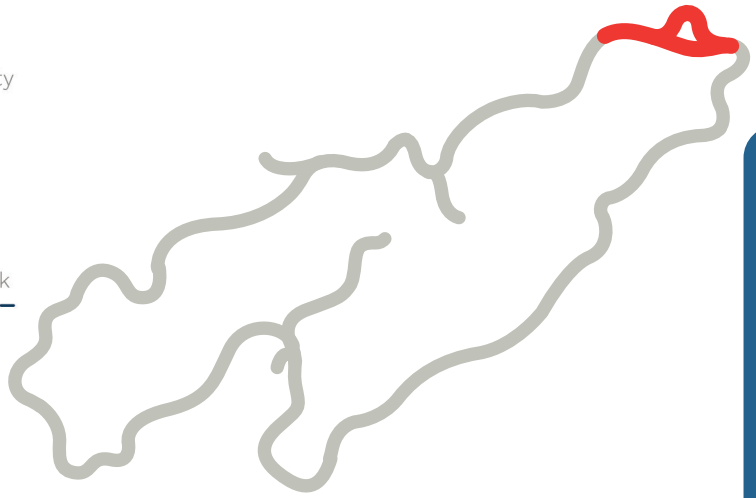
- Two-way cycle track
- Bike lane
- Bike boulevard
- Sidepath
- Natural surface trail
- Greenway
- Alternate alignment

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

Corridor E provides **traffic calming along Georgia Rd** and will provide a true **"trail" experience** within the **Ruffner Mountain Rail Trail** with large shade trees and rolling topography. This corridor provides for an important connection for the overall trail loop around Birmingham by crossing under I-20 and Oporto-Madrid Blvd and providing **crossing improvements** at the connection with **Ruffner Baseball Park**. Corridor E will connect the surrounding communities to Irondale and beyond.

TOTAL MILEAGE

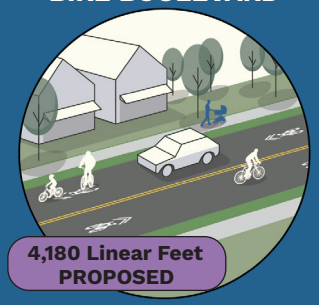
2.91 MI (15,362 Linear Feet)

TOTAL ESTIMATED PROJECT COST (2024 $)

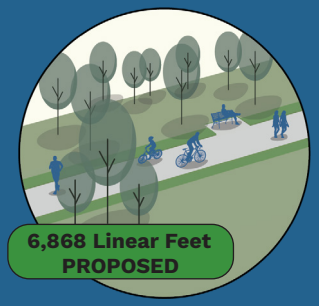
$3,608,000.00

FACILITY TYPOLOGIES FOR THIS CORRIDOR

BIKE BOULEVARD



GREENWAY



SIDEPATH

EXISTING CONDITIONS ALONG RAIL CORRIDOR

CORRIDOR E | RUFFNER MOUNTAIN RAIL TRAIL

GEORGIA RD | 16TH ST N | 2ND AVE N

annual average daily traffic

Georgia Rd: 2,500-3,500 (1,981 east of Ruffner Mountain)
1st Ave S: 5,900
Kimberly Ave: N/A
16th St: 3,685

right-of-way

Georgia Rd: 40-75 Linear Feet (LF)
Kimberly Ave: 60 LF

permitting needs

- NPDES General Permit
- Right-of-way occupancy
- Environmental (erosion / sediment control)
- Tree removal – may require mitigation

implementation (west to east)

Bike Boulevard (Georgia Rd, 1st Ave S to Brussels Ave)
Introduce traffic calming and sharrows. Existing pavement varies between 24-30'.

- Lane narrowing, pinch points, mini refuge islands, and other traffic-calming features should be considered
- Wayfinding signage recommended along segment

Sidepath (E side of Brussels Ave)
Clear and grub corridor to make way for trail construction.

- 10-12' sidepath
- Intersection improvements at Brussels Ave and Georgia Rd should be considered
- Evaluate potential trailhead at Ruffner Mountain Rail Trail intersection
- Challenges: Plan for proper driveway / street crossings; drainage improvements may be required

Greenway (Ruffner Mountain Rail Trail)
Clear and grub to construct 12' trail.

- 12' greenway
- Challenges: Trail maintenance agreement needs to be coordinated with property owner / Public Works; owner must have access to maintain private facilities

Sidepath (E side of Kimberley Ave, Ruffner Mountain Rail Trail to Georgia Rd)
Clear and grub corridor to make way for trail construction.

- 12' sidepath (evaluate feasibility of continuation of Ruffner Mountain Rail Trail instead of on-street facility)
- Roundabout encouraged at intersection of Kimberly Ave and 67th St
- Challenges: Plan for proper driveway / street crossings; existing right-of-way may constrain facility

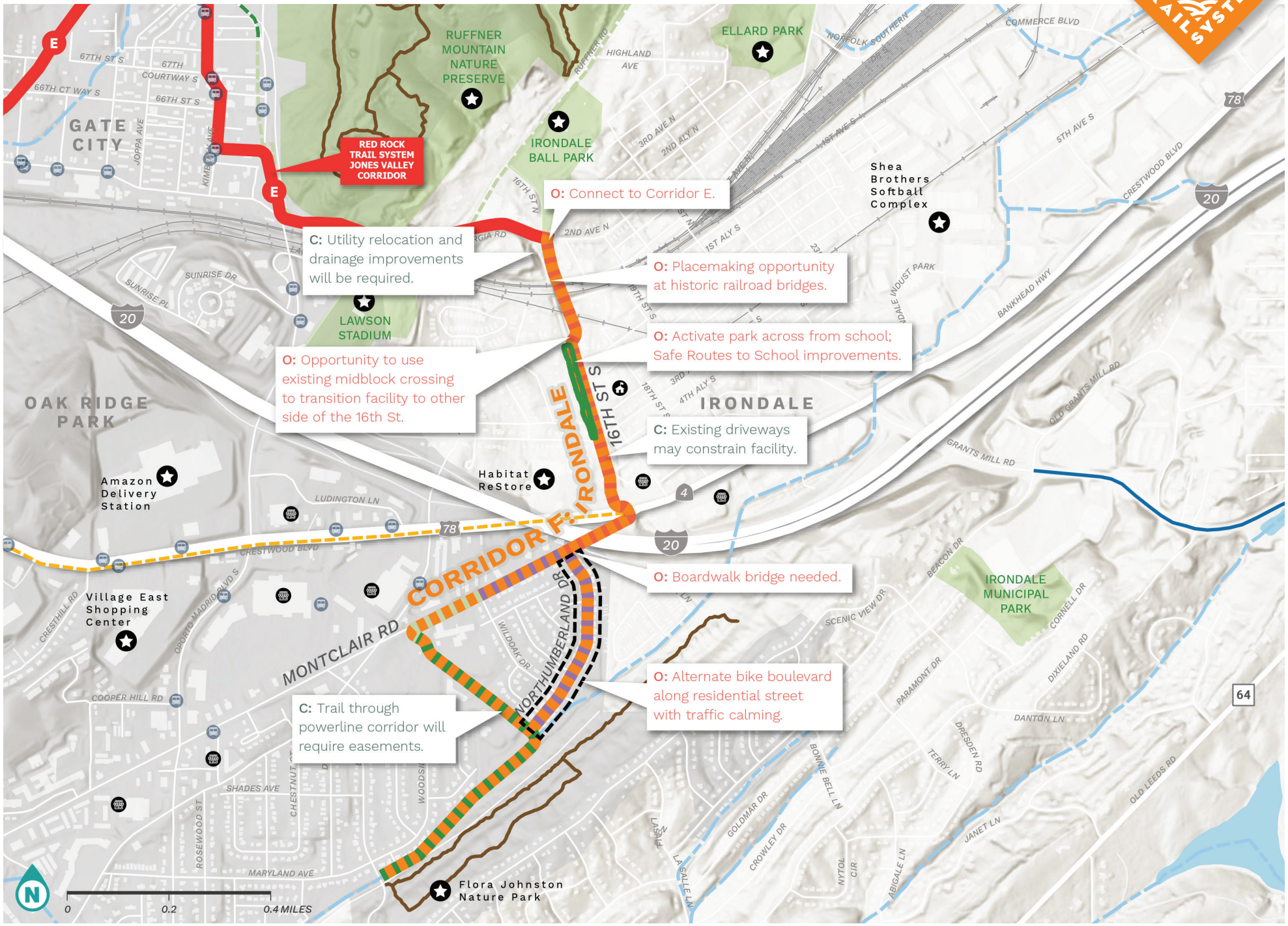
Greenway (Kimberly Ave to Ruffner Rd)
Clear and grub to construct 12' trail.

- 12' greenway
- Intersection improvements at Georgia Ave may be required
- Challenges: Trail maintenance agreement needs to be coordinated with property owner / Public Works; owner must have access to maintain private facilities; extensive earthwork will be required for eliminating elevation differences; railroad easement might be needed during construction

COORDINATING AGENCIES

- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation
- Maintenance - City of Birmingham Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities (electric, gas, water/sewer, telephone, etc.) - Alabama Power, Spire, Birmingham Water Works + Sewer Board, AT+T, Charter, Brighthouse
- Transit - Birmingham Jefferson County Transit Authority
- Environmental
- City of Birmingham Parks and Recreation
- Railroad
- City of Irondale
- Ruffner Mountain

CORRIDOR F | IRONDALE



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Shades Creek Corridor
- Two-way cycle track
- Sidepath
- Bike boulevard
- Greenway

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

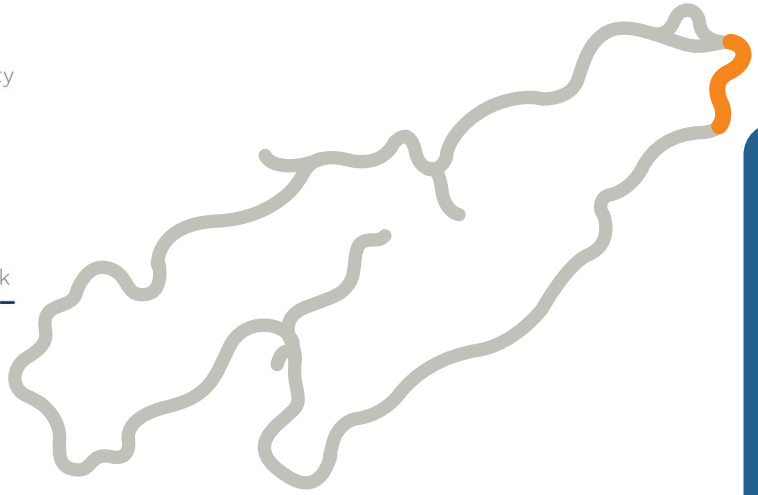
- Two-way cycle track
- Bike boulevard
- Natural surface trail
- Alternate alignment
- Bike lane
- Sidepath
- Greenway

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

Corridor F is an important connection for the overall trail loop around the Greater Birmingham Metropolitan Area, crossing under **two historic railroad bridges**, improving **intersection safety at Crestwood Blvd**, and crossing under I-20. This corridor connects the **Irondale Community School, WE Putnam Middle School, St. Martin's in the Pines**, and terminates at the **Flora Johnston Nature Park** to access 1.5 miles of hiking trails.

TOTAL MILEAGE

1.74 MI (9,172 Linear Feet)

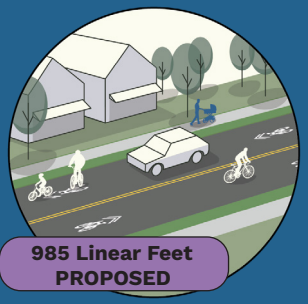
TOTAL ESTIMATED PROJECT COST (2024 $)

$3,969,000.00

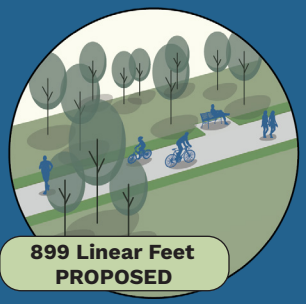
FACILITY TYPOLOGIES FOR THIS CORRIDOR

TWO-WAY CYCLE TRACK

BIKE BOULEVARD



SIDEPATH

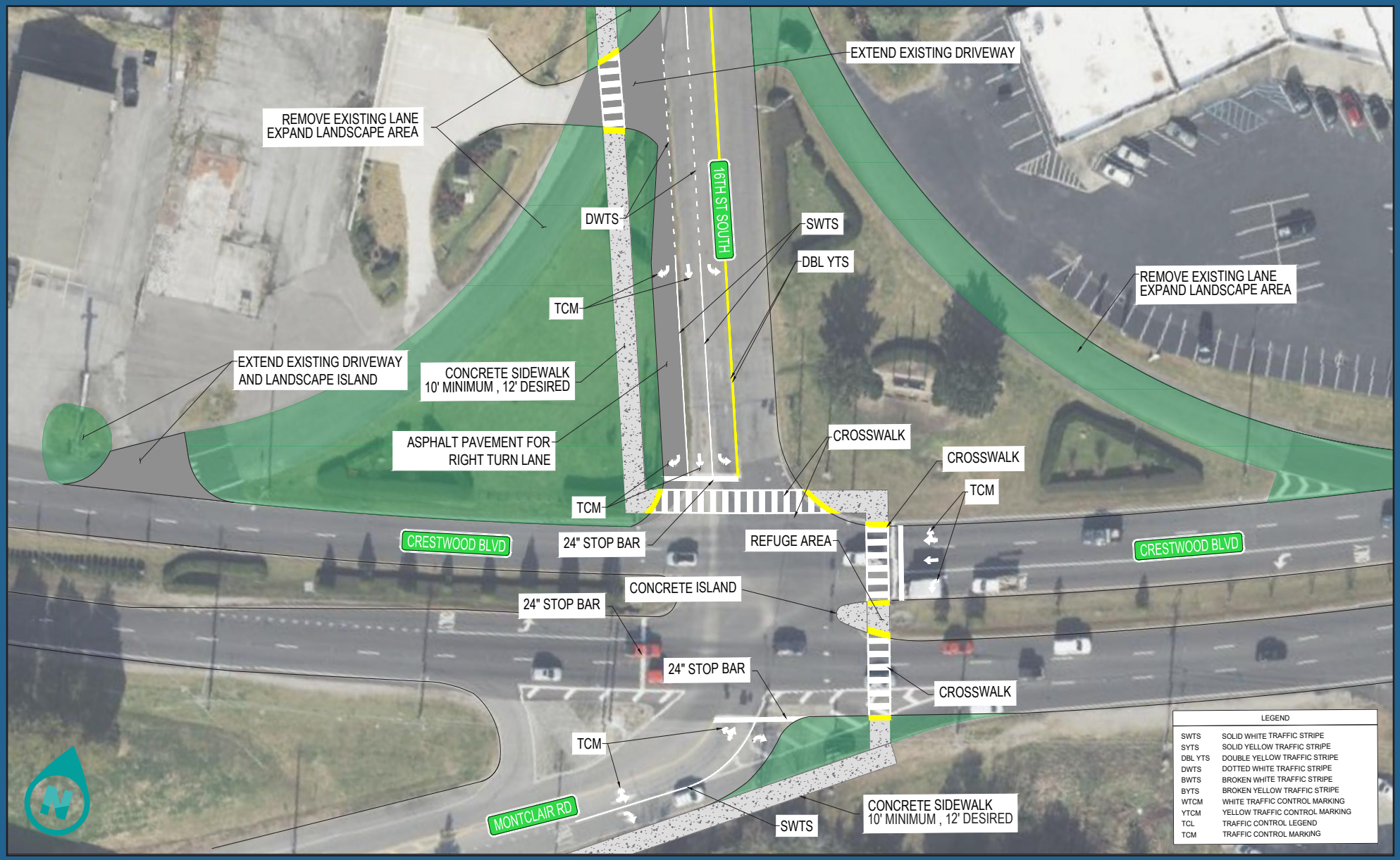


GREENWAY

RENDERING OF TWO-WAY CYCLE TRACK AT 16TH ST N

CORRIDOR F | IRONDALE

16TH ST S | CRESTWOOD BLVD | MONTCLAIR RD



annual average daily traffic

16th St S: 3,000-5,000
Montclair Rd: 8,500

right-of-way

16th St S: 150-200 Linear Feet (LF) (40 LF curb-to-curb)
Montclair Rd: 120 LF

permitting needs

- NPDES General Permit
- Right-of-way occupancy
- Environmental (erosion / sediment control)
- Tree removal – may require mitigation

implementation (north to south)

Two-Way Cycle Track (W side of 16th St S to Crestwood Blvd)

Remove travel lane to create space for cycle track.

- 10’ cycle track with 3’ buffer
- Opportunity to implement placemaking at historic rail bridges
- Activate park across from Irondale Community School
- Evaluate Safe Routes to School improvements approaching Irondale Community School
- Challenges: Sign and utility relocation may be required; a traffic analysis will need to be performed to evaluate the feasibility of a lane removal

Two-Way Cycle Track (S side of Montclair Rd to Northumberland Dr)

Reduce lanes to 11’. Restripe road and add raised or planted buffer.

- 12’ cycle track with 6’ buffer
- Traffic control (rectangular rapid flashing beacon at min.) and crossing markings required at Montclair Rd crossing by the utility easement
- Evaluate Safe Routes to School improvements approaching Putnam Elementary School
- Realign and improve intersection with Crestwood Blvd and 16th St S (see concept)
- Challenges: Sign and utility relocation, and drainage improvements may be required

Bike Boulevard (Montclair Rd / Residential Service Rd / Northumberland Dr)

Introduce traffic calming and sharrows.

- Lane narrowing, pinch points, mini refuge islands, and other traffic calming features should be considered
- Wayfinding signage recommended along segment

Greenway (Utility easement to Flora Johnston Nature Park)

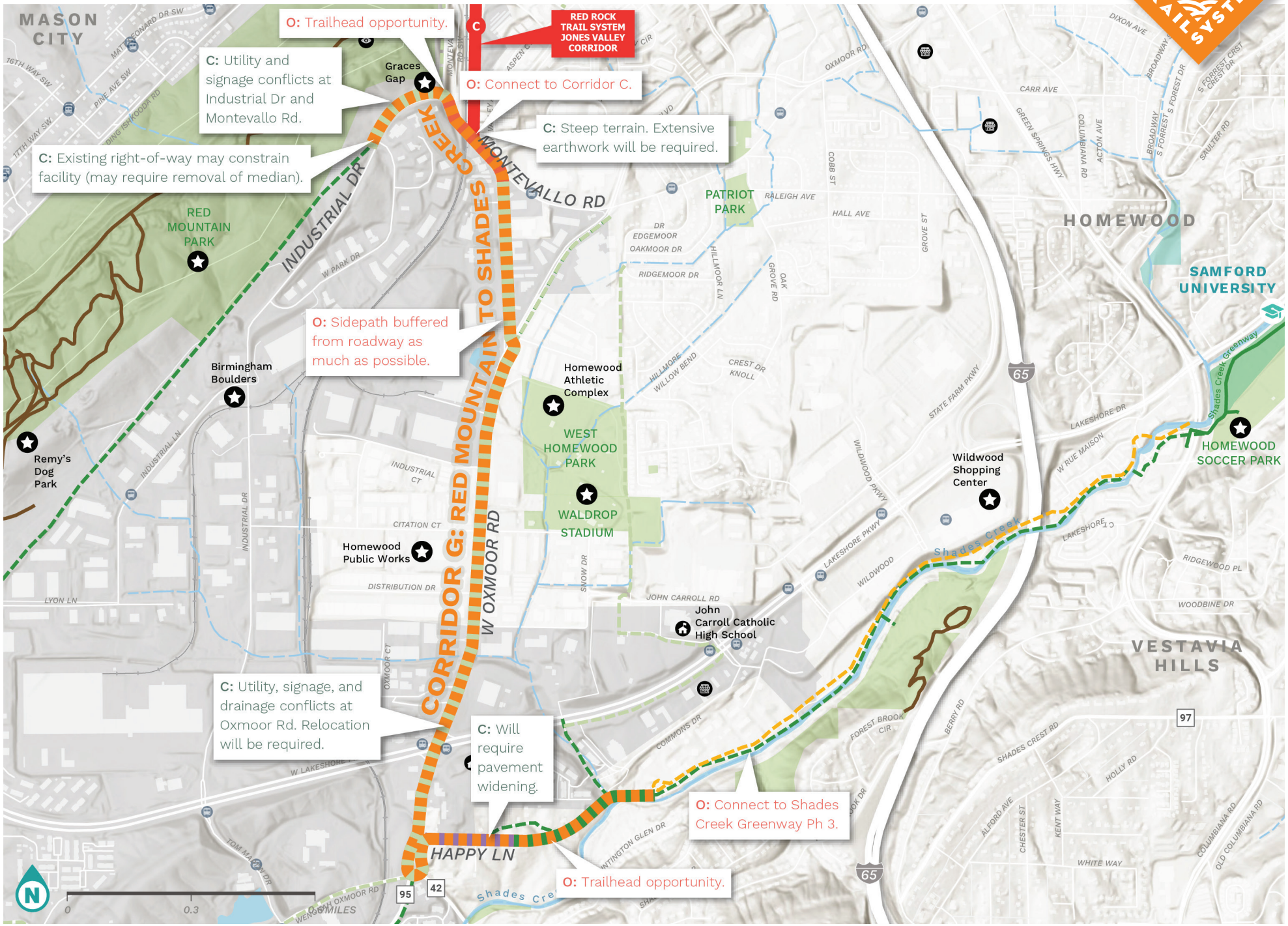
Clear and grub corridor to make way for trail construction.

- 12’ greenway
- Evaluate potential trailhead at Flora Johnston Nature Park
- Challenges: Maintenance agreement needs to be coordinated with Alabama Power; utility company must have access to maintain power lines

COORDINATING AGENCIES

- Parking - Birmingham Parking Authority
- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation
- Maintenance - City of Birmingham Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities (electric, gas, water/sewer, telephone, etc.) - Alabama Power, Spire, Birmingham Water Works + Sewer Board, AT+T, Charter, Brighthouse
- Transit - Birmingham Jefferson County Transit Authority
- Railroad
- Environmental
- City of Birmingham Parks and Recreation
- City of Irondale
- Ruffner Mountain Nature Preserve

CORRIDOR G | RED MOUNTAIN PARK TO SHADES CREEK



red rock action plan recommendations

- FLT Priority Projects (ongoing)
- Red Rock Trail System Shades Creek Corridor
- Two-way cycle track
- Greenway
- Bike boulevard
- Sidepath

connecting pedestrian + bicycle facilities

existing: solid line proposed: dashed line

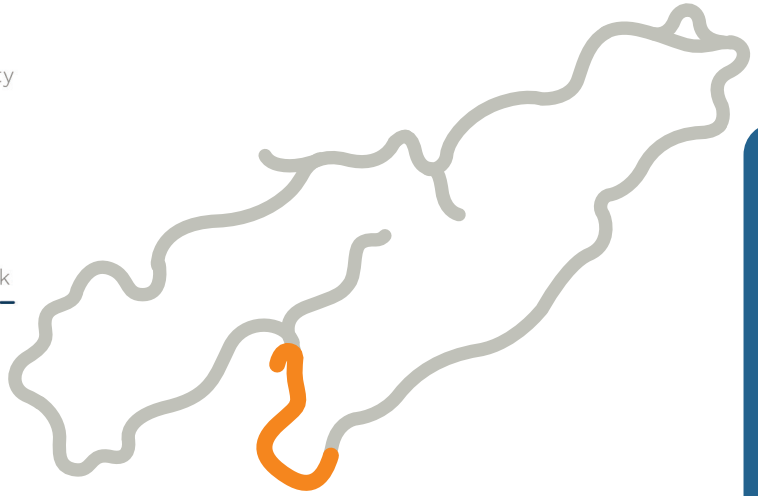
- Two-way cycle track
- Bike lane
- Bike boulevard
- Sidepath
- Natural surface trail
- Greenway

community assets

- Higher education
- Parks
- Streams
- Railroad
- Bus stop
- Trailhead opportunity
- Scenic viewpoint
- Commercial hub
- School
- Public parking
- Community landmark

analysis

- O Opportunity
- C Challenge



PROJECT SNAPSHOT

CORRIDOR DESCRIPTION

Corridor G is a complex and essential connection for the overall trail system. While adjacent land uses and vehicular annual average daily traffic are not ideal, it provides the best available connection from the **Shades Creek Greenway to Red Mountain Park**, while providing **multimodal intersection safety improvements** and a **new bicycle / pedestrian bridge** over the railroad corridor at Montevallo Rd. Future spurs can provide additional connections to the **Homewood Athletic Complex, Waldrop Stadium, and John Carroll Catholic High School.**

TOTAL MILEAGE

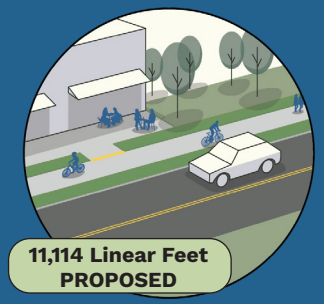
2.99 MI (15,765 Linear Feet)

PROJECT COST

$10,440,000.00

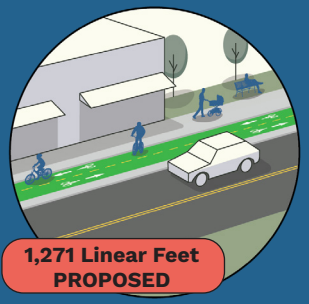
FACILITY TYPOLOGIES FOR THIS CORRIDOR

SIDEPATH



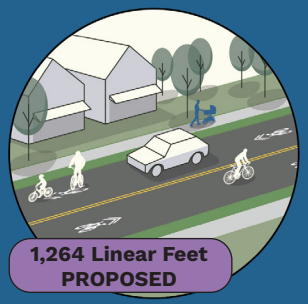
11,114 Linear Feet PROPOSED

TWO-WAY CYCLE TRACK



1,271 Linear Feet PROPOSED

BIKE BOULEVARD



1,264 Linear Feet PROPOSED

GREENWAY

2,116 Linear Feet PROPOSED

RENDERING OF TRAILHEAD AT SHADES CREEK GREENWAY

CORRIDOR G | RED MOUNTAIN PARK TO SHADES CREEK

W OXMOOR RD + LAKESHORE PKWY

annual average daily traffic

Montevallo Rd: 6,957-16,359
W Oxmoor Rd: 11,029-17,185 (5,380 south of Lakeshore Pkwy)
Lakeshore Pkwy: 19,982-33,429

right-of-way

Montevallo Rd: 100 Linear Feet (LF) (32-40 LF curb-to-curb)
W Oxmoor Rd: 125-150 LF (varies)
Happy Ln: 30 LF

permitting needs

- NPDES General Permit
- Environmental (erosion / sediment control)
- Tree removal – may require mitigation

implementation (north to south)

Sidepath (Red Mountain trailhead connector to Montevallo Rd)

Continue proposed trail along N side of Industrial Blvd. Clear and grub corridor to make way for trail construction. A lane width reduction or median removal should be considered to create space.

- 10-12' sidepath
- Evaluate potential trailhead at Red Mountain Park
- Consider protected intersection at Montevallo Rd to ensure smooth transition to two-way cycle track
- Challenges: Constrained right-of-way as corridor approaches Montevallo Rd

Two-Way Cycle Track (W side of Montevallo Rd to Oxmoor Rd)

Reduce lane widths. Existing pavement width should allow for 10' cycle track.

- Consider intersection realignment of Oxmoor Rd and Montevallo Rd – reduce curb radii, remove porkchops, and protected bicycle movements
- Challenges: Transmission lines run on west side and power lines run on east side; extensive earthwork will be required for harmonization; traffic analysis may be required to determine percentage of heavy trucks

Sidepath (W Side of Oxmoor Rd to Happy Ln)

Clear and grub corridor to make way for trail construction.

- 10-12' sidepath
- Challenges: Power lines on east side of Oxmoor Rd. Plan for proper driveways / street crossings; extensive drainage improvements will be required
- Alternate recommendation includes widening the road to create conventional bike lanes (if utility and drainage work becomes too cumbersome)

Bike Boulevard (Happy Ln)

Introduce traffic calming and sharrows. Existing pavement varies between 24-30'.

- Traffic calming features should be considered
- Wayfinding signage recommended along segment
- Evaluate potential trailhead at Shades Creek connector entrance

Greenway (Shades Creek Greenway connector)

Clear and grub corridor to make way for trail construction.

- 12' greenway
- Challenges: Maintenance agreement needs to be coordinated with property owners; property owners must have access to maintain private facilities

COORDINATING AGENCIES

- Parking - Birmingham Parking Authority
- Traffic (signals, pavement markings, and signage) - City of Birmingham Department of Transportation and Jefferson County Department of Roads and Transportation
- City of Birmingham and Jefferson County Department of Public Works (trash pickup, tree maintenance, sidewalk maintenance, etc.)
- Utilities (electric, gas, water/sewer, telephone, etc.) - Alabama Power, Spire, Birmingham Water Works + Sewer Board, AT+T, Charter, Brighthouse
- Environmental
- City of Homewood Parks and Recreation
- City of Birmingham Parks and Recreation
- Red Mountain Park

04 | IMPLEMENTATION

where we've been + where we're going

After the adoption of The Red Rock Ridge + Valley Trail System Master Plan, Freshwater Land Trust has actively been fundraising for, as well as designing and constructing significant portions of both off-street greenways and on-street bicycle infrastructure. This Action Plan served as the next step to identifying priority projects and assessing construction feasibility for future trail and on-street bicycle infrastructure. Through the process of developing this Action Plan, various trail corridors were considered as potential priority projects and vetted through evaluation criteria to **identify projects for the next five to 15 years.** The criteria reflect the projects' goals of creating a demand-driven, connected, and equitable trail network. To illustrate the corridor feasibility, the cutsheets highlight specific recommendations for implementation and **provide the foundation for the next phase of detailed design.** The following report sections highlight various funding opportunities at the federal, state, and local level and other strategies for implementation and fundraising.

what's next for the RED ROCK ACTION PLAN?

1

PRESENT FINDINGS TO FRESHWATER LAND TRUST BOARD + MUNICIPAL PARTNERS

Before proceeding further, the Red Rock Action Plan should be presented to the Freshwater Land Trust Board + municipal partners for review and adoption.

2

ENGAGE A PROFESSIONAL DESIGN / ENGINEERING FIRM

Identify a consultant or consultant team to develop a complete design package for the first segment of trail.

3

ENGAGE PROPERTY OWNERS

Municipal staff, project partners, and the consultant team should determine the best strategy to reach out to adjacent property owners along the trail corridor to obtain approval of final design.

4

FINALIZE THE ROUTE

Following public input, staff should organize a team meeting to review this document in detail, along with the results of the previous two steps, and confirm the details of the final routing and recommended improvements.

5

COMPLETE DESIGN

Once the route is finalized, the consultant team should complete a full design of the trail and produce a comprehensive set of construction documents that follow the standards required for the appropriate funding source.

6

CONSTRUCT THE TRAIL

Once the construction documents are produced, the trail can then be constructed with any federal/state funds that have been set aside for the project and any local funds required to supplement those funds.

7

PERFORM ONGOING MAINTENANCE + PATROLLING

Once the trail is on the ground, municipal staff should continue to maintain and patrol the trail in accordance with the trail management and maintenance best practices.

strategy for implementation

Each of the seven corridors in this Action Plan serve as vital connecting links between various destinations and contribute to a connected loop around the Greater Birmingham Metropolitan Area. While each trail segment is important and represents a critical building block for creating an interconnected trail network, trail development requires time, funding, and resources.

To provide recommendations for implementation, a phasing framework was created to help identify various factors to consider when selecting corridors to implement. Through engagement with local partners, six criteria were identified as scoring factors.

- Demand
- Equity
- Connectivity
- User Experience
- Safety
- Feasibility

CRITERIA	METRICS
equity	Age, income, limited English proficiency, race, and access to a personal vehicle
demand	Where people live, work, recreate, shop, attend school, and access public transportation
connectivity	Connections to existing facilities, Freshwater Land Trust priority projects, parks, and destinations
user experience	Level of comfort as measured by facility type
safety	Number of bicycle and pedestrian crashes located along the corridor
feasibility	Measures potential feasibility based on difficulty of implementation and funding availability

partnerships

While the development of Red Rock Trail System® will be led by Freshwater Land Trust, a number of local, state, and federal agencies are involved in the planning and regulation of natural resources and transportation systems in the study area. It will take the collective action of these agencies and other project supporters to successfully realize the vision laid out in this Red Rock Trail System® Action Plan. With a sustained and coordinated effort over the next several years, there is an opportunity to build off of the momentum of this Action Plan.

To the right is a list of action items to help create the partnerships and coordination that will be necessary to guide the process of developing Red Rock Trail System®.

1. LEAD AGENCY BEGINS EARLY ACTIONS

A core part of Freshwater Land Trust's (FLT) mission is to lead the implementation of this regional trail effort. FLT, as lead agency, will coordinate with partners on various steps of the trail development process, segment-by-segment. This will mainly be achieved by: 1) providing technical support and assisting local and regional partners with their own trail efforts, from planning through public engagement and implementation, and 2) pursuing trail funding opportunities, including strategies to leverage funds across federal, state, local, private, and nonprofit sources.

2. ESTABLISH A TRAILS CONSORTIUM

A Trails Consortium should be established to continue the coordinated efforts begun during the development of this Action Plan. The Trails Consortium should consist of (at a minimum) the partner agencies that have been involved in the Red Rock Trail System® Steering Committee, as well as previous planning efforts. This will continue to develop local institutional knowledge, as well as fostering relationships supportive of the project. Strengthening current partnerships and forming a new roster of diverse institutional relationships collaboratively working to advance the project will increase the likelihood of successful and timely implementation.

The Trails Consortium should meet periodically to promote progress in implementing this Action Plan.

As the Trails Consortium builds momentum over time, specialized committees can be created to augment existing expertise in a wide variety of relevant subject areas, such as Project Development, Financing, Marketing + Public Outreach, Construction, and Maintenance. Specialized committees could work to publish localized best practice guidelines and standard procedures to provide systematized assistance.

3. CREATE A TRAILS COORDINATOR POSITION

A Trails Coordinator position at FLT will be established in the near future in order to have a secondary full-time professional dedicated to supporting the future build out of all trail segments. A Trail Coordinator will work directly under the Red Rock Trail System Director, supporting trail initiatives at FLT, providing the necessary coordination link between the various committees, and working towards the development of the Red Rock Trail System®. FLT could start with one or two trail coordinator positions and eventually possibly establish a position for each corridor.

4. ESTABLISH A "FRIENDS OF THE TRAIL" GROUP

"Friends of the Trail" groups are commonly established as volunteer advocacy groups to help build support and funding to create a trail. These groups often work to build visibility for the trail within the community that can be used to leverage political support. They can also coordinate fundraising campaigns and cleanup events for the trail corridors.

Examples of "Friends of the Trail" groups include:

- **Friends of the Ecusta Trail** in Henderson and Transylvania County, North Carolina
- **Friends of the Greenway (FROGS)** in Mount Holly, North Carolina
- **Friends of the Thread** in LaGrange, Georgia

identifying funding

Having sufficient design and construction funds is necessary for implementation of Red Rock Trail System®. **Communities that are consistently successful in implementing these types of projects leverage funds from a variety of sources and are consistent, year after year, with making investments in capital and maintenance projects.** This study recognizes the challenge of funding a multi-mile, large scale network while outlining suitable funding opportunities below.

FEDERAL FUNDING OPPORTUNITIES

Federal funding is typically directed through state agencies to local governments either in the form of formula funds or discretionary grants. Federal funding typically requires a local match of five percent to 50 percent, but there are sometimes exceptions. Boxes to the right include a list of possible federal funding sources that could be used to support the construction of trail facilities.

The Infrastructure Investment + Jobs Act (IIJA)

The following is a preliminary summary of how IIJA may affect funding sources related to bicycle, pedestrian, and trail infrastructure based on what is known at the time this plan was written (2022).

DISCRETIONARY GRANTS (USDOT ADMINISTERS TO LOCALS)

» **Rebuilding American Infrastructure with Sustainability and Equity (RAISE).** In the first RAISE grant cycle, nearly one in five funded grant applications involved trail development. In addition, the selection committee awarded another 21% of funding to projects focused on making roads safer for vulnerable road users like cyclists and pedestrians. Under the Infrastructure Investment and Jobs Act (IIJA), the RAISE grant program will have $7.5 billion available over the next five years.

Competitive applications to this program have the following in common:

1. The project can demonstrate broad community support and is a recognized local or regional priority.
2. The project explicitly considers how it will address climate change and racial equity, particularly in Areas of Persistent Poverty and Historically Disadvantaged Communities (see map on page 54).
3. The project documents direct and significantly favorable local or regional impact relative to the scoring criteria:
   - » Safety
   - » Environmental Sustainability
   - » Quality of Life
   - » Economic Competitiveness
   - » State of Good Repair
   - » Innovation
   - » Partnership
4. The project has a high benefit to cost ratio.
5. The project demonstrates readiness by providing a detailed scope of work and budget, a realistic project delivery schedule, an understanding of the environmental risks, permit requirements, and mitigation measures, and is within the public right-of-way.
6. A United States Senator or Congress member actively champions the project.

For more information on RAISE program guidelines and upcoming Notice of Funding Opportunities, see: *www.transportation.gov/RAISEgrants*

- **Reconnect Communities (new):** Funds projects for communities that were previously cut off from economic opportunities due to inequitable transportation infrastructure (see map on page 54).
- **Safe Streets and Roads for All (new):** $6 billion federal grant program to fund Vision Zero plans, infrastructure, and programs.
- **Healthy Streets Programs (new)*:** Funds projects that address urban heat island effect to include porous pavement changes and improvements to the tree canopy, especially along walkways and transit stops.
- **Active Transportation Infrastructure Investment Program (new)*:** Local, regional, state, and tribal governments can apply to receive funding for active transportation projects and planning grants that build upon a local / regional / state network or network spine. The projects and planning efforts have to account for safety and facilitate more people walking and biking.

USDOT is developing grant program guidelines and will publish Notices of Funding Opportunities (NOFO) as they become available for each of the above programs.

FORMULA FUNDS (STATE DOTs ADMINISTER TO LOCALS)

- **Transportation Alternatives Program (TAP)** will increase from $850 million to $1.44 billion per year. This is the largest dedicated source of funds for walking and biking projects in the US, and it just got 70% bigger.
- **Congestion Mitigation and Air Quality Improvement Program (CMAQ)** will increase by 10% to $13.2B. This program funds interchange improvements, local transit operations, and bike and pedestrian infrastructure to help meet the National Ambient Air Quality Standard in nonattainment areas. Each project is evaluated to quantify its air quality improvement benefits. Funds cannot be used to add capacity for single-occupancy vehicles. Funding is distributed to nonattainment areas by population and weighted by air quality severity.
- States with 15% of all fatalities involving cyclists or pedestrians (Vulnerable Road Users or VRU) will be required to spend 15% of their **Highway Safety Improvement Program (HSIP)** funding on bicycle /pedestrian projects. Projects are evaluated, prioritized, and selected at the DOT district based on three years of crash data (targeted funds) or systemic approved projects as outlined in the HSIP guidance. While from 2018-2020 the percentage of VRU fatalities in Alabama fluxtuated between 11-13%, Alabama can still spend some HSIP funding on bicycle / pedestrian projects. Safety for VRUs is also an emphasis area of the 2017 Alabama Strategic Highway Safety Plan.
- Every state and metropolitan planning organization will be required to use at least 2.5% of its apportioned funding to develop planning documents that can include, but are not limited to, Complete Streets standards, a Complete Streets prioritization plan, multimodal corridor studies, or active transportation plans (among other uses).

**Please note: These programs have not had funding appropriated yet (June 2022), but they are anticipated to receive funding in the next budget cycle (2023).*

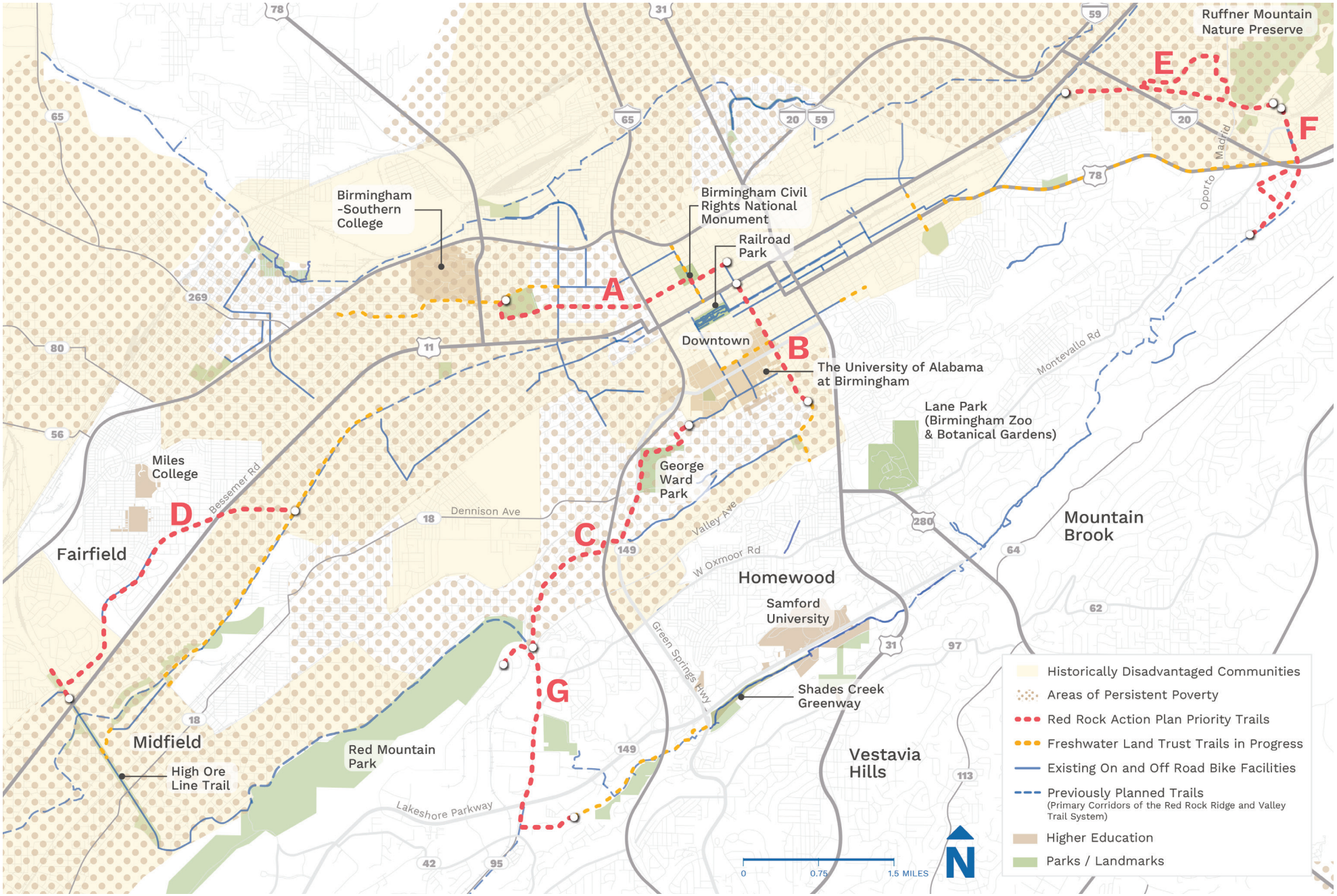
Alabama Transportation Alernatives Program (TAP)

Projects that qualify for TAP funds include streetscape improvements, pedestrian and bicycle facilities, and multiuse paths that:

- Provide economic development or tourism benefits
- Enhance connectivity of regional or statewide active transportation networks
- Have a significant transportation connection
- Meet the needs of targeted user types
- Are listed as priority projects for ALDOT, county, regional, or municipal transportation plans
- Improve safety for people on foot or bike
- Are included as part of a larger non-TAP funded active transportation project

RED ROCK TRAIL SYSTEM® FEDERAL FUNDING MAP

FOR HISTORICALLY DISADVANTAGED COMMUNITIES + AREAS OF PERSISTENT POVERTY



other sources

COUNTY + LOCAL FUNDING

Local taxes and infrastructure bonds are the primary local public funding sources for trail projects. Local taxes create dedicated funds for transportation operating expenses and capital improvement projects. Revenue from these taxes is stable and reliable from year-to-year, unlike specific appropriated sources.

The sales tax is the most common form of local revenue, but other sources include utility taxes, property taxes, impact fees, transportation sales taxes, hotel/motel taxes, Tax Allocation Districts (aka Tax Increment Financing – value capture of the increment tax increase collected and used for improvements within the district), Community Improvement Districts (self-taxing districts for non-residential properties), and capital improvement budget funds.

PRIVATE FUNDING

Many private funding sources are available for trail projects, from small grants for marketing activities to multi-year foundation grants. Small scale projects and improvements that require land acquisition are often funded primarily from private sources. Specific funding sources for creating active communities may include local health and wellness charities, corporate and cultural organizations, local hospitals, and health departments, as well as national foundations such as Grantmakers in Aging, the Robert Wood Johnson Foundation, and People for Bikes.

PUBLIC-PRIVATE PARTNERSHIPS

Public-private partnerships are contractual agreements that can leverage funds from both sectors for infrastructure projects and facilities. Where municipal budgets fall short, private revenue can fill the gaps.

INNOVATIVE FUNDING SOURCES

Increasingly, nonprofit organizations, municipalities, and individual advocates are using crowdsourcing to fund innovative pedestrian and bicycle projects. Crowdsourcing uses a large audience for fundraising, typically with the help of internet donation websites such as Ioby.org and kickstarter.com. Transportation agencies such as MARTA in Atlanta, Georgia have used ioby.org to raise $4,500 for self-service bicycle maintenance kiosks at select transit stations. The kiosks will be useful for basic repairs such as fixing flat tires or broken chains and will complement Atlanta's bike share program. A nonprofit organization in Memphis, Tennessee raised $75,000 through a crowdsourcing website to cover costs of design of a separated bike lane on Broad Street (the Hamp Line).

LOCAL SET-ASIDES

Active transportation projects need to be safely accessible by walking and biking to succeed. Local governments can set aside portions of general transportation revenue, public school bonds, county health department funding, parking fees, and traffic violation revenue for upgrades to walking and biking facilities.

BONDS AND LOANS

Bonds have been a very popular way for communities across the country to finance their pedestrian and trail projects. A number of bond options are listed below. Since bonds rely on the support of the voting population, an education and awareness program should be implemented prior to any vote. Austin, Texas; Raleigh, North Carolina; and many other cities have used bond issues to fund a portion of their bicycle and trail systems.

- General Obligation Bonds
- Revenue Bonds
- Special Assessment Bonds

APPENDIX A | GLOSSARY OF TERMS

CHICANE

A series of alternating curves or lane shifts that are located in a position to force a motorist to steer back and forth out of a straight travel path. The curvilinear path is intended to reduce the speed at which a motorist is comfortable traveling through the feature. The chicane curves can be created with a curb extension or a parking lane that alternates from one side of the street to the other.

FURNISHING ZONE

The portion of the sidewalk used for street trees, landscaping, transit stops, street lights, and site furnishings (benches, shelters, trash receptacles, bike racks, etc.).

NPDES

National Pollutant Discharge Elimination System; a permit program that addresses water pollution by regulating point sources that discharge pollutants to waters of the United States.

PORKCHOP ISLAND

A triangular raised island placed between a right-turn slip lane and through-travel lanes in order to channelize vehicular traffic and provide a refuge for pedestrians crossing a roadway, where they can wait for a suitable gap in traffic or for the WALK phase of a pedestrian signal.

REFUGE ISLAND

A small section of pavement or sidewalk, surrounded by asphalt or other road materials, where pedestrians can stop before finishing crossing a road. Refuge islands are often located in the middle of a roadway crossing.

ROAD DIET

Also called a lane reduction, road rechannelization, or road conversion; a technique in transportation planning where the number of travel lanes and/or effective width of the road is reduced in order to achieve systemic improvements.

SHARROWS

Also called shared lane markings (SLMs); road markings used to indicate a shared lane environment for bicycles and automobiles. Sharrows reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and may be configured to offer directional and wayfinding guidance.

The following guiding principles will help assure the operation of a first class system:

1. FOREMOST PROTECT LIFE, PROPERTY, AND THE ENVIRONMENT.
2. SOUND PLANNING AND DESIGN PROVIDE THE FRAMEWORK TO ENSURE EFFECTIVE AND EFFICIENT MAINTENANCE DECISIONS.
3. PROMOTE AND MAINTAIN A QUALITY OUTDOOR RECREATION AND TRANSPORTATION EXPERIENCE.
4. MAINTAIN QUALITY CONTROL AND STANDARDS AND CONDUCT REGULAR INSPECTIONS.
5. DEVELOP A MANAGEMENT PLAN THAT IS REVIEWED AND UPDATED ANNUALLY WITH TASKS, OPERATIONAL POLICIES, STANDARDS, AND ROUTINE AND REMEDIAL MAINTENANCE GOALS.
6. CONDUCT REGULAR INSPECTIONS AND KEEP COMPLETE RECORDS.
7. MAINTAIN AN EFFECTIVE, RESPONSIVE PUBLIC FEEDBACK SYSTEM AND PROMOTE PUBLIC PARTICIPATION.
8. BE A GOOD NEIGHBOR TO ADJACENT PROPERTIES.
9. OPERATE A COST-EFFECTIVE PROGRAM WITH SUSTAINABLE FUNDING SOURCES.
10. ESTABLISH, ADOPT, AND IMPLEMENT A UNIFORM PLAN AND LEVEL OF QUALITY AMONGST ALL OF RESPECTIVE AGENCIES AND JURISDICTIONS ALONG THE ENTIRE RED ROCK TRAIL SYSTEM®.

overview

Although FLT acts as the facilitator and clearinghouse for Red Rock Trail System®, typically trails are maintained by the municipality in which they are constructed. As the trail system expands, it will become increasingly important to execute maintenance agreements for each segment or phase of the network to ensure all involved parties are educated and prepared to fulfill their maintenance responsibilities. An example of an Operations and Maintenance (O+M) Interagency Agreement is included in the Appendix of this report.

o+m strategies and actions

The purpose of an O+M Plan is to promote a well-maintained, well-groomed, safe, secure, and pleasant-to-use trail system. O+M plans describe tasks of work to be performed, along with policies and programs that will be undertaken by responsible partners to operate, manage, and maintain a trail system. The term operations and maintenance refers to day-to-day tasks, as well as the long-term remedial tasks and programs, performed to assure resources and facilities of the trail system are kept in a usable condition. This begins with sound design, durable construction, and a comprehensive management plan. In addition, community groups, residents, business owners, developers, and other stakeholders will continue to be engaged in the long-term stewardship of the resources preserved and enhanced by the trail system.

ROUTINE MAINTENANCE refers to the normal regime of trail sweeping, trash and debris removal, sign replacement, weed control, tree and shrub trimming, ice or snow removal, and other regularly scheduled activities. Routine maintenance also includes minor repairs and replacement such as fixing cracks and potholes or repairing broken furniture and furnishings.

REMEDIAL MAINTENANCE refers to correcting significant defects, as well as repairing, replacing, or restoring major components that have been destroyed, damaged, or significantly deteriorated during the life of the project. Some items (“minor repairs”) may occur on a five-to-ten-year cycle, such as repainting, seal coating asphalt pavement, or replacing signage. Major reconstruction items will occur over a longer period or after an event, such as a flood. Examples of major reconstruction remedial maintenance include: stabilization of a severely eroded hillside, repaving a significant stretch of the trail surface, repaving a street used for biking, or replacing a footbridge. Remedial maintenance should be part of a long-term capital improvement plan.

SEASONAL MAINTENANCE is in addition to the routine and remedial categories and includes seasonal tasks that should be performed on an as-needed basis. Designated maintenance crews should remove leaf debris and sediment from flood events, snow, and ice, etc. from all trail facilities as soon as possible. (Leaf debris is hazardous when wet, and special attention should be given to facilities with heavier usage).

lifecycle of built facilities

Constructed trail system facilities will have a limited life cycle or useful life. The life cycle varies based on environmental impact, use, and care of the resource. The following chart offers a typical life cycle for major trail system elements.

TRAIL SYSTEM COMPONENT	LIFE CYCLE	REPLACE COSTS
asphalt trails	10-15 years	$1.5 million per mile
concrete trails	25-35 years	$2 million per mile
gravel trails	5-7 years	$500k per mile
wood bank trails	2-3 years	$750k per mile
wood boardwalk trails	7-10 years	$2 million per mile
steel bicycle + pedestrian bridge	15-20 years	$75k per foot
asphalt parking lot	10-12 years	$10k per parking space
crosswalks	3-5 years	$7.5k per crosswalk
greenway signage	7-10 years	$5k per sign
park benches	7-10 years	$4.5k per bench
trash receptacles	7-10 years	$2k per trash can
wood bollards	5-7 years	$750 per bollard
metal bollards	15-20 years	$2.5k per bollard

Source: Greenways Incorporated (2022)

EXAMPLE
Interagency Agreement for O&M

The _____ and the _____, formally agree to the following provisions concerning management and maintenance of Phase ___ of Red Rock Trail System®. The primary objective of this agreement is to assure that the public's health and safety are protected during normal use of the trail system. This agreement is intended to outline a cooperative approach to common problems but is not intended to be all inclusive.

1. General

   A. _____ and _____ shall act as the lead agencies to coordinate the maintenance and management of the trail system as a linear park and to provide overall direction, supervision and control of the same during its continuing operation.

   B. Red Rock Trail System® shall be classified as a linear park and shall be formally maintained in a clean, safe and usable condition like all other parks within the _____.

   C. The area of Red Rock Trail System® that is defined with this agreement is located between milepost _____ and milepost _____. A map is attached providing reference to this location.

2. Safety and Security Program
   In order to provide a standard of care that offers reasonable and ordinary safety measures and decreases liability risk, _____ and _____ shall work together to develop and implement a Safety and Security Program for Red Rock Trail System®. Important components include:

   A. Hours of Operation

      1. Red Rock Trail System® shall be open for public use from sunrise to sunset, as posted, 365 days a year, except as specifically designated. Individuals who are found to be using these facilities after dusk and before dawn should be deemed in violation of these hours of operation and treated as trespassers.

      2. _____ shall discourage the public from using any segment of the trail that is under construction. Individuals who use trail segments that are under construction, without written permission from an appropriate agency, should be deemed in violation of the Hours of Operation Policy and treated as a trespasser.

   B. Trail User Rules and Regulations
      In order to effectively reduce the amount of trail user conflicts on Red Rock Trail System®, _____ and _____ shall post the following rules and regulations along the trail. These rules should be displayed in brochures and on information signs throughout the trail system:

      1. **Be Courteous**: All Trail users, including bicyclists, joggers, walkers, wheelchairs, skateboarders and skaters, should be respectful of other users regardless of their mode of travel, speed or level of skill. Respect the privacy of adjacent landowners.

      2. **Keep Right**: Always stay to the right as you use the Trail, or stay in the lane that has been designated for your user group. The exception to this rule occurs when you need to pass another user.

      3. **Pass on the Left**: Pass others going in your direction on their left. Look ahead and behind to make sure that your lane is clear before you pull out and around the other user. Pass with ample separation. Do not move back to the right until you have safety gained distance and speed on the other user. Faster traffic should always yield to slower and on-coming traffic.

      4. **Give Audible Signal When Passing**: All user should give a clear warning signal before passing. This signal may be produced by voice, bell or soft horn. Voice signals might include "Passing on your left!" or "Cyclist on your left!" Always be courteous when providing the audible signal - profanity is unwarranted and unappreciated.

      5. **Be Predictable**: Travel in a consistent and predictable manner. Always look behind before changing position on the Trail, regardless of your mode of travel.

      6. **Control Your Bicycle**: Inattention, even for a second, can cause disaster - always stay alert! Maintain a safe and legal speed at all times.

      7. **Don't Block the Trail**: When in a group, including your pets, use no more than half the trailway, so as not to block the flow

of other users. If your group is approached by users from both directions, form a single line or stop and move to the far right edge of the Trail to allow safe passage by these users.

8. **Yield When Entering or Crossing Trails**: When entering or crossing the Trail at uncontrolled intersections, yield to traffic already using the other trail.

9. **Don't Use this Trail Under the Influence of Alcohol or Drugs**: It is illegal to use this Trail if you have consumed alcohol in excess of the statutory limits, or if you have consumed illegal drugs. Persons who use a prescribed medication should check with their doctor or pharmacist to ensure that it will not impair their ability to safely operate a bicycle or other wheeled vehicle.

10. **Clean-up Your Litter**: Please keep this Trail clean and neat for other users to enjoy. Do not leave glass, paper, cans or any other debris on or near the Trail. Please clean up after your pets. Pack out what you bring in, and remember to always recycle your trash.

11. **Keep Pets on Leashes**: All pets must be kept on secure and tethered leashes. Failure to do so may result in fines. Share the Trail! Always exercise due care and caution when using the Trail!

C. Security and Safety Patrol

1. _____ and, _____ and _____ shall agree to share responsibility for monitoring and patrolling Red Rock Trail System®.

2. All applicable federal, state and local laws, rules, and regulations shall be enforced along the trail.

D. Emergency Response

1. _____, the _____, and the _____ shall work together to define an emergency response system in conjunction with appropriate local fire stations and paramedical units. This system will define which agencies respond to 911 calls, and should provide easy to understand routing plans and access points for emergency vehicles. Local hospitals shall be notified of these routes so they may also be familiar with the size and scope of the project. The entire trail system will be developed to support a minimum gross vehicle weight of 6.5 tons in order to accommodate emergency vehicles.

3. Volunteers

A. _____ shall be the lead agency responsible for the management of volunteers working to improve or maintain the Trail System through Adopt-a-Trail or other programs.

4. Maintenance

A. _____ and _____ shall share responsibilities for routine and remedial maintenance of the Trail.

B. _____ and _____ shall prepare a maintenance schedule to ensure the regular inspection and repair of the Trail.

C. Routine maintenance and responsibility for such tasks is as follows:

1. _____ will be responsible for removal of debris, trash, litter, obnoxious and unsafe man-made structures, and other foreign matter so as to be safe for public use;

2. _____ will be responsible for mowing, brush cutting and weed control;

3. _____ will be responsible for the inspection and repair of signs, kiosks, bollards, railings, rest areas (including trash receptacles and benches) and trailheads (including restrooms, water fountains, telephones, and bicycle parking);

4. _____ will be responsible for the removal of ice and snow from the surface of the trail;

5. _____ will be responsible for the repair of pavement striping, rough trail edges, severe bumps or depressions in the trail surface, cracked or uneven pavement, and the removal of vegetation occurring in the tread of the trail so that the trail surface is maintained as a continuous, even and clean surface;

6. _____ will be responsible for the removal of vegetation in order to maintain the integrity of the levee.

7. _____ shall be responsible for maintaining drainage structures along Red Rock Trail System®. This includes the inspection and repair of drainage ditches, and responsibility for erosion and silt control.

D. _____ shall prepare and coordinate the distribution of a Trail User Response Form. This form will serve to alert the agency of any maintenance needs in a timely manner.

Execution of Agreement

This agreement supersedes all prior verbal and written agreements and represents the basis for managing Red Rock Trail System®. This agreement is entered into by both parties on this _____ day of _____, 20 ___.

_____

_____
Signatory

Agency # 1

_____
Signatory

Agency # 2

_____
Signatory

adopt-a-trail

In 2018, FLT launched an Adopt-a-Trail program that allows organizations and citizen volunteer groups to have an active role in maintaining the lands and facilities of trail segments throughout Jefferson County, as well as lead beautification, art, or planning projects. FLT provides volunteers with training and work supplies for light maintenance tasks along an assigned segment of FLT trail. Tasks may include:

- Litter pickup
- Leaf raking
- Graffiti removal
- Spreading of mulch, gravel, etc.
- Sweeping of paved trails
- Removal of exotic invasive plants
- Reporting of safety hazards, illegal dumping, injured or dead animals, storm damage, and other issues

Individuals are also encouraged to volunteer to gather data, conduct trail counts, and/or attend annual group work days. FLT can seek to expand their Adopt-a-Trail program as new segments are constructed.

For more information about FLT's Adopt-a-Trail program, see: https://freshwaterlandtrust.org/get-involved/volunteer/

trail ambassador programs

Trail Ambassadors differ from those who participate in Adopt-a-Trail services. Ambassadors are an additional set of eyes and ears on the trail. They promote goodwill, help trail users with minor needs (such as directions), and promote safety and authorized use of the trail. Ambassadors often work in pairs and are usually given clothing to signify their status. Ambassadors are typically volunteers who provide services to an entire trail corridor. Some communities may deputize Ambassadors and provide them with telecommunications equipment. Ambassadors are skilled in first aid, they are very knowledgeable about the trail and location of services and facilities, and they are also knowledgeable about natural and cultural resources. As with Adopt-a-Trail programs, Trail Ambassadors will undergo orientation and training. They are asked to work specific dates and times. Some local governments will ask that they sign waiver of liability forms. Often times, Ambassadors make use of a bike to complete their service.

safety and security on trails

Multi-use trails, on occasion, can acquire the reputation as a place that is unsafe. Some of the reasons for this reputation are a lack of consistent lighting, poor visibility due to adjacent railroads and utilities, unsheltered encampments, and other land use contexts. Generally speaking, trails are equally as susceptible to safety and security issues as any other public space. However, there is no evidence to support that trails increase safety issues.

DEFINITION OF SAFETY + SECURITY

Safety is defined as the prevention of accidents and user conflicts by reducing the likelihood of danger or risk. This is mostly addressed through design criteria to prevent accidents and user conflicts. For the purposes of this report, safety will focus on flood risk and perceived safety through Crime Prevention Through Environmental Design principles.

Security is defined as the protection of people from intentional acts that could result in injury or harm and protection of property from deliberate acts. This includes crime prevention and law enforcement.

PERCEIVED SAFETY + SECURITY

Perceived safety and security are essential to an individual's perception of risk. It is important to understand the influence of risk perception on a user's decision to use Red Rock Trails, as well as while using them. When visitors of all ages, backgrounds, and abilities feel secure and welcome on the trail, it empowers the community to take pride and ownership of the space. Community ownership of space can help reduce perceived security concerns. Interpreting personal security in public space can be subjective; however, key physical attributes in the landscape can promote a greater sense of security and user confidence.

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

CPTED is a proactive technique in which the design and effective use of the built environment can reduce the fear of incidents of crime and asocial behavior. CPTED strategies rely upon the psychological design of space to influence user decisions that affect the built, social, and administrative environment. This is a different approach from addressing crime concerns by implementing visually affronting security or target-hardening measures. CPTED promotes high quality and visually pleasing solutions as first responses that aim to enhance the legitimate use of space. CPTED interventions can be applied without interfering with the original design program of a space. It can be economical to implement, especially if it is done early at the planning and design stages of a project. The five principles of CPTED include:

- Natural Surveillance
- Natural Access Control
- Territorial Reinforcement
- Activity Support
- Maintenance

While CPTED originates as a community-driven application, it is subject to individual practitioner biases, especially in law enforcement. If applied improperly or in a vacuum, CPTED can rely too heavily on enforcement and may result in disproportionate policing of space and bias against specific groups of individuals, including people of color and youth. CPTED strategies are successful when multiple sectors of the community are involved and the project maintains the goal of providing public space that is safe, secure, and welcome to all users.

NATURAL SURVEILLANCE

Natural surveillance increases the threat of apprehension by taking steps to increase the perception that people can be seen while using a trail. Natural surveillance occurs by designing the placement of physical features, activities, and people in such a way as to maximize visibility and foster positive social interaction among legitimate users of public space. With natural surveillance in place, people who intend to commit crimes feel increased scrutiny and limitations on their escape routes. Natural surveillance design features include:

- Use adjacent roadways and the passing vehicular traffic as a surveillance asset
- Create landscape designs that provide surveillance, especially in proximity to designated points of entry and opportunistic points of entry
- Use the shortest, least sight-limiting fence appropriate for the situation
- Avoid unnecessary light pollution by using appropriately sized and positioned lighting
- Avoid poorly placed lights that create blind-spots for potential observers and miss critical areas; ensure potential problem areas are well-lit (pathways, stairs, entrances/exits, parking areas, children's play areas, recreation areas, storage areas, dumpster, recycling areas, etc.)
- Avoid overly bright security lighting that creates blinding glare and/or deep shadows, hindering the view for potential observers; eyes adapt to night lighting and have trouble adjusting to severe lighting disparities (using lower intensity lights often requires more fixtures)
- Place lighting along pathways and other pedestrian-use areas at proper heights for lighting the faces of the people in the space

(and to identify the faces of people intending to commit crimes)
- Natural surveillance measures can be complemented by mechanical and organizational measures; for example, closed-circuit television (CCTV) cameras can and should be utilized

NATURAL ACCESS CONTROL

Natural access control limits the opportunity for crime by taking steps to clearly differentiate between public space and private space. Natural access control occurs by selectively placing entrances and exits, fencing, lighting, and landscape to limit access or control flow.

- Use a single, clearly identifiable point of entry
- Use low, thorny bushes to keep people out of sensitive areas
- Use waist-level, picket-type fencing to control access and encourage surveillance
- Natural access control is used to complement mechanical and operational access control measures, such as target hardening

NATURAL TERRITORIAL REINFORCEMENT

Natural territorial reinforcement promotes safety through increased definition of space and improved proprietary concern. An environment designed to clearly delineate private space creates a sense of ownership. Vested ownership creates an environment where people committing crimes stand out and are more easily and accurately identified and reported to police. Natural territorial reinforcement occurs by using buildings, fences, pavement, signs, lighting, and landscape to express ownership and define public, semi-public, and private space. Additionally, these objectives can be achieved by assignment of space to designated users in previously unassigned locations.

- Maintain premises and landscaping such that it communicates an alert and active presence occupying the space
- Provide trees in residential areas; research results indicate that, contrary to traditional views within the law enforcement community, outdoor residential spaces with more trees are seen as significantly more attractive, safer, and more likely to be used than similar spaces without trees
- Restrict private activities to defined private areas
- Display security system signage at access points
- Avoid cyclone fencing and razor-wire fence topping as it communicates the absence of a physical presence and a reduced risk of being detected
- Place amenities such as seating or refreshments in common areas in a commercial or institutional setting to help attract larger numbers of desired users
- Schedule activities in common areas to increase proper use, attract more people, and increase the perception that these areas are safe
- Use natural territorial reinforcement measures to make the typical user feel safe and make people who intend to commit crimes aware of a substantial risk of apprehension or scrutiny

TRAIL WATCH PROGRAM

A Trail Watch program for Red Rock Trail System® will help to promote safety and appropriate trail use by providing information and assistance to all trail users. Trail Watch volunteers observe and document safety issues requiring attention, serve as a positive presence on the trail, and assist the local governments and law enforcement agencies with keeping Red Rock Trail System® safe and well-maintained.

APPENDIX C |
BENEFITS ANALYSIS TECHNICAL MEMORANDUM

MEMORANDUM

To: Freshwater Land Trust

From: Alta Planning + Design

Date: 5/20/2022

Re: Economic Benefits of the Red Rock Trail System®

Economic Benefits of the Red Rock Trail System® Action Plan

Executive Summary

This technical memorandum contains an economic impact analysis of the proposed Red Rock Trail System® put forth in the Red Rock Trail System® Action Plan (RRTAP) in the Birmingham, Alabama area. For the purposes of this memo, the "proposed alignment" or "proposed trail system" refers to the current best estimate of a conceptual RRTAP trail alignment, based on existing segments of trail, existing plans, and several potential spur trails.

The analysis estimated the number of bicycle and pedestrian trips that might take place on the proposed trail system; approximated the corresponding reduction in vehicle trips and vehicle-miles traveled (VMT); and assessed the potential benefits that might accrue if the entire proposed trail system was constructed. In total, it was estimated that the proposed trail system could generate **$11.75 million in annual benefits,** organized around the following categories:

- **Transportation Benefits:** Includes reductions in vehicle miles traveled and the associated reduction in congestion, collision, roadway maintenance costs, and emissions (CO2, NOx, SOx, and PM 2.5).
- **Health Benefits:** Includes increased physical activity levels, increased cardiovascular health, and other positive outcomes for users, leading to benefits in mortality reduction.
- **Economic Benefits:** Includes estimated spending from non-local visitors to the trail on goods, services, and lodging.

Table 1 displays the annual estimated benefits for each category. Subtotals for each category are shown in bold. The following sections provide an explanation of how each benefit was calculated and **Appendix C** – Multipliers details additional multipliers that were used for the analysis.

MEMORANDUM

Table 1. Total Annual Benefits

CATEGORY	MONETARY VALUE
TRANSPORTATION BENEFITS	**$4,157,000**
Reduced Traffic Congestion Costs	$271,000
Reduced Vehicle Crash Costs	$1,622,000
Reduced Road Maintenance Costs	$278,000
Household Vehicle Operation Cost Savings	$1,860,000
CO2 Emissions Reduced (metric tons)	102
Other Vehicle Emission Reduced (metric tons)[1]	0.2
Total Vehicle Emission Costs Reduced	$126,000
HEALTH BENEFITS	**$2,682,000**
Mortality Reduction Benefits from Walking	$1,021,000
Mortality Reduction Benefits from Cycling	$1,661,000
ECONOMIC BENEFITS	**$4,916,000**
Food/Meals	$1,874,000
Retail	$476,000
Entertainment	$151,000
Bicycle Rental	$32,000
Lodging	$2,383,000
TOTAL BENEFITS	**$11,755,000**

*Numbers are rounded to three digits in the table.

Methodology and Results

Existing Walking and Biking Activity

This analysis first examined the current levels of walking and biking within the project area. **Table 2** displays the existing commute to work mode share for people within walking and biking distance of the proposed regional trails.

[1] Includes particulate matter 2.5, nitrous oxides, sulfur oxides, and volatile organic compounds

Table 2. Means of Transportation to Work of People Living Near the Proposed Trail Network (2019 American Community Survey)

RRTAP Corridor	Population	Drove Alone	Carpool	Public Transit	Bicycled	Walked	Other
Walkshed (within half-mile)	116,624	79.99%	9.33%	1.81%	0.28%	4.26%	0.92%
Bikeshed (within 3 miles)	324,058	80.88%	10.11%	1.58%	0.29%	2.25%	0.93%

Demand

Next, the analysis estimated the expected number of biking and walking trips that would occur on the trail system. To understand the potential demand for the proposed trail system, count data at similar trails in Texas and Alabama were analyzed (**Table 3**).

Table 3: Trail Counts at Similar Facilities

Trail (Location)	Primary Land Use	Length	Estimated Daily Bicyclists (per mile)	Estimated Daily Pedestrians (per mile)	Estimated Total Daily Users (per mile)	Estimated Total Annual Users (per mile)	Source
Legacy Trail (Plano, TX)	Suburban	2.9 miles	26 (9)	40 (14)	66 (23)	N/A	Texas Bicycle and Pedestrian Count Exchange. Texas Department of Transportation and Texas A&M Transportation Institute (2019).
Aldridge Creek Greenway (Huntsville, AL)**	Suburban	5.0 miles	weekend 145 (29)	weekend 34 (7)	179 (36)	N/A	The Land Trust of North Alabama
Shoal Creek (Austin, TX)***	Urban	3.7 miles	73 (20)	447 (121)	520 (141)	N/A	City of San Antonio and City of Austin. EcoCounter (2021).

**Based on count data from one location along greenway; Aldridge Creek Greenway (6:30 AM – 6:30 PM)
***Assumed 86 percent pedestrians and 14 percent bicyclists from The Trail: Economic Impact Analysis 2016

Creating context sensitive estimates of demand based on existing counts often requires extrapolating based on other datasets to understand how demand changes throughout a corridor. Powerful proxy metrics for demand and modeshift potential include looking at the rates of Active Trip Potential (ATP) trips, or vehicle trips shorter than three miles. Using the average daily volumes from the comparable trails in **Table 3**, bicycle and pedestrian trip counts were scaled and applied to mile-long segments of the proposed trail by leveraging ATP trips to create adjustment factors. Replica Places' activity-based model outputs for a typical Thursday in 2019 were used to collect information on ATP trips. Details of Replica's modeling approach are articulated in **Appendix A.** ATP trips evaluated included those that terminate within a 1-mile buffer of the proposed trail segment relative to the baseline number of ATP trips occurring within a similar 1-mile buffer area around the existing trail segment. These estimated counts were then summed up for all segments along the proposed trail and divided by the average bicycle and pedestrian trip length from the 2017 National Household Travel Survey to account for unique trips (2.38 miles and 0.86 miles, respectively).

In a sentence, we compute the person-miles traveled based on the estimated counts on these "synthetic counters", and then divide them by the average trip distances to get an estimate of unique user trips.

This impact assessment includes the total 19 miles of the proposed trail system. **Table 4** displays the average daily number of bicycles and pedestrians per mile, along each segment of the RRTAP alignment. Overall, it is expected there would be an **estimated 1,486 bicyclists per day** and an **estimated 704 pedestrians per day**. The list of comparable facilities included data collected multiple years post-construction, and as such, it is expected that it may take multiple years for the proposed trail to reach these per day estimates.

Table 4. Projected Trail Use

Trail Name	Average Daily Bicycle Trips	Average Daily Pedestrian Trips	Red Rock Proposed Alignment (miles)
Smithfield to Downtown	30	182	3
20th Street (2nd Ave S to 15th Ave S)	66	406	1
Red Mountain Park to University of Alabama Birmingham	651	31	3
High Ore Line to Jones Valley Trail Corridor	397	19	3
Ruffner Mountain Rail Trail	16	25	3
Flora Johnston to Ruffner	16	24	2
Red Mountain to Shades Creek Greenway (Alternate)	309	15	3
Total	**1,486**	**704**	**19**

Transportation Benefits

The most readily-identifiable benefits of the proposed trail derive from its potential ability to connect residences and visitors to major activity centers and recreation opportunities across the greater Birmingham metropolitan area. The daily estimates (1,486 bicycle users and 704 pedestrian users) were extrapolated to annual trip volumes and broken into different trip types (i.e. commute, recreation, school, college, and utilitarian) using the existing travel patterns (**Table 2**) and data from the National Household Transportation Survey **Table 5**. The annual extrapolations account for the expected number of trips per week by trip type (i.e. commute, school, and college trips are expected five out of seven days a week, and other trip types are expected to occur seven days a week).

Table 5: Trip Purpose Multiplier[2]

	Bike	Walk
Utilitarian Trip Multiplier	5.33	8.77
Social/Recreational Trip Multiplier	1.68	2.18

The estimated number of **annual bike trips is 501,218** and the estimated number of **annual pedestrian trips is 238,237** for a total of 739,445 trips per year. Some of the estimated 739,445 annual bicycle and pedestrian trips are expected to replace motor vehicle trips. Calibrated to modal shift factors reported in literature[3], a univariate regression model estimates the motor vehicle trip replacement factor based on the percentage of trips that terminate in census block groups within ¼-mile of the proposed facility that are less than 4 miles. Trip distance data is provided by Replica for a typical travel Thursday in Fall 2019[4]. The motor vehicle trip replacement factor for all active mode trips is **17.6%**. The details of this model are documented in **Appendix B.**

To estimate the number of vehicle-miles that might be replaced by bicycling and walking trips, **Table 6** shows the average trip distance of bicycling and walking trips by trip purpose. The number of vehicle miles reduced due to bicycle and pedestrian trips was calculated by multiplying the number of biking or walking trips by the trip replacement and trip distance factors. The analysis estimates that the 739,455 walking and biking trips on the trail system would reduce vehicle miles traveled by 242,286 miles.

Table 6: Trip Distance (miles)

	Bike	Walk
Commute Trips[5]	2.47	0.72
College Trips[6]	1.31	0.43
K-12 School Trips[7]	1.36	0.69
Utilitarian Trips[8]	2.28	0.83
Social/Recreational Trips[9]	2.73	1.12

While no money may change hands, real savings can be estimated from the reduction costs associated with congestion, vehicle crashes, road maintenance, and household vehicle operations. The impact analysis model also evaluates and quantifies annual savings from reduced vehicle emissions, using a number of readily-available data

[2] Travel Day Person Trips (in millions), NHTSA 2017 <https://nhts.ornl.gov/>
[3] Volker et al (2019). Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks
[4] Replica Places (2019). https://replicahq.com/
[5] NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl_TRPTRANS_WHYTRP1S.html
[6] Ibid.
[7] Safe Routes National Center for Safe Routes to School, Trends in Walking and Bicycling to School from 2007 to 2013 (2015). http://www.saferoutesinfo.org/sites/default/files/SurveyTrends_2007-13_final1.pdf
[8] NHTS (2017). http://nhts.ornl.gov/tables09/fatcat/2009/aptl_TRPTRANS_WHYTRP1S.html
[9] Ibid

inputs were analyzed. **Table 7** displays the monetary value and air quality improvements of these benefits due to the 242,286-mile reduction in vehicle miles traveled

Table 7. Annual Transportation and Emission Benefits

CATEGORY	MONETARY VALUE
Reduced Traffic Congestion Costs[10]	$271,000
Reduced Vehicle Crash Costs[11]	$1,622,000
Reduced Road Maintenance Costs[12]	$278,000
Household Vehicle Operation Cost Savings[13]	$1,860,000
CO2 Emissions Reduced (metric tons)[14]	102
Other Vehicle Emission Reduced (metric tons)[15]	0.2
Total Vehicle Emission Costs Reduced[16]	$126,000
Total Transportation Benefits	**$4,157,000**

Quality of Life Benefits

More people bicycling and walking can help encourage an increase in physical activity levels, increased cardiovascular health, and other positive outcomes for users. The benefits from reduced mortality were calculated using the recommended values provided in the 2022 USDOT BCA Guidance (Table A-12) and the national distribution of age ranges and travel patterns. These benefits were applied to the estimated number of walking and biking trips along the RRTAP alignment. **Table 8** displays the multipliers that were used.

Table 8: Mortality Reduction Multipliers

Mortality Reduction Benefits of Induced Active Transportation	Value
Walking Value per Induced Trip	$7.08

[10] Average Annual Miles per Driver by Age Group. Last modified: September 26, 2014. FHWA. https://www.fhwa.dot.gov/ohim/onh00/bar8.htm; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. http://www.camsys.com/pubs/AAA.pdf
[11] Average Annual Miles per Driver by Age Group. Last modified: Sepetember 26, 2014. FHWA. https://www.fhwa.dot.gov/ohim/onh00/bar8.htm; Using Figure ES.3 "Cost of Crashes and Congestion per Vehicle Mile Traveled" ratios from 2008 report and adjusting to 2011 values. http://www.camsys.com/pubs/AAA.pdf
[12] Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis.
[13] American Automobile Association, Your Driving Costs - 2017 Edition (2017) <http://exchange.aaa.com/automobiles-travel/automobiles/driving-costs/#.Wt9eRojwa72>
[14] Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks, EPA (2008) < https://www3.epa.gov/otaq/consumer/420f08024.pdf>
[15] Ibid. Includes particulate matter, nitrous oxides, sulfur oxides, and volatile organic compounds
[16] GHG Equivalencies Calculator, EPA < https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references>

Cycling Value per Induced Trips	$6.31
Walking Age Proportion (20-74 years old)	68%
Cycling Age Proportion (20-64 years old)	59%
Trips induced from non-active modes	89%

Economic Benefits

After implementation, visitors to the Red Rock Trail System® are likely to spend money on food, retail, entertainment, and lodging. The average percent of trail users that were not from the area surrounding the trail was 33 percent among comparable trails to the proposed Red Rock Trail System®. If there are 739,455 annual trips on the proposed trail and it experienced the same percent of non-local trail users as the comparable trails, then an **estimated 244,020 non-local trail trips would occur on the proposed trail each year**.

Table 9: Trip Point of Origin and Length of Stay

Location	Trip Point of Origin (Percent of Surveyed Users, Number of Responses)		Surveyed Users	Source
	Local	Non-local		
Brevard Greenway, Average of Years 1 and 2 (Brevard, NC)	64%	36%,	500	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year Two.* North Carolina Department of Transportation (2016).
American Tobacco Trail, Average of Years 1 and 2 (Triangle Region, NC)	65%	35%	3,989	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year Two.* North Carolina Department of Transportation (2016).
Washington & Old Dominion Railroad (Arlington, VA to Leesburg, VA)	95%	5%	1,462	*The Washington & Old Dominion Trail: An Assessment of User Demographics, Preferences, and Economics; Virginia Dept. of Conservation, 2004.*
Great Allegheny Passage (Pittsburgh, PA to Cumberland, MD)	69%	31%	1,272	*Trail Town Economic Impact Study (Phase II: Trail User Survey), Progress Fund and Laurel Highlands Visitor Bureau; 2009*
Katy Trail (St. Louis Region, MO)	33%	67%	N/A	*Katy Trail Economic Impact Report: Visitors and MGM2 Economic Impact Analysis (2012)*
Erie Canalway Trail (Buffalo to Albany, NY)	77%	23%	562	*The Economic Impact of the Erie Canalway Trail: AN ASSESSMENT AND USER PROFILE OF NEW YORK'S LONGEST MULTI-USE TRAIL (2014)*
Average	**67%**	**33%**		

The average expenditures of groups of trail users on comparable trails was $64 for food/meals, $60 at retail establishments, $31 for entertainment, $52 for bicycle rental, and $93 for lodging **(Table 10).** If the estimated non-local trail users purchased goods at the same rate as the comparable trails and there are an average of 4 people per group,[17] then the proposed trail system would contribute to an estimated $1,874,000 in annual food/meal spending, $476,000 in annual retail spending, $151,000 in annual entertainment spending, $32,000 in annual bicycle rental spending, and $2,283,000 in annual lodging spending (assumes 42 percent of non-local trail users stay overnight in a hotel)[18], for a total in **$4,916,000 in estimated annual trail-related spending from non-local trail users** (excludes transportation spending). These estimates assume the availability of such goods and services. This section only includes direct economic benefits of the trail system. There are also indirect economic benefits, as trail-related spending from non-local users is expected to circulate through the economy, providing a multiplier effect.

Table 10: Average Expenditure

Location	*Average Expenditure (Percent of Surveyed Users, Number of Responses, Average Expenses)*					*Source*
	Restaurant	*Grocery*	*Retail*	*Entertainment*	*Bicycle Rental*	
Duck Trail, Year 2 (Duck, NC)	31%, 510, $40	16%, 509, $70	12%, 510, $68	2%, 510, $73	3%, 510, $63	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Duck Trail Year Two.* North Carolina Department of Transportation (2016).
Brevard Greenway, Year 2 (Brevard, NC)	21%, 239, $25	15%, 238, $28	8%, 239, $37	<1%, 239, $6	2%, 239, N/A	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year Two.* North Carolina Department of Transportation (2016).
Brevard Greenway, Year 1 (Brevard, NC)	37%, 217, $20	19%, 216, $32	7%, 216, $47	<1%, 217, $10	2%, 217, $70	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: Brevard Greenway Year One.* North Carolina Department of Transportation (2016).

[17] Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017).

[18] Proportion of visitors who stay overnight on recreational bicycle rides from The Economic Significance of Bicycle-Related Travel in Oregon.

American Tobacco Trail, Year 2 (Durham, NC)	19%, 1,833, $15	8%, 1,834, $31	3%, 1,835, $73	1%, 1,835, $22	0%, 1,835, $25	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year Two*. North Carolina Department of Transportation (2016).
American Tobacco Trail, Year 1 (Durham, NC)	20%, 1,927, $21	13%, 1,920, $28	5%, 1,923, $73	1%, 1,924, $36	0%, 1,925, $48	*Evaluating the Economic Impact of Shared Use Paths in North Carolina, Technical Memorandum: American Tobacco Trail Year One*. North Carolina Department of Transportation (2016).
Huntsville/ Madison County	88%, 150, $76		42%, 150, $61	45%, 150, $36	N/A	*Spring Intercept Survey Results. Huntsville/Madison County Convention & Visitors Bureau (2017). Alabama Tourism Industry 2019 Economic Impact.*
Average	48%, $64		13%, $60	8%, $31	1%, $52	

Table 11: Annual Economic Benefits[19]

CATEGORY	MONETARY VALUE
Food/Meals	$1,874,000
Retail	$476,000
Entertainment	$151,000
Bicycle Rental	$32,000
Lodging[20]	$2,383,000
Total Economic Benefits	**$4,916,000**

Limitations

The primary purpose of the analysis is to enable a more informed policy discussion on the benefits of investing in the proposed Red Rock Trail System®. Even with extensive primary and secondary research incorporated into the impact analysis model, it is impossible to accurately predict the *exact* impacts of various factors. Accordingly, all estimated benefit values are rounded and should be considered order of magnitude estimates, rather than exact amounts.

[19] These values are calculated from the average spending totals and rates of spending shown in Table 12

[20] This assumes the average nightly hotel rate of $93 from Budget your Trip: Texas <https://www.budgetyourtrip.com/united-states-of-america/texas> and the proportion of visitors who stay overnight on recreational bicycle rides (42 percent) from The Economic Significance of Bicycle-Related Travel in Oregon

Appendix A: Technical Documentation. Replica Methodology

technical documentation.

replica methodology

0. Executive Summary

Replica produces high-fidelity activity-based mobility models, at “megaregion” scale (~30 million people), with disaggregate data outputs down to the network-link level.

Activity-based models are transportation models in which travel demand is derived from people's daily activity patterns. Activity-based models predict which activities are conducted when, where, for how long, for and with whom, and the travel choices they will make to complete them.

Replica generates its data by running large scale, computational-intensive simulations. Rather than simply cleansing, normalizing, and scaling individual data sources, Replica:

(1) Creates a synthetic population that matches the characteristics of a given region
(2) Trains a number of behavior models specific to that region
(3) Runs simulations of those behavior models applied to the synthetic population in order to create a “replica” of transportation and economic patterns
(4) Calibrates the outputs of the model against observed “ground-truth” to improve quality

This methodology is how Replica delivers granular data outputs that match behavior in aggregate but don’t surface the actual movements (or compromise the privacy) of any one individual.

Origin-destination pairs are consistent with human activities. Population demographics are accurate and correlate with appropriate movement. Recurring activities are coherent over time and capture a pattern of life. Routing between locations is consistent with local road networks and transportation options. And the scale of population and number of trips is appropriate for a given geographic extent.

Replica has served over 60 clients throughout the U.S., including Caltrans (the California DOT), the Metropolitan Transportation Authority in NYC, the NY State Division of the Budget, the Illinois DOT, New Jersey Transit, and the Office of the Chief Technology Officer (OCTO) in Washington, D.C.

In the following document, we outline our sources, methodology, and outputs, as well as detail regarding our uncompromising approach to protecting individual privacy.

I. Overview

Replica simulations are delivered as megaregions, each covering between 20 and 50 million residents and multiple states, enabling the entire contiguous United States to be produced in 14 megaregions. The output of each simulation is a complete, disaggregate trip and population table for an average weekday and average weekend day in the subject season (e.g., Fall 2021). The model represents a 24-hour period with second-by-second temporal resolution, and point-of-interest-level spatial resolution. In essence, each row of data in the simulation output reflects a single trip, with characteristics about both the trip (e.g, origin, destination, mode, purpose, routing, duration) and trip taker (e.g., age, race/ethnicity, income, home location, work location). In aggregate, the output dataset reflects the complete activities and movements of residents, visitors, and commercial vehicle fleets in the target region and season on a typical day.

Each year, Replica produces a spring simulation and a fall simulation for each megaregion. Each completed model also includes an associated quality report, which compares the outputs of the simulation to ground truth data, enabling comparisons between modeled outputs and observed counts.

II. Source Data

Replica utilizes a diverse set of public and private third-party source data to inform its simulations. These sources include five categories of data:

Mobile location data: Multiple types (currently five unique sources) of de-identified location data collected from personal mobile devices and in-dashboard telematics are used to create a representative sample of daily movement patterns within a place.

Consumer resident data: Demographic data from public and private sources provides the basis for determining where people live and work, and the characteristics of the population, such as age, race, income, and employment status.

Land use / real estate data: Land use data, building data, and transportation network data are used to paint a complete picture of the built environment, and where people live, work, and shop.

Credit transaction data: Credit transactions from financial companies are used to model consumer spending. With this input, Replica depicts the level and types of spending that occurred at a particular time and place.

Ground truth data: Ground truth data is used to calibrate and improve the overall accuracy of Replica outputs. The types of ground truth collected by Replica include auto and freight volumes, transit ridership, and bike and pedestrian counts.

By building a composite of these diverse sets of data, Replica minimizes the risk of sampling bias that exists in any single source on its own. For example, a product that relies more heavily on data from personal mobile devices risks failing to adequately simulate the portions of the population that do not have mobile devices or those who opt out of device tracking

technologies. Our composite approach also creates resiliency against data quality issues and protects against disruptions of individual data sources.

III. Methodology & Approach to Privacy

At a high level, Replica's approach to generating its simulations is best described in four steps:

Step 1: Population Synthesis A nationwide synthetic population, statistically equivalent to the actual population, is generated for the entirety of the United States each year. Replica creates a synthetic population because census data is limited to aggregate geographies, which limits the ability to assign attributes to individuals or households. Synthetic populations also help protect privacy without compromising spatial fidelity.

The synthetic population is generated using census and consumer marketing data. Replica applies data science techniques to this data that allow for: (1) modeling the dependencies in socio-demographic parameters and structure of the households, and (2) synthesis of the population at the level of individual households so that it matches aggregate census information at the required level of aggregation such as block groups or tracts.

Each synthetic household consists of people with an assigned set of attributes: age, sex, race, ethnicity, employment status, household income, vehicle ownership status, and resident or visitor status. Workplace locations for all employed individuals are assigned based on the combination of mobile location data aggregates and census information. These assignments are static in each seasonal model, but can and do change across seasons.

The population relevant for each specific megaregion is extracted from the nationwide population to begin each simulation.

Step 2: Mobility Model Creation Modern machine learning techniques are then leveraged to develop travel personas from the composite of mobile location data for the subject megaregion and season. Personas are an extraction of behavioral patterns from individual devices that live in, work in, travel to, travel from, or pass through a specific region during the subject season.

Each persona is composed of three underlying behavioral-choice models: activity planning and sequencing (e.g., at home -> drive to work -> at work -> drive to shop -> drive to home), destination location choice (i.e., the exact location people are traveling to and from), and travel mode (i.e., the chosen mode).

Replica's composite of mobile-location data represents anywhere from 5% to 20% of a local population. Replica intentionally only acquires the necessary data required to build statistically representative models, another tenet of balancing model fidelity with user privacy.

Step 3: Activity Generation To simulate activity, the outputs from Step 1 and Step 2 are joined. Each synthetic household is assigned one or more personas using home and work locations as a primary input, enhanced with matching by available socio-demographic attributes and by the role of the person in a household. In effect, with travel behavior models assigned, each synthetic person can now make choices about when, where, and how to travel.

Individuals in the synthetic population are then set into motion via three models. The **activity sequence model** determines the activities of a simulated person's day, including both recurring activities (e.g., travel to work, school drop off), as well as one-time activities (e.g., shopping, visiting a restaurant, social visit to a friend's residence). The **location choice model** determines the specific location of each discretionary activity (e.g., what restaurant is chosen for lunch, where grocery shopping gets done), assigning a location at the point-of-interest level. And the **mode choice model** determines how the trip will be made based on the state of the transportation network, accounting for available transit options and multiple driving routes.

Movement is then simulated with an agent-based approach that accounts for congestion and other interactions between individual travel itineraries.

Step 4: Calibration After each individual simulation run, the modeled outputs are compared to aggregate control group data (i.e., observed counts, or "ground truth") for quality and reporting purposes. This calibration process involves solving a set of large-scale optimization problems with an objective function defined as "fit to observed ground truth." A careful balance is struck to ensure that the calibration algorithms do not overfit the modeled outputs to the calibration data, as both outliers and a certain level of noise is often present in every dataset.

To complete this iterative calibration process, Replica always holds out some of its own ground-truth data from the initial mobility simulation. Replica can also incorporate additional ground-truth provided by its customers for additional quality enhancement.

Each completed model includes an associated quality report, which transparently displays a comparison of modeled outputs to ground truth data, enabling users to compare model outputs to observed counts.

Approach to Privacy: The approach outlined here reflects Replica's uncompromising belief that better insights should not come at the expense of personal privacy. Our methodological approach enables us to provide highly granular output data while remaining faithful to a series of privacy-first technical commitments. At Replica, we:

- Only procure de-identified data from our source vendors. The data we receive is never associated with an individual's personally identifiable information.
- Never share raw locational data with our customers — or any other third-parties
- Build models from different data sources independently so that we abstract out potentially identifying details of any individual before combining these models into our aggregate outputs
- Never join data sources on keys containing sensitive data
- Incorporate proven techniques, like statistical noise injection, into our algorithms to ensure that (1) it is impossible to ascertain if an individual's information is part of our source data by inspecting our modeled outputs; (2) it is impossible to learn which specific locations were visited by an individual whose information was part of our source data by inspecting our modeled outputs

Simply put, Replica's methodology results in outputs that make it impossible to track or identify the movements of any individual.

IV. Data Outputs

Each simulation results in a complete trip, population, and routing table.

Population Attributes: Each trip is associated with a specific person in the simulation, for whom the following characteristics are available:

- Age
- Sex
- Race
- Ethnicity
- Employment status
- Household income
- Vehicle ownership status
- Resident or visitor status

Trip Attributes: Each trip is assigned the following attributes:

- Origin and destination points
- Trip distance
- Trip duration
- Start and end time
- Complete routing information for each trip
- Trip mode, including private auto driver, private auto passenger, public transit, walking, biking, freight, and transportation network companies (TNCs)
- Trip purpose, including home, work, errands, eat, social, shop, recreation, commercial, school

Location Detail: Replica models to specific real-world locations and points of interest (e.g., a specific office building, the Starbucks at a certain address) — trips are modeled from individual building footprint to individual building footprint, rather than zone to zone. We update our nationwide catalogue of points of interest monthly, and we use the applicable set of locations for each simulation.

V. Geographic and Temporal Coverage

Replica is currently focused on covering the United States. Each year, Replica produces a spring simulation and a fall simulation for each of our megaregions. We can also run simulations for specific time periods or locations for our customers as needed; for instance, we could produce a model for December 2019 that would be distinct from our regular fall 2019 model for a given location.

alta

Appendix B: Modal Substitution Rate Methodology

To: BCA Reviewers

From: Grace Young, Rohan Oprisko, Mike Sellinger, and David Wasserman, Alta Planning + Design

Date: April 1, 2022

Re: Modal Shift Model Notes

Modal Substitution Rates: Introduction

Modal substitution rates refer to the percentage of users of a facility who substituted one mode for another (Volker et al. 2019). These rates are often determined from survey instruments asking about alternative modes. When users substitute a carbon-free mode like biking for a carbon-intensive mode like driving, there is an associated emissions savings, proportional to the length of the trip. The following model provides a means for estimating the percentage of future facility users that will substitute a carbon-free mode in place of driving. This serves as a crucial step in identifying reductions in vehicle miles traveled and the emissions-saving benefits of the proposed facility.

Methodology

A series of univariate regression models were tested on peer-reviewed auto-to-bike substitution rates for projects in 10 cities around the United States. Six variables were collected at the city level and tested as inputs in a univariate regression model predicting the modal shift factor using an ordinary least squares regression from the statsmodels Python library. The variables are described in Table 1. The same variables were also tested in predicting the natural log of the modal shift percentage.

Data Review

Table 1. Peer-reviewed auto-to-bike modal shift factor and six demographic variables reported for the respective project cities[1]

City	Modal Shift (ratio)	Population Density (people per sq. mi.)	Median Income ($)	Travel Time to Work (min.)	% of Trips <4 Miles (ratio)	Active Mode Split (ratio)	Bike Mode Split (ratio)	Source
Los Angeles, CA	0.109	8,092	62,142	32	0.471	0.147	0.030	Matute et al. (2016)
Denver, CO	0.237	3,923	68,592	26	0.531	0.251	0.015	Piatkowski et al. (2015)
Boulder, CO	0.571	3,948	69,520	20	0.652	0.283	0.045	Piatkowski et al. (2015)
Littleton, CO[2]	0.724	3,215	76,105	26	0.512	0.254	0.060	Piatkowski et al. (2015)
Sacramento, CA	0.273	4,764	62,335	26	0.437	0.195	0.090	Piatkowski et al. (2015)

MEMORANDUM – Confidential Business Information (CBI)

City	Modal Shift (ratio)	Population Density (people per sq. mi.)	Median Income ($)	Travel Time to Work (min.)	% of Trips <4 Miles (ratio)	Active Mode Split (ratio)	Bike Mode Split (ratio)	Source
Davis, CA	0.250	6,637	69,3709	23	0.636	0.220	0.095	Piatkowski et al. (2015)
Austin, TX	0.146	2,653	71,576	25	0.502	0.179	0.016	Monsere et al. (2014)
Chicago, IL	0.374	11,841	58,247	35	0.598	0.377	0.070	Monsere et al. (2014)
Portland, OR	0.202	4,375	71,005	27	0.538	0.267	0.027	Monsere et al. (2014)
San Francisco, CA	0.263	17,179	112,449	34	0.547	0.245	0.060	Monsere et al. (2014)
Washington, DC	0.202	9,856	86,420	31	0.564	0.311	0.018	Monsere et al. (2014)

Notes:

min. : minute

sq. mi. : square mile

1. Adapted from Volker et al. 2019.
2. Littleton, CO, was removed as an outlier in this modeling exercise for both final models.
3. All sources can be found in the Volker, J et. al (2019) paper specified in the references section.

Results

We found two acceptable models for contextual estimation of modal substitution rates given the available data: the examination of short trips (under 4 miles) and the active mode split model. Alta's preferred model is the examination of short trips due to its theoretical consistency with the idea that short trips are indicators that a higher proportion of vehicle trips can be converted to active modes given improved infrastructure and support. Alta uses the active mode split model depending on the available data sources on a given project or for sensitivity analysis to generate a conservative estimate.

Correlation and R-Squared

Table 2. Variable performance in correlation test and ordinary least squares univariate regression

Variable	Source	Correlation with Modal Shift	Correlation with ln (Modal Shift)	Adjusted R-Squared Predicting Modal Shift		Adjusted R-Squared Predicting ln (Modal Shift)	
				No Constant	With Constant	No Constant	With Constant
Population Density	Census	-0.21	-0.11	0.411	-0.063	0.663	-0.098

Variable	Source	Correlation with Modal Shift	Correlation with ln (Modal Shift)	Adjusted R-Squared Predicting Modal Shift		Adjusted R-Squared Predicting ln (Modal Shift)	
				No Constant	With Constant	No Constant	With Constant
Median Income	Census	-0.01	0.03	0.689	-0.111	0.813	-0.110
Travel Time to Work	Census	-0.32	-0.30	0.653	0.001	0.864	-0.014
Percent of Trips Under 4 Miles	Replica Places (2022)	0.31	0.41	0.744	-0.005	0.805	0.076
Active Mode Split (all trips)	Replica Places (2022)	0.39	0.53	0.763	0.057	0.709	0.200
Bike Mode Split	Replica Places (2022)	0.32	0.43	0.654	0.003	0.479	0.090

Note:

All values reported in this table are for models without the Littleton, CO outlier removed.

Linear Relationship Plots

Figure 1 and Figure 2 show the linear relationship between the log of modal shift and the percentage of trips less than 4 miles or active mode share, respectively. Littleton, CO, is identified as an outlier in both cases and thus removed for the final model development.

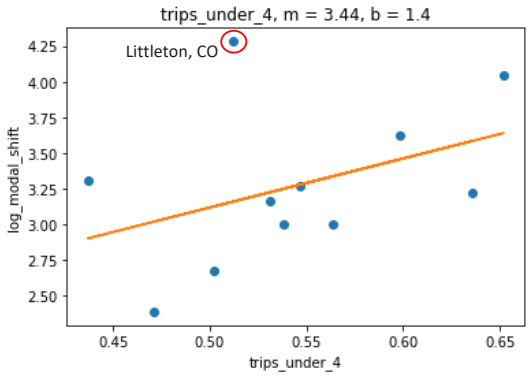


Figure 1. Modeled Relationships Between the Percentage of Short Trips and the Log of Modal Shift

MEMORANDUM – Confidential Business Information (CBI)

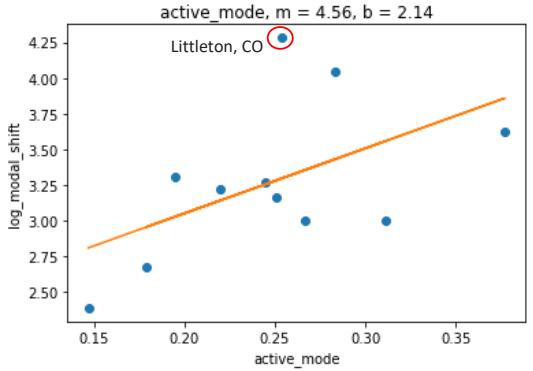


Figure 2. Modeled Relationships Between Active Mode Share and the Log of Modal Shift

Final Model Summaries

The two acceptable models are summarized in Table 3, along with the derived equations for applying each to a project-specific context.

Table 3. Model summaries for acceptable final models

Dependent Variable	*Log modal shift percentage*		Dependent Variable	*Log modal shift percentage*	
R-squared	*0.424*		R-squared	*0.414*	
Independent Variable	Coefficient	P-Value	Independent Variable	Coefficient	P-Value
Percent of trips under 4 miles	4.39	0.041	Active mode share	1.85	0.045
Constant	0.77	0.462	Constant	2.08	0.002
Equation			Equation		
ln(modal shift %) = 0.77 + 4.39*(% trips under 4 miles)			ln(modal shift %) = 2.08 + 1.85*(% active mode share)		

Discussion

These models enable a flexible and actionable approach to provide context-sensitive estimates of potential modal substitution rates given investments in multimodal infrastructure that are suitable for transportation planning practice. This approach aligns well with the understanding that compact, mixed-use locations with small urban footprints and high destination access encourage shorter trips and active travel (NASEM 2014). These models provide a decision-support tool to make informed and context-sensitive assessments of potential modal substitution rates given a project study boundary. Understanding how much reduction in vehicle miles traveled is possible given investments in active transportation is relevant to choosing a quick and responsive model.

However, there are limitations to this approach worth considering:

- While significant relationships were identified between these variables and modal substitution rates from literature, they are based on small sample sizes and depend on the removal of outliers.
- These models are not using any control variables. These univariate linear regression models are intended to enable quick determinations of possible modal substitution given a specific built context. While other variables such as population density or travel time to work were evaluated, they were not used as controls within the same model.
- Many other factors can influence rates of modal substitution beyond those identified here, and they warrant further study. It is highly complex result of localized intercept surveys, but their ranges from literature benefit from a context sensitive approach for analysis.

References

NASEM (National Academies of Sciences, Engineering, and Medicine). (2014). *Estimating Bicycling and Walking for Planning and Project Development: A Guidebook*. Washington, DC: The National Academies Press. https://doi.org/10.17226/22330

Volker, J., S. Handy, A. Kendall, and E. Barbour. (2019). *Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks: Summary Report.* California Air Resources Board (CARB). March 25, 2019.

Replica Places (2022). Replica Platform. Retrieved from https://replicahq.com/

MEMORANDUM – Confidential Business Information (CBI)

CBI Rationale

These regression equations are the result of internal R&D at Alta and represent a data-driven approach to identifying realistic modal substitution rates given contextual information about a project area. Disclosure of these models before they can be further published in peer review research represents a disincentive for firms to advance research and development to advance context sensitive practice. This research was based on Alta Planning + Designs proprietary know-how and understanding of active transportation research and available data resources to inform them.

Appendix C: Multipliers

This section displays additional multipliers that were used to calculate the benefits throughout this analysis that were not presented in the body of the analysis results.

For every vehicle-mile reduced, there is an assumed decrease in greenhouse gases and criteria pollutants. **Table 12** lists the reduction in greenhouse gases and criteria pollutants by vehicle-mile traveled, along with the cost to mitigate or clean-up those pollutants.

Table 12: Environmental Protection Multipliers

	Value (metric tons/VMT)	Value ($USD/VMT)
Particulate Matter (PM) [i]	0.00000005	$0.019032
Nitrous Oxides (NOx) [ii]	0.00000069	$0.006051
Sulfur Oxides (SOx) [iii]	0.00000001	$0.000391
Volatile Organic Compounds (VOC) [iv]	0.00000103	$0.002205
Carbon Dioxide[v]	0.00042047	$0.005201

Safety benefits are a result of the expected reduction in collisions due to the decrease in vehicle miles traveled. **Table 13** displays the collision cost reduction per vehicle mile traveled.

Table 13: Collision Costs

Type of Collision	Collision Cost [vi]
Collision Cost Savings	$0.22/VMT

Table 14 shows the estimated roadway maintenance cost savings associated with a reduction in vehicle-miles traveled.

Table 14: State of Good Repair Multiplier

	Value (metric tons/VMT)
Roadway Maintenance Cost Savings	$0.06 per VMT[vii]

Multiplier Notes

[i] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf

[ii] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf

[iii] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf

[iv] The Safer Affordable Fuel-Efficient Vehicles Rule for MY2021-MY2026 Passenger Cars, BUILD Guidance 2020, Table A-7 and Light Trucks Preliminary Regulatory Impact Analysis (October 2018) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/ld_cafe_co2_nhtsa_2127-al76_epa_pria_181016.pdf

[v] Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf

[vi] Caltrans Highway Safety Improvement Program http://www.dot.ca.gov/hq/LocalPrograms/HSIP/apply_nowHSIP.htm

[vii] Kitamura, R., Zhao, H., and Gubby, A. R. Development of a Pavement Maintenance Cost Allocation Model. Institute of Transportation Studies, University of California, Davis. https://trid.trb.org/view.aspx?id=261768

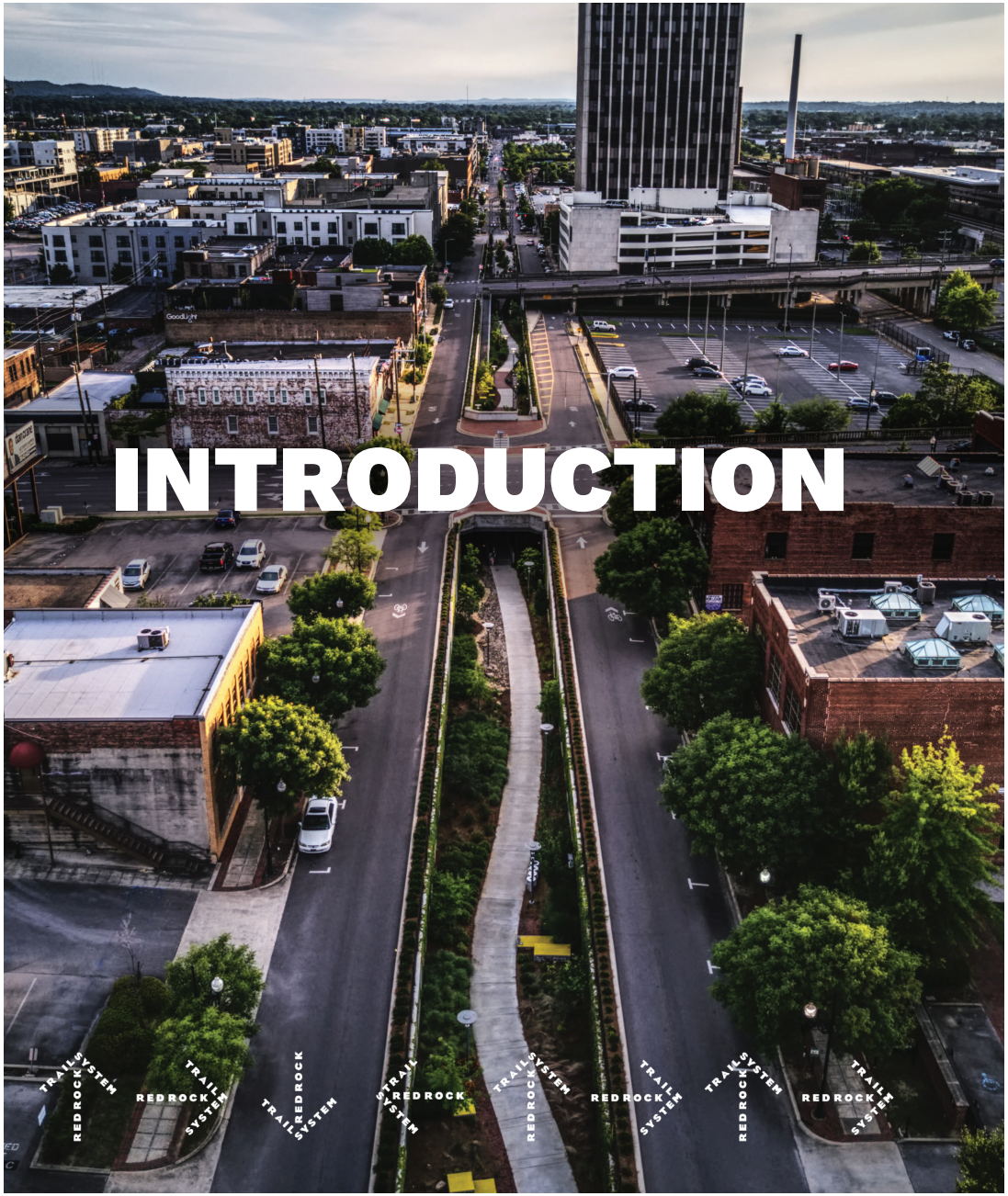
APPENDIX D | BENEFITS ANALYSIS BROCHURE OF PRIORITY TRAIL PROJECTS

Red Rock Trail System®

How a connected trail network around Jefferson County will benefit the Greater Birmingham Metropolitan Area, its residents, and the local economy

freshwater LAND TRUST

Table of Contents

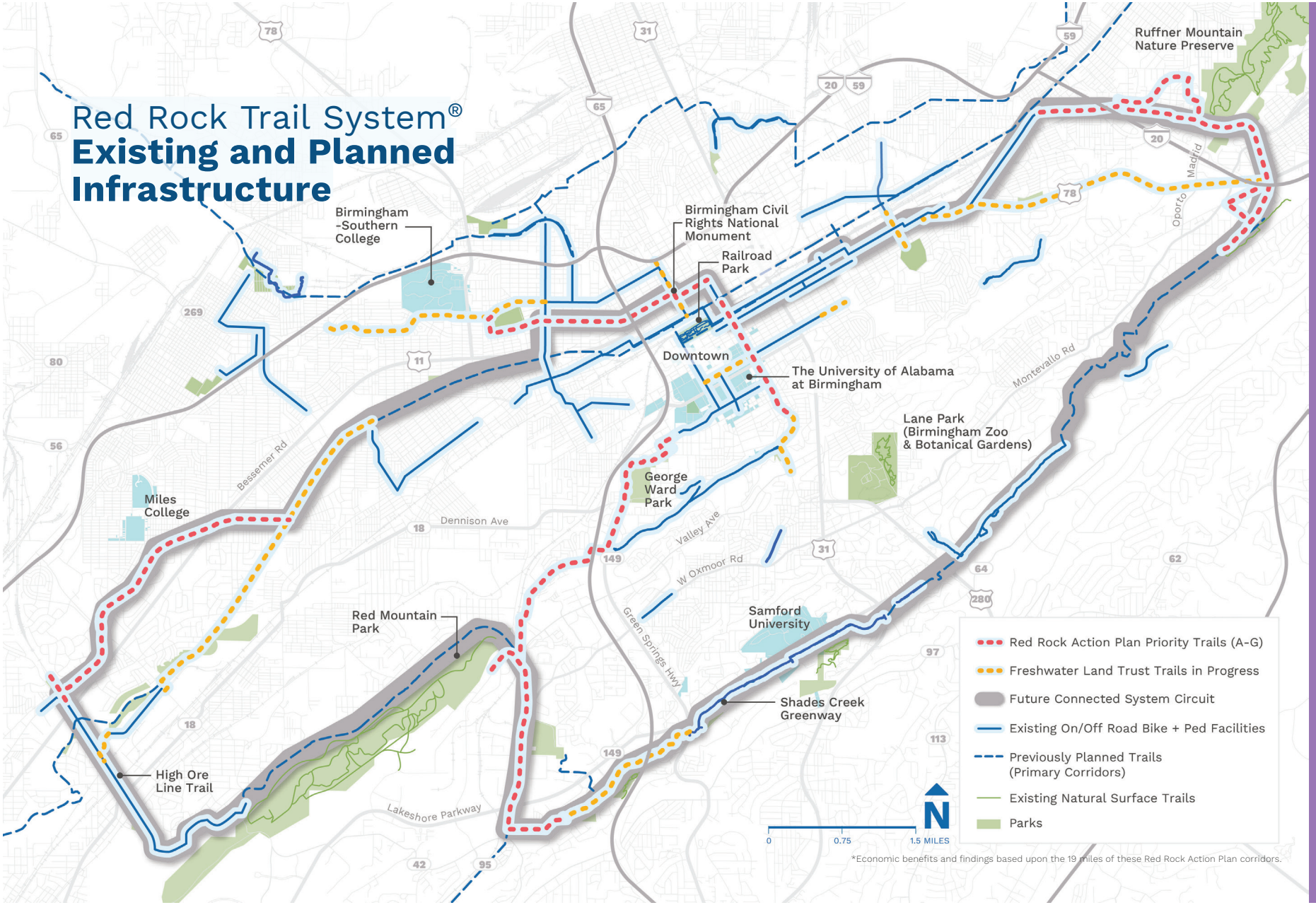


In 2010, Freshwater Land Trust, in partnership with the Jefferson County Department of Health and the Health Action Partnership, received funding through a Centers for Disease Control "Communities Putting Prevention to Work" grant to develop a greenway master plan for Jefferson County, Alabama. The purpose of the plan was to develop a feasible and "ground-truthed" master plan for greenways, bicycle, and pedestrian infrastructure that would promote active and healthy living, use of alternative modes of transportation, and protect regional waterways. The planning process was given the name "Our One Mile," and it exemplified the indispensable value of individual input in a plan designed to serve the public. The original planning effort set the stage for future plans, including the 2019 B-Active and 2020 Jefferson County Active Transportation Plans. Combined, these plans laid the foundation for future trails around Jefferson County.

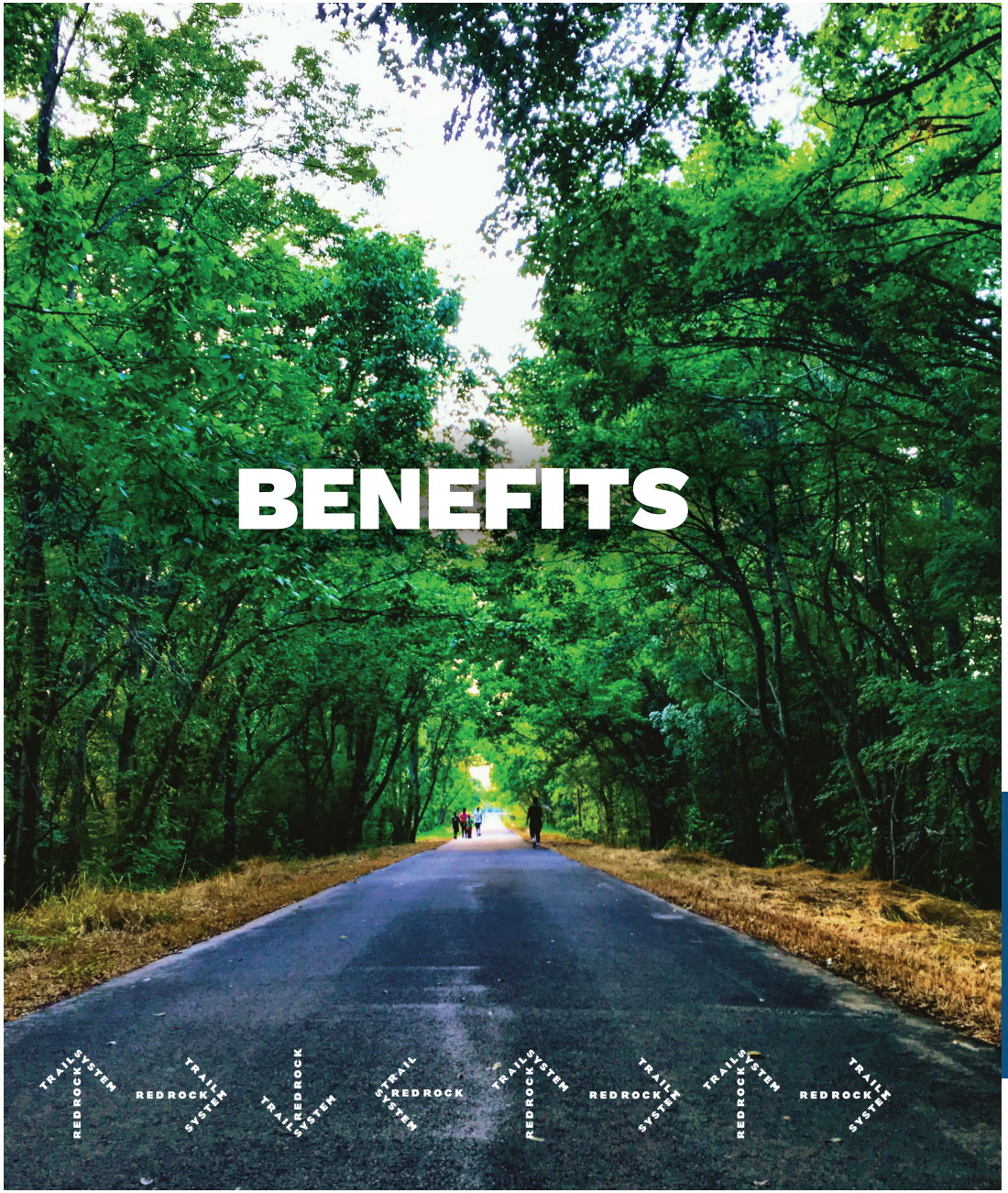
Since then, local partners have spearheaded significant greenway projects, such as High Ore Line Trail, Rotary Trail, Shades Creek Greenway, Kiwanis Vulcan Trail, and Hugh Kaul Trail. Other on-street connectivity projects have also resulted from this, including the Birmingham Green bike lane and streetscape. These trails enhance quality of life for residents as they serve as both active transportation and recreational amenities that are enjoyed on a daily basis.

As one of the next steps to bring this trail system to life, this Red Rock Action Plan identifies seven key corridors that will create a circuit around the Greater Birmingham Metropolitan Area, highlighting key landmarks and connecting residents to everyday destinations and activities.

Red Rock Trail System®
Existing and Planned Infrastructure



*Economic benefits and findings based upon the 19 miles of these Red Rock Action Plan corridors.



How trails will benefit the Greater Birmingham Metropolitan Area and its residents

Red Rock Trail System® interconnected network of trails and on-street facilities will connect residents and visitors to downtown, parks, colleges, shopping centers, employment centers, and historic landmarks. With the network fully built out, the trail system will generate multiple health, economic, and transportation benefits.

The benefits highlight both the quantitative and qualitative returns future implementation of the seven priority trail segments can generate within the Greater Birmingham Metropolitan Area. It is estimated that the Red Rock Action Plan corridors, totaling 19 miles of new trail, could generate ***$11.75 million*** in annual benefits, categorized by transportation, health, and economic benefits in this document.

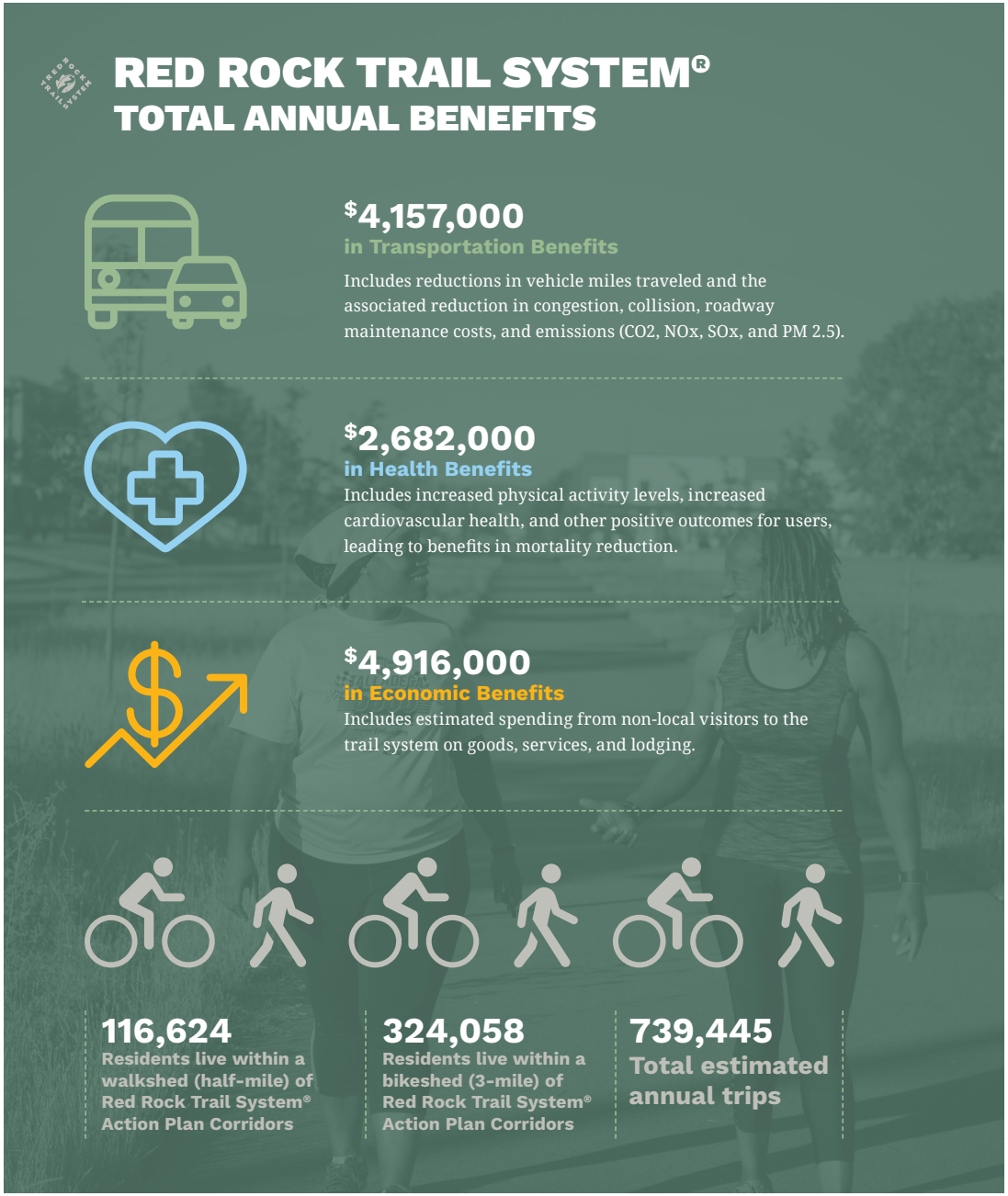


TABLE 1 ESTIMATED DAILY TRIPS

Trail Name	Average Daily Bicycle Trips	Average Daily Pedestrian Trips	Red Rock Proposed Alignment (miles)
Smithfield to Downtown	30	182	3
20th Street (2nd Ave S to 16th Ave S)	66	406	1
High Ore Line to Valley Creek Rails-to-Trails	651	31	3
Red Mountain Park to University of Alabama at Birmingham (UAB)	397	19	3
Ruffner Mountain Rail Trail	16	25	3
Irondale (Flora Johnston Nature Park to Ruffner Mountain)	16	24	2
Red Mountain Park to Shades Creek Greenway	309	15	3
Total	**1,486**	**704**	**19**

Process and Limitations

The benefit analysis estimated the expected number of biking and walking trips that would occur on the proposed seven new trail system corridors. To understand the potential demand for the future trail system, count data at similar trails in Texas and Alabama were analyzed. The primary purpose of the analysis is to enable a more informed policy discussion on the benefits of investing in Red Rock Trail System®. Even with extensive primary and secondary research incorporated into the impact analysis model, it is impossible to accurately predict the exact impacts of various factors. Accordingly, all estimated benefit values are rounded and should be considered order of magnitude estimates, rather than exact amounts.

The report does not take into account other indirect economic impacts such as property value impacts, attraction of future residents, retention of current residents, and creation of new business and new jobs.

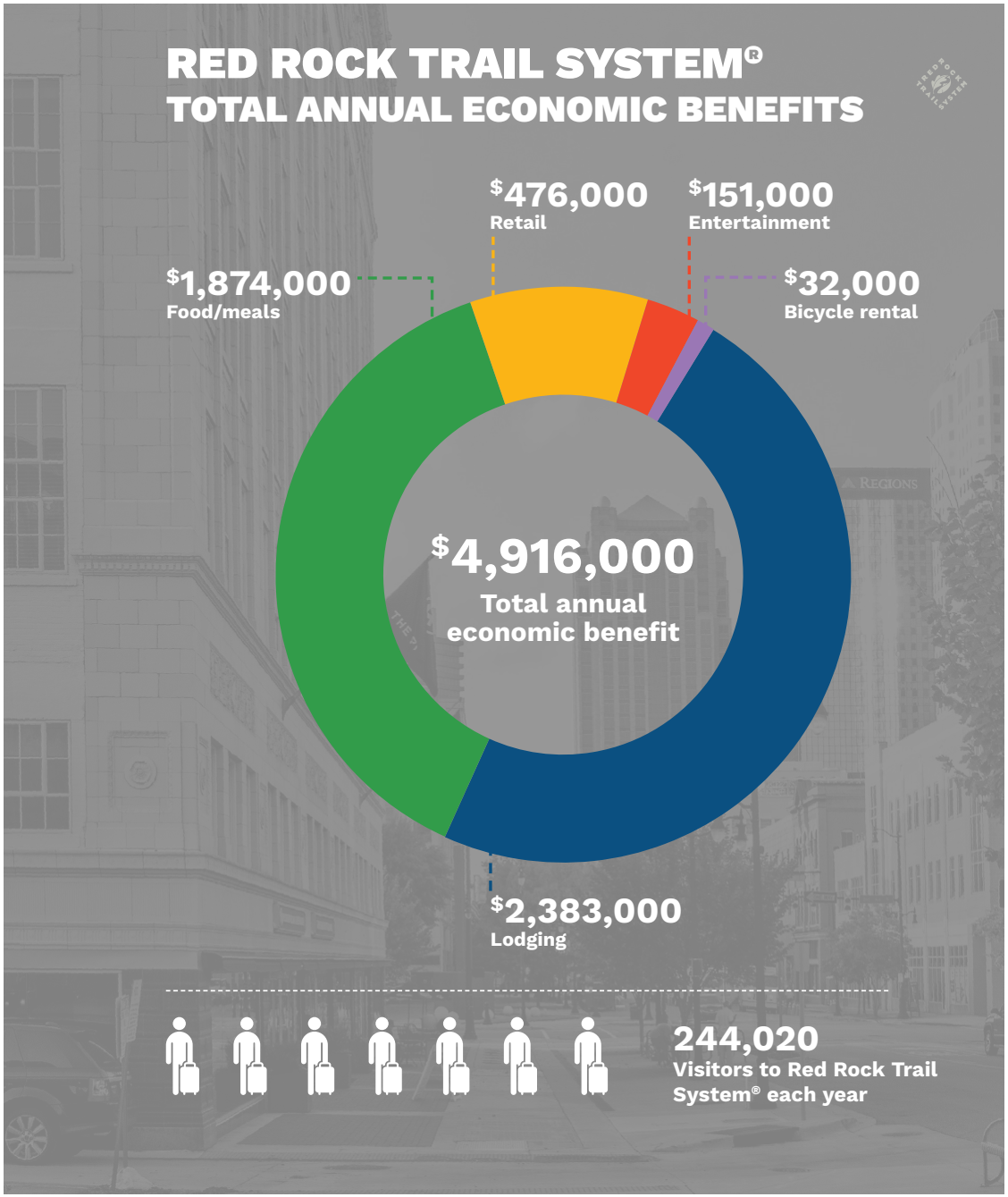
Economic Benefits

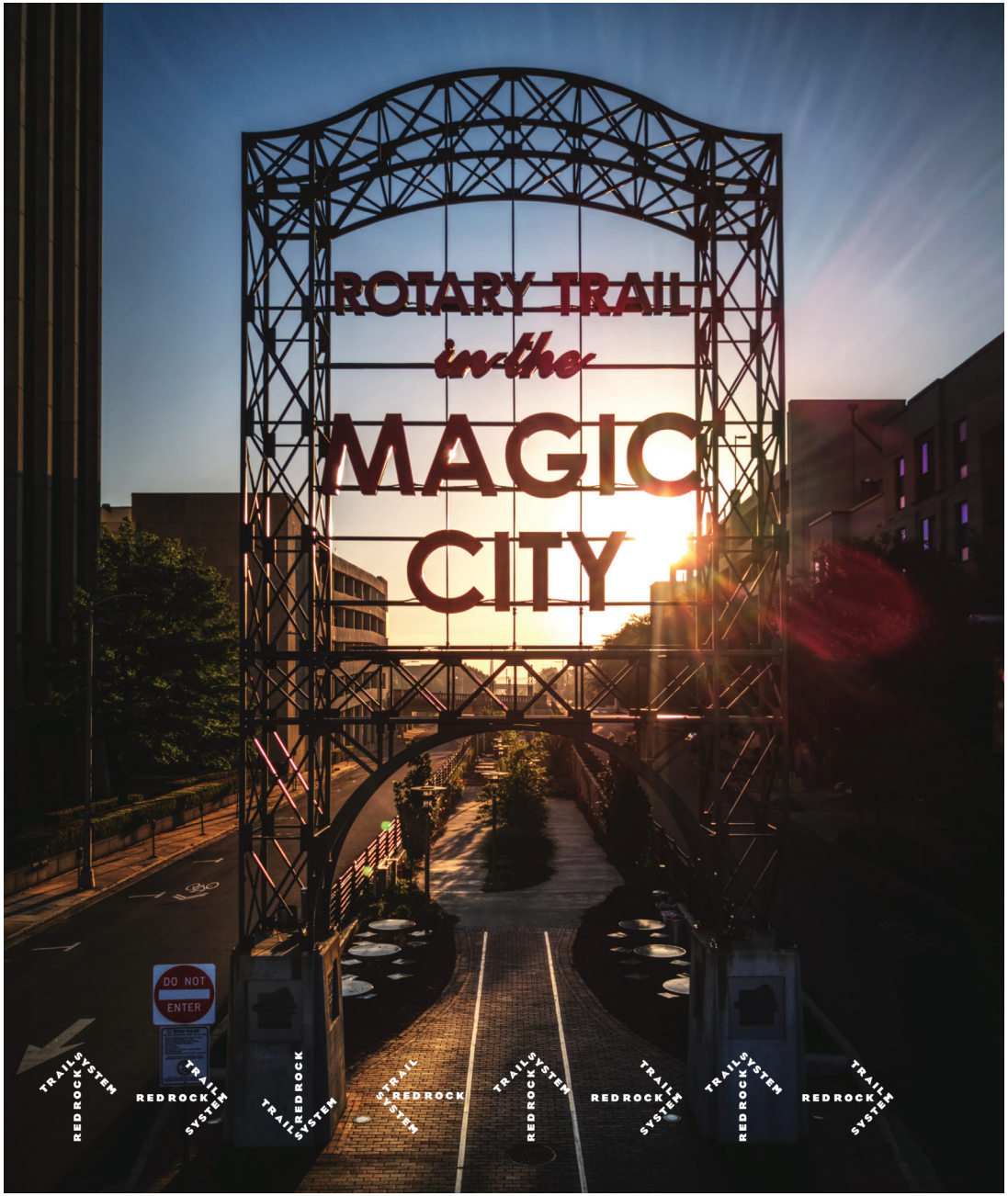
After implementation, visitors to Red Rock Trail System® are likely to spend money on food, retail, entertainment, and lodging. The 2017 Outdoor Recreation Economy Report by the Outdoor Industry Association found that bicyclists spent $83 billion on trip-related sales and generated $97 billion in national retail spending. Specific to Alabama, according to the 2022 Bureau of Economic Analysis, outdoor recreation in Alabama accounts for $4.2 billion in annual economic activity and generates over 56,000 jobs.

Access to nearby trails and a walkable community consistently rank in the top five important amenities by buyers of all ages when making purchase decisions according to the National Association of Home Builders. Additionally, trails generate residential and commercial development, as demonstrated by the success and economic activity around Birmingham's Rotary Trail, among the most iconic and photographed areas in the city.

The average percentage of trail users that were not from the area surrounding the trail was 33 percent among comparable trails to Red Rock Trail System®. If there are 739,455 annual trips on the proposed seven new trail corridors and they generate the same percent of non-local users as the comparable trails, then an estimated 244,020 non-local trail trips would occur on Red Rock Trail System® each year, bringing in a projected $4,915,000 in annual trail trip-related spending from non-local trail users.

This study includes only direct economic benefits from the Red Rock Trail System® Action Plan network. There are also indirect economic benefits, as trail trip-related spending from non-local users is expected to circulate through the economy, providing a multiplier effect.





Transportation Benefits

Active transportation and micromobility routes add another layer to the Greater Birmingham Metropolitan Area transportation network, providing resilient and efficient modes of travel to everyday destinations for residents, as well as sought-after experiences for visitors. A transportation network with multiple routes designed for people of all ages and abilities will improve flexibility and cost efficiency when repairs, natural hazards, or other temporary closures result in losses to the system's capacity.

Connected transportation options provide for safe travel to jobs and schools and create access to green spaces for residents of all ages, abilities, and socioeconomic backgrounds. Locating these facilities equitably ensures that disadvantaged communities within the Greater Birmingham Metropolitan Area have access to this active transportation network to travel to school, employment, and everyday shopping destinations. Having this network in place is especially important to those without vehicle access, accounting for 8% of Jefferson County's population.

TABLE 2 TRANSPORTATION BENEFITS

Category	Monetary Value
Reduced Traffic Congestion Cost[10]	$271,000
Reduced Vehicle Crash Cost[11]	$1,622,000
Reduced Road Maintenance Costs[12]	$278,000
Household Vehicle Operation Cost Savings[13]	$1,860,000
CO_2 Emissions Reduced (metric tons)[14]	102
Other Vehicle Emission Reduced (metric tons)[15]	0.2
Total Vehicle Emission Cost Reduced[16]	$126,000
Total Transportation Benefits	**$4,157,000**

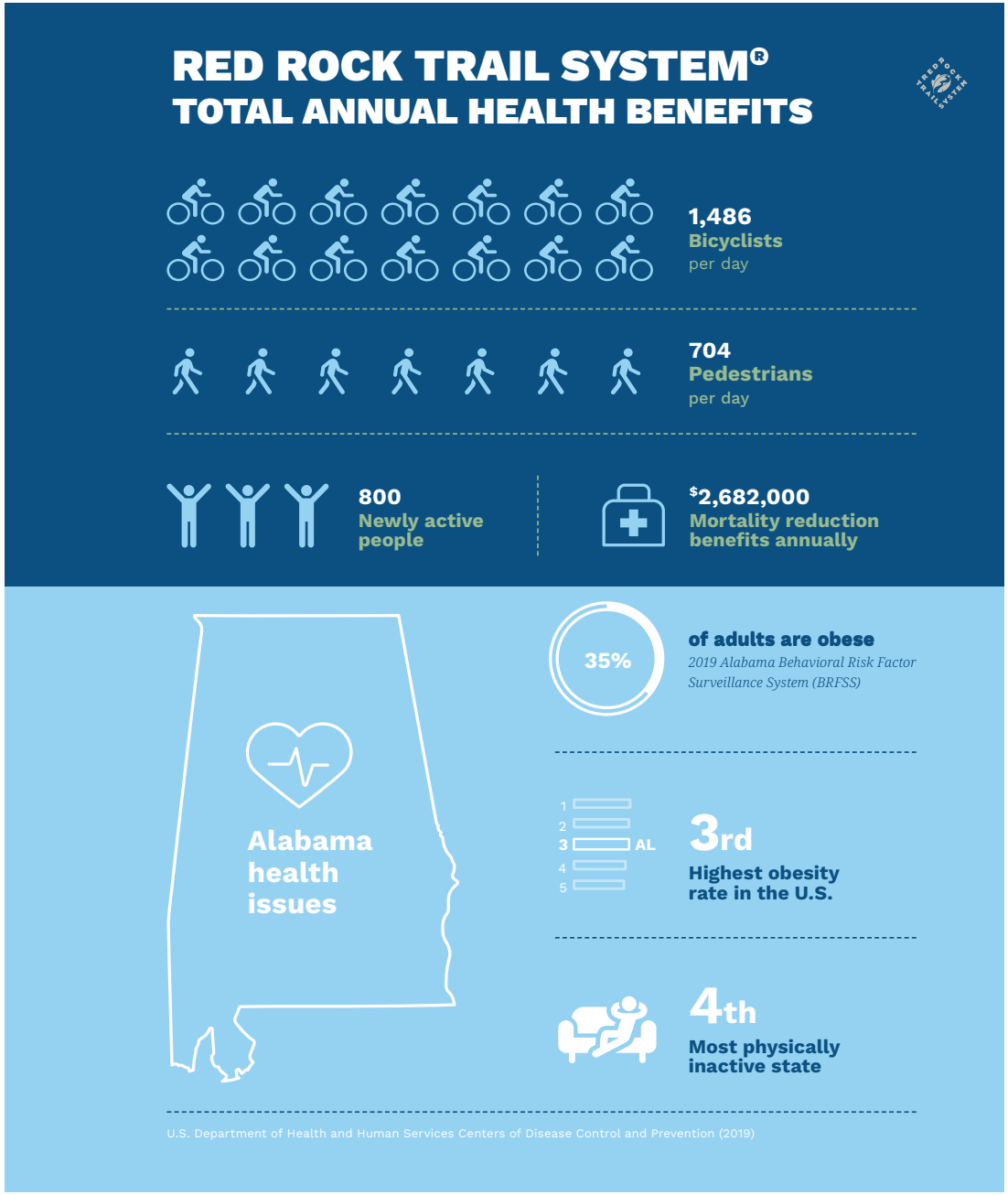
Health Benefits

Since the advent of the personal vehicle, our cities have been designed to facilitate car travel and many times have reduced the quality and quantity of infrastructure for walking and biking. A growing number of studies show that the design of our neighborhoods and nearby access to parks, trails, and other public recreational facilities affect people's ability to reach the recommended 30 minutes of moderately intense daily physical activity (60 minutes for youth). With a connected network of walking and biking facilities within the Greater Birmingham Metropolitan Area, residents can more easily exercise or access parks for recreation.

Alabama ranks 3rd highest in the nation for adult obesity and 5th highest for youth obesity. According to the Centers for Disease Control and Prevention (CDC), "physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic."[1] The increased rate of disease associated with inactivity reduces quality of life for individuals and increases medical costs for families, companies, and local governments. The CDC has determined that creating and improving places to be active could result in a 25% increase in the number of people who exercise at least three times a week.[2]

The implementation of a well-designed, connected trail system across the Greater Birmingham Metropolitan Area will encourage a shift to active modes of transportation such as walking and biking. The impact analysis model evaluates and quantifies the estimated increase in walking and biking trips, the estimated increase in physical activity, and the annual savings resulting from reduced healthcare costs.

1. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (1996). Physical Activity and Health: A Report of the Surgeon General.
2 U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2002). Guide to Community Preventive Services.



freshwater
LAND TRUST

APPENDIX E | ORDER-OF-MAGNITUDE COST ESTIMATES FOR PRIORITY GREENWAY PROJECTS

alta

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 1: SMITHFIELD TO DOWNTOWN**
2790 10' WIDE CONCRETE SIDE PATH FROM 7TH AVE/6TH ST TO GRAYMONT AVE / JASPER
1298 LF UTILIZE EXISTING SIDEWALK FOR SIDE PATH GRAYMONT AVE / JASPER TO GRAYMONT AVE / CENTER ST
9472 LF CYCLE TRACK IN ROADWAY, RESURFACING, AND LANE RECONFIGURATION FROM GRAYMONT AVE / CENTER ST TO 4TH AVE / 20TH ST

TOTAL LENGTH: **2.6 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY BIRMINGHAM, AL
ESTIMATE BY: JF
DATE: 7/5/2022
REVISED: CA
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
201A002	CLEARING AND GRUBBING (MAXIMUM ALLOWABLE BID $)	LS	1	$10,000.00	$10,000.00
210A000	UNCLASSIFIED EXCAVATION	CUYD	2191	$30.00	$65,715.00
210D001	BORROW EXCAVATION (LOOSE TRUCKBED MEASUREMENT)	CUYD	832	$30.00	$24,960.00
301A004	CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 4" COMPACTED THICKNESS	SQYD	2867	$18.00	$51,600.00
405A000	TACK COAT	GAL	4042	$5.50	$22,231.00
408B000	MICRO-MILLING EXISTING PAVEMENT (APPROXIMATELY 0.00" THRU 1.00" THICK)	SQYD	54038	$2.00	$108,076.00
420A015	POLYMER MODIFIED OPEN GRADED FRICTION COURSE	TON	2653	$150.00	$397,950.00
600A000	MOBILIZATION	LS	1	$133,800.00	$133,800.00
618A000	CONCRETE SIDEWALK, 4" THICK	SQYD	2867	$60.00	$172,020.00
618B003	CONCRETE DRIVEWAY, 6" THICK (INCLUDES WIRE MESH)	SQYD	467	$100.00	$46,700.00
618D000	CURB RAMP	SQYD	108	$230.00	$24,840.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LF	176	$60.00	$10,530.00
650A000	TOPSOIL	CUYD	173	$50.00	$8,650.00
680A001	GEOMETRIC CONTROLS - SURVEY	LS	1	$21,000.00	$21,000.00
701G142-54	SOLID/BROKEN WHITE/YELLOW, CLASS W, TYPE A TRAFFIC STRIPE (5" WIDE)	LF	44992	$3.00	$134,976.00
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	4672	$5.90	$27,565.98
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	406	$25.00	$10,140.00
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	946	$21.00	$19,874.40
	CONCRETE ISLAND	SQYD	2100	$80.00	$168,000.00

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	SIGNAL IMPROVEMENTS AT CENTER ST AND GRAYMONT AVE, 3RD ST AND GRAYMONT AVE, (SHIFT 2-LEGS OF SIGNAL HEADS ON SPAN WIRE FOR ROADWAY RECONFIGURATION)	LS	2	$10,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT 9TH ST AND 5TH AVE, 10H ST AND 5TH AVE, 11TH ST AND 5TH AVE, 14TH ST AND 5TH AVE, 15TH ST AND 5TH AVE, 16TH ST AND 5TH AVE, 16TH ST AND 4TH AVE, 17TH ST AND 4TH AVE, 18TH ST AND 4TH AVE, 19TH ST AND 4TH AVE, 20TH ST AND 4TH AVE (SHIFT 1-LEG OF SIGNAL HEADS FOR ROADWAY RECONFIGURATION INCLUDING ONE SINGAL POLE/MAST ARM REPLACEMENT, INSTALL BICYCLE SIGNALS)	LS	11	$70,000.00	$770,000.00
	TEMPORARY TRAFFIC CONTROL	LS	1	$90,000.00	$90,000.00
	EROSION CONTROL ALLOWANCE	LS	1	$25,000.00	$25,000.00
	MINOR ITEMS (5%)	LS	1	$118,181.42	$118,181.42
				CONSTRUCTION COST SUBTOTAL	$2,481,809.80
	CONTINGENCIES			30.0%	$744,542.94
	UTILITIES (ABOVE GROUND)				$50,000.00
				CONSTRUCTION COST TOTAL (2022)	$3,276,352.74
	INFLATION FACTOR	2	YEARS	7.0%	$474,743.51
				CONSTRUCTION COST TOTAL (2024)	**$3,751,096.25**
	DESIGN AND PERMITTING			15.0%	$562,664.44
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$562,664.44
				TOTAL ESTIMATED PROJECT COST (2024)	**$4,876,425.13**

NOTE:
- ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
- BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
- PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
- UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.

alta

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 2: 20th STREET**
6845 PROTECTED BIKE LANES WITH CONCRETE ISLANDS AND ROADWAY LANE RECONFIGURATION ALONG 20TH ST FROM MORRIS AVE TO 14TH AVE
490 LF 2-WAY CYCLE TRACK WITH CONCRETE ISLAND AND ROADWAY LAND RECONFIGURATION ALONG 20TH ST FROM 14TH AVE TO 16TH AVE
(INCLUDES 144600 SF ASPHALT ROAD RESURFACING)

TOTAL LENGTH: **1.4 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY BIRMINGHAM, AL
ESTIMATE BY: JF
DATE: 7/5/2022
REVISED: CA
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
405A000	TACK COAT	GAL	1286	$5.00	$6,430.00
408B000	MICRO-MILLING EXISTING PAVEMENT (APPROXIMATELY 0.00" THRU 1.00" THICK)	SQYD	19587	$2.00	$39,174.00
420A015	POLYMER MODIFIED OPEN GRADED FRICTION COURSE	TON	844	$175.00	$147,700.00
600A000	MOBILIZATION	LS	1	$57,000.00	$57,000.00
701G142-54	SOLID/BROKEN WHITE/YELLOW, CLASS W, TYPE A TRAFFIC STRIPE (5" WIDE)	LF	60510	$3.00	$181,530.00
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	2234	$5.90	$13,180.60
703C001	REMOVAL OF EXISTING TRAFFIC CONTROL MARKINGS OR LEGENDS (PLASTIC)	SQFT	9169	$4.90	$44,928.10
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	216	$25.00	$5,400.00
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	864	$22.00	$19,008.00
	CONCRETE ISLAND	SQYD	4700	$80.00	$376,000.00
	SIGNAL IMPROVEMENTS AT 14th AVE / 20TH ST, (SHIFT 1-LEG OF SIGNAL HEADS ALONG EX. MAST ARM FOR ROADWAY RECONFIGURATION)	LS	1	$5,000.00	$5,000.00
	TEMPORARY TRAFFIC CONTROL	LS	1	$60,000.00	$60,000.00
	LIGHTING AND ART INSTALLATION - UNDER 20TH / RAILROAD BRIDGE	LS	1	$50,000.00	$50,000.00
	MINOR ITEMS (5%)	LS	1	$47,767.54	$47,767.54
				CONSTRUCTION COST SUBTOTAL	$1,053,118.24
	CONTINGENCIES			30.0%	$315,935.47
	UTILITIES (ABOVE GROUND)				$0.00
				CONSTRUCTION COST TOTAL (2022)	$1,369,053.71
	INFLATION FACTOR	2	YEARS	7.0%	$198,375.88
				CONSTRUCTION COST TOTAL (2024)	**$1,567,429.59**
	DESIGN AND PERMITTING			15.0%	$235,114.44
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$235,114.44
				TOTAL ESTIMATED PROJECT COST (2024)	**$2,037,658.46**

NOTE:
- ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
- BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
- PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
- UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.
- DOES NOT INCLUDE ROUNDABOUT FOR CONSIDERATION AT FIVE POINTS.

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 3: RED MOUNTAIN PARK TO UAB**
2380 SHARED STREETS ALONG 24TH AVE S., 6TH ST S. AND 10TH AVE S.
2870 LF CYCLE TRACK WITH CONCRETE ISLAND, ROAD RESURFACING, AND RECONFIGURATION OF ALL LANES ALONG GREEN SPRINGS HWY
7590 LF 12' ASPHALT GREENWAY ALONG RAILROAD CORIDOR AND IN GEORGE WARD PARK
5180 LF 12' CONCRETE SIDE PATH ALONG ROBERT JEMISON RD

TOTAL LENGTH: **3.4 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY BIRMINGHAM, AL
ESTIMATE BY: JF
DATE: 6/28/2022
REVISED: CA
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
201A002	CLEARING AND GRUBBING (MAXIMUM ALLOWABLE BID $)	LS	1	$71,000.00	$71,000.00
210A000	UNCLASSIFIED EXCAVATION	CUYD	19247	$30.00	$577,410.00
301A004	CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 4" COMPACTED THICKNESS	SQYD	15876	$17.00	$269,884.44
405A000	TACK COAT	GAL	2851	$5.60	$15,963.36
408B000	MICRO-MILLING EXISTING PAVEMENT (APPROXIMATELY 0.00" THRU 1.00" THICK)	SQYD	29032	$2.00	$58,064.00
420A015	POLYMER MODIFIED OPEN GRADED FRICTION COURSE	TON	1340	$170.00	$227,800.00
424B642	SUPERPAVE BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B	TON	835	$126.00	$105,197.40
600A000	MOBILIZATION	LS	1	$152,000.00	$152,000.00
618A000	CONCRETE SIDEWALK, 4" THICK	SQYD	5756	$60.00	$345,360.00
618D000	CURB RAMP	SQYD	144	$230.00	$33,120.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LF	585	$40.00	$23,400.00
650A000	TOPSOIL	CUYD	2676	$34.00	$90,984.00
680A001	GEOMETRIC CONTROLS - SURVEY	LS	1	$96,000.00	$96,000.00
701G142-54	SOLID/BROKEN WHITE/YELLOW, CLASS W, TYPE A TRAFFIC STRIPE (5" WIDE)	LF	15068	$3.90	$58,765.20
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	2116	$6.00	$12,696.00
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	180	$25.00	$4,500.00
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	420	$22.00	$9,240.00
	CONCRETE ISLAND	SQYD	1600	$80.00	$128,000.00

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	PEDESTRIAN BRIDGE	LF	20	$3,000.00	$60,000.00
	RECTANGULAR RAPID FLASHING BEACON (EACH SIGN)	EACH	2	$10,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT GREEN SPRING AVE / GREEN SPRINGS HIGHWAY (SHIFT 2-LEGS OF SIGNAL HEADS ON SPAN WIRE FOR ROADWAY RECONFIGURATION, INSTALL PEDESTRIAN SIGNALS 3 LEGS)	LS	1	$25,000.00	$25,000.00
	TEMPORARY TRAFFIC CONTROL	LS	1	$100,000.00	$100,000.00
	DRAINAGE ALLOWANCE	LS	1	$45,000.00	$45,000.00
	EROSION CONTROL ALLOWANCE	LS	1	$155,000.00	$155,000.00
	MINOR ITEMS (5%)	LS	1	$134,219.22	$134,219.22
				CONSTRUCTION COST SUBTOTAL	$2,818,603.62
	CONTINGENCIES			30.0%	$845,581.09
	UTILITIES (ABOVE GROUND)				$130,000.00
				CONSTRUCTION COST TOTAL (2022)	$3,794,184.71
	INFLATION FACTOR	2 YEARS		7.0%	$549,777.36
				CONSTRUCTION COST TOTAL (2024)	**$4,343,962.08**
	DESIGN AND PERMITTING			15.0%	$651,594.31
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$651,594.31
				TOTAL ESTIMATED PROJECT COST (2024)	**$5,647,150.70**

NOTE:
ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 4: HIGH ORE LINE TO JONES VALLEY GREENWAY**
1830 LF 10' ASPHALT GREENWAY AT HIGH LINE CONNECTION
12935 LF 10' CONCRETE SIDE PATH ALONG MILESTEAD RD, WOODWARD RD, DOCTOR MLK BLVD FROM WOODWARD RD TO CT I, AND DOCTOR MLK BLVD FROM AVENUE M TO BESSEMER
1930 LF CYCLE TRACK WITH CONCRETE ISLAND, ROAD RESURFACING, AND RECONFIGURATION OF ALL LANES ALONG DOCTOR MLK BLVD FROM CT I TO AVENUE M
3530 SHARED STREETS ALONG 52ND ST ENSLEY

TOTAL LENGTH: **3.9 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY BIRMINGHAM, AL
ESTIMATE BY: CA
DATE: 7/5/2022
REVISED:
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
201A002	CLEARING AND GRUBBING (MAXIMUM ALLOWABLE BID $)	LS	1	$63,000.00	$63,000.00
210A000	UNCLASSIFIED EXCAVATION	CUYD	15566	$30.00	$466,980.00
301A004	CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 4" COMPACTED THICKNESS	SQYD	16566	$17.00	$281,614.44
405A000	TACK COAT	GAL	1021	$6.00	$6,124.02
408B000	MICRO-MILLING EXISTING PAVEMENT (APPROXIMATELY 0.00" THRU 1.00" THICK)	SQYD	10723	$2.00	$21,446.00
420A015	POLYMER MODIFIED OPEN GRADED FRICTION COURSE	TON	563	$175.00	$98,525.00
424B642	SUPERPAVE BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B	TON	168	$130.00	$21,807.50
600A000	MOBILIZATION	LS	1	$261,100.00	$261,100.00
618A000	CONCRETE SIDEWALK, 4" THICK	SQYD	14533	$60.00	$871,980.00
618B003	CONCRETE DRIVEWAY, 6" THICK (INCLUDES WIRE MESH)	SQYD	325	$100.00	$32,500.00
618D000	CURB RAMP	SQYD	516	$230.00	$118,680.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LF	6960	$40.00	$278,400.00
630a004	STEEL BEAK GUARDRAIL, CLASS B, TYPE 2	LF	690	$220.00	$151,800.00
650A000	TOPSOIL	CUYD	2312	$35.00	$80,920.00
680A001	GEOMETRIC CONTROLS - SURVEY	LS	1	$113,000.00	$113,000.00
701G142-54	SOLID/BROKEN WHITE/YELLOW, CLASS W, TYPE A TRAFFIC STRIPE (5" WIDE)	LF	10133	$3.90	$39,518.70
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	376	$7.00	$2,632.00
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	450	$25.00	$11,250.00

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	902	$22.00	$19,844.00
	CONCRETE ISLAND	SQYD	900	$85.00	$76,500.00
	SPEED CUSHIONS (SET OF 3)	EACH	8	$4,000.00	$32,000.00
	RAILROAD BRIDGE TO PEDESTRIAN BRIDGE CONVERSION (INSTALL PEDESTRIAN DECKING AND RAILING, STRUCTURAL REHABILITATION OF EX. BRIDGE)	LF	150	$1,200.00	$180,000.00
	SIGNAL IMPROVEMENTS AT AARON ARONOV DR / DOCTOR MLK BLVD (PEDESTRIAN SIGNALS 2-LEGS)	LS	1	$20,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT CT I / VINESVILLE RD (PEDESTRIAN SIGNALS 2-LEGS)	LS	1	$20,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT 52ND ST / BESSEMER RD (PEDESTRIAN SIGNALS 2-LEGS)	LS	1	$25,000.00	$25,000.00
	TEMPORARY TRAFFIC CONTROL	LS	1	$140,000.00	$140,000.00
	DRAINAGE ALLOWANCE	LS	1	$385,000.00	$385,000.00
	EROSION CONTROL ALLOWANCE	LS	1	$130,000.00	$130,000.00
	MINOR ITEMS (5%)	LS	1	$197,481.08	$197,481.08
				CONSTRUCTION COST SUBTOTAL	$4,147,000.00
	CONTINGENCIES			30.0%	$1,244,000.00
	UTILITIES (ABOVE GROUND)				$345,000.00
				CONSTRUCTION COST TOTAL (2022)	$5,736,000.00
	INFLATION FACTOR	2 YEARS		7.0%	$831,000.00
				CONSTRUCTION COST TOTAL (2024)	**$6,567,000.00**
	DESIGN AND PERMITTING			15.0%	$985,000.00
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$985,000.00
				TOTAL ESTIMATED PROJECT COST (2024)	**$8,537,000.00**

NOTE:
ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 5: RUFNER MOUNTAIN RAIL TRAIL**
7270 LF 12' ASPHALT GREENWAY AT RAIL TRAIL FROM BRUSSELS TO KIMBERLY, FROM KIMBERLY AVE TO MADRID AVE, AND RAIL TO TRAIL FROM MADRID AVE TO RUFFNER RD
2650 LF 12' CONCRETE SIDE PATH ALONG BRUSSELS AVE, ALONG KIMBERLY AVE, AND ALONG GEORGIA RD FROM RUFNER TO 16TH ST
5060 SHARED STREETS ALONG GEORGIA FROM 1ST TO BRUSSELS, AND ALONG MADRID AVE

TOTAL LENGTH: **2.8 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY BIRMINGHAM, AL
ESTIMATE BY: CA
DATE: 7/5/2022
REVISED:
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
201A002	CLEARING AND GRUBBING (MAXIMUM ALLOWABLE BID $)	LS	1	$108,000.00	$108,000.00
210A000	UNCLASSIFIED EXCAVATION	CUYD	8696	$30.00	$260,880.00
301A004	CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 4" COMPACTED THICKNESS	SQYD	13067	$17.00	$222,133.33
405A000	TACK COAT	GAL	775	$6.00	$4,652.82
424B642	SUPERPAVE BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B	TON	800	$125.00	$99,962.50
600A000	MOBILIZATION	LS	1	$97,100.00	$97,100.00
618A000	CONCRETE SIDEWALK, 4" THICK	SQYD	3374	$60.00	$202,440.00
618B003	CONCRETE DRIVEWAY, 6" THICK (INCLUDES WIRE MESH)	SQYD	200	$100.00	$20,000.00
618D000	CURB RAMP	SQYD	288	$230.00	$66,240.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LF	1490	$40.00	$59,600.00
635A000	WOVEN WIRE FENCE	LF	320	$50.00	$16,000.00
650A000	TOPSOIL	CUYD	1444	$38.00	$54,872.00
680A001	GEOMETRIC CONTROLS - SURVEY	LS	1	$75,000.00	$75,000.00
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	352	$6.90	$2,428.80
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	378	$25.00	$9,450.00
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	546	$22.00	$12,012.00
	CONCRETE ISLAND	SQYD	200	$90.00	$18,000.00
	PEDESTRIAN BRIDGE	LF	20	$3,000.00	$60,000.00
	SPEED CUSHIONS (SET OF 3)	EACH	10	$4,000.00	$40,480.00

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	TEMPORARY TRAFFIC CONTROL	LS	1	$50,000.00	$50,000.00
	DRAINAGE ALLOWANCE	LS	1	$105,000.00	$105,000.00
	EROSION CONTROL ALLOWANCE	LS	1	$130,000.00	$130,000.00
	MINOR ITEMS (5%)	LS	1	$85,712.57	$85,712.57
				CONSTRUCTION COST SUBTOTAL	$1,800,000.00
	CONTINGENCIES			30.0%	$540,000.00
	UTILITIES (ABOVE GROUND)				$85,000.00
				CONSTRUCTION COST TOTAL (2022)	$2,425,000.00
	INFLATION FACTOR	2	YEARS	7.0%	$351,000.00
				CONSTRUCTION COST TOTAL (2024)	**$2,776,000.00**
	DESIGN AND PERMITTING			15.0%	$416,000.00
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$416,000.00
				TOTAL ESTIMATED PROJECT COST (2024)	**$3,608,000.00**

NOTE:
ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 6: IRONDALE**
4040 LF 12' ASPHALT GREENWAY ALONG POWERLINE EASEMENT AND CREEK
1660 LF 10'-12' CONCRETE CYCLE TRACK / SIDE PATH ALONG MONTCLAIR RD
3250 LF CYCLE TRACK WITHIN ROADWAY, INCLUDING RESURFACING AND FULL ROAD LANE RECONFIGURATION
985 SHARED STREET AND SIDEWALK ALONG MONTCLAIR SERVICE RD

TOTAL LENGTH: **1.9 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY BIRMINGHAM, AL
ESTIMATE BY: CA
DATE: 7/5/2022
REVISED:
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
201A002	CLEARING AND GRUBBING (MAXIMUM ALLOWABLE BID $)	LS	1	$70,000.00	$70,000.00
210A000	UNCLASSIFIED EXCAVATION	CUYD	8578	$30.00	$257,340.00
301A004	CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 4" COMPACTED THICKNESS	SQYD	7169	$18.00	$129,040.00
405A000	TACK COAT	GAL	1670	$6.00	$10,017.24
408B000	MICRO-MILLING EXISTING PAVEMENT (APPROXIMATELY 0.00" THRU 1.00" THICK)	SQYD	15556	$2.00	$31,112.00
420A015	POLYMER MODIFIED OPEN GRADED FRICTION COURSE	TON	817	$170.00	$138,890.00
424B642	SUPERPAVE BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B	TON	438	$126.00	$55,162.80
600A000	MOBILIZATION	LS	1	$108,100.00	$108,100.00
618A000	CONCRETE SIDEWALK, 4" THICK	SQYD	2410	$60.00	$144,600.00
618B003	CONCRETE DRIVEWAY, 6" THICK (INCLUDES WIRE MESH)	SQYD	267	$100.00	$26,700.00
618D000	CURB RAMP	SQYD	144	$230.00	$33,120.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LF	1725	$40.00	$69,000.00
650A000	TOPSOIL	CUYD	1005	$40.00	$40,200.00
680A001	GEOMETRIC CONTROLS - SURVEY	LS	1	$51,000.00	$51,000.00
701G142-54	SOLID/BROKEN WHITE/YELLOW, CLASS W, TYPE A TRAFFIC STRIPE (5" WIDE)	LF	17063	$3.90	$66,545.70
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	274	$6.90	$1,890.60
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	576	$25.00	$14,400.00
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	832	$22.00	$18,304.00

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	CONCRETE ISLAND	SQYD	1100	$85.00	$93,500.00
	PEDESTRIAN BRIDGE	LF	80	$3,000.00	$240,000.00
	RECTANGULAR RAPID FLASHING BEACON (EACH SIGN)	EACH	2	$10,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT CRESTWOOD /16TH (SHIFT 1-LEG OF SIGNAL HEADS ON SPAN WIRE, INSTALL BIKE SIGNALS ON 2-LEGS)	LS	1	$25,000.00	$25,000.00
	TEMPORARY TRAFFIC CONTROL	LS	1	$50,000.00	$50,000.00
	DRAINAGE ALLOWANCE	LS	1	$135,000.00	$135,000.00
	EROSION CONTROL ALLOWANCE	LS	1	$80,000.00	$80,000.00
	MINOR ITEMS (5%)	LS	1	$95,446.12	$95,446.12
				CONSTRUCTION COST SUBTOTAL	$2,005,000.00
	CONTINGENCIES			30.0%	$602,000.00
	UTILITIES (ABOVE GROUND)				$60,000.00
				CONSTRUCTION COST TOTAL (2022)	$2,667,000.00
	INFLATION FACTOR	2	YEARS	7.0%	$386,000.00
				CONSTRUCTION COST TOTAL (2024)	**$3,053,000.00**
	DESIGN AND PERMITTING			15.0%	$458,000.00
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$458,000.00
				TOTAL ESTIMATED PROJECT COST (2024)	**$3,969,000.00**

NOTE:
ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.

PLANNING ESTIMATE

DESCRIPTION: **RED ROCK PRIORITIZATION - CORRIDOR 7: RED MOUNTAIN TO SHADES CREEK**
2700 LF 12' ASPHALT GREENWAY ALONG SHADES CREEK
11130 LF 12' CONCRETE SIDE PATH ALONG INDUSTRIAL DR, AND OXMOOR RD
1270 LF CYCLE TRACK WITHIN ROADWAY, INCLUDING RESURFACING AND FULL ROAD LANE RECONFIGURATION ALONG MONTEVALLO RD
1410 SHARED STREET ALONG HAPPY LN

TOTAL LENGTH: **3.1 MILES**

PROJECT NUMBER: 00-2021-176
COUNTY: JEFFERSON

CITY: BIRMINGHAM, AL
ESTIMATE BY: CA
DATE: 7/5/2022
REVISED:
CHECKED BY:

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
201A002	CLEARING AND GRUBBING (MAXIMUM ALLOWABLE BID $)	LS	1	$71,000.00	$71,000.00
210A000	UNCLASSIFIED EXCAVATION	CUYD	22908	$25.00	$572,700.00
301A004	CRUSHED AGGREGATE BASE COURSE, TYPE B, PLANT MIXED, 4" COMPACTED THICKNESS	SQYD	17360	$17.00	$295,120.00
405A000	TACK COAT	GAL	736	$6.00	$4,414.44
408B000	MICRO-MILLING EXISTING PAVEMENT (APPROXIMATELY 0.00" THRU 1.00" THICK)	SQYD	5645	$3.00	$16,935.00
420A015	POLYMER MODIFIED OPEN GRADED FRICTION COURSE	TON	297	$180.00	$53,460.00
424B642	SUPERPAVE BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1/2" MAXIMUM AGGREGATE SIZE MIX, ESAL RANGE A/B	TON	293	$127.00	$37,160.20
600A000	MOBILIZATION	LS	1	$285,700.00	$285,700.00
618A000	CONCRETE SIDEWALK, 4" THICK	SQYD	13814	$60.00	$828,840.00
618B003	CONCRETE DRIVEWAY, 6" THICK (INCLUDES WIRE MESH)	SQYD	1378	$100.00	$137,800.00
618D000	CURB RAMP	SQYD	360	$230.00	$82,800.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LF	9740	$40.00	$389,600.00
650A000	TOPSOIL	CUYD	1767	$35.00	$61,845.00
680A001	GEOMETRIC CONTROLS - SURVEY	LS	1	$106,000.00	$106,000.00
701G142-54	SOLID/BROKEN WHITE/YELLOW, CLASS W, TYPE A TRAFFIC STRIPE (5" WIDE)	LF	4948	$4.00	$19,792.00
703A002	TRAFFIC CONTROL MARKINGS, CLASS 2, TYPE A	SQFT	155	$7.00	$1,085.00
710A170	CLASS 4, ALUMINUM FLAT SIGN PANELS 0.08" THICK (TYPE IV BACKGROUND)	SQFT	162	$25.00	$4,050.00
710B021	ROADWAY SIGN POST (#3 U CHANNEL, GALVANIZED STEEL OR 2", 14 GA SQUARE TUBULAR STEEL)	LF	234	$22.00	$5,148.00

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	CONCRETE ISLAND	SQYD	500	$85.00	$42,500.00
	PEDESTRIAN BRIDGE	LF	390	$3,000.00	$1,170,000.00
	SIGNAL IMPROVEMENTS AT INDUSTRIAL / MONTEVALLO (SHIFT 2-LEGS OF SIGNAL HEADS ON SPAN WIRE)	LS	1	$10,000.00	$10,000.00
	SIGNAL IMPROVEMENTS AT OXMOOR / MONTEVALLO (SHIFT 2-LEGS SIGNAL HEADS ON SPAN WITH 1 SIGNAL POLE/MAST ARM REPLACEMENT)	LS	1	$70,000.00	$70,000.00
	SIGNAL IMPROVEMENTS AT CITATION / W OXMOOR (PED SIGNALS 1-LEG)	LS	1	$15,000.00	$15,000.00
	SIGNAL IMPROVEMENTS AT SNOW / W OXMOOR (PED SIGNALS 2-LEGS)	LS	1	$20,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT OXMOOR CT / W OXMOOR (PED SIGNALS 1-LEG)	LS	1	$15,000.00	$15,000.00
	SIGNAL IMPROVEMENTS AT LAKESHORE PKWY / OXMOOR (PED SIGNALS 1-LEG)	LS	1	$20,000.00	$20,000.00
	SIGNAL IMPROVEMENTS AT RT 42 / W OXMOOR (PED SIGNALS 1-LEG)	LS	1	$15,000.00	$15,000.00
	TEMPORARY TRAFFIC CONTROL	LS	1	$90,000.00	$90,000.00
	DRAINAGE ALLOWANCE	LS	1	$480,000.00	$480,000.00
	EROSION CONTROL ALLOWANCE	LS	1	$125,000.00	$125,000.00
	MINOR ITEMS (5%)	LS	1	$252,297.48	$252,297.48
				CONSTRUCTION COST SUBTOTAL	$5,299,000.00
	CONTINGENCIES			30.0%	$1,590,000.00
	UTILITIES (ABOVE GROUND)				$125,000.00
				CONSTRUCTION COST TOTAL (2022)	$7,014,000.00
	INFLATION FACTOR	2	YEARS	7.0%	$1,016,000.00
				CONSTRUCTION COST TOTAL (2024)	**$8,030,000.00**
	DESIGN AND PERMITTING			15.0%	$1,205,000.00
	CONSTRUCTION ENGINEERING INSPECTION (CEI)			15.0%	$1,205,000.00
				TOTAL ESTIMATED PROJECT COST (2024)	**$10,440,000.00**

NOTE:
- ESTIMATE IS NOT BASED ON AN ENGINEERING DESIGN, AND IS FOR PLANNING PURPOSES ONLY.
- BASED ON 2022 UNIT PRICES AND INFLATED TO 2024. ESCALATION ADJUSTMENTS MUST BE APPLIED FOR OTHER YEARS.
- PROJECT COST DOES NOT INCLUDE RIGHT-OF-WAY ACQUISITION.
- UNDERGROUND UTILITY COORDINATION/RELOCATION COSTS UNKNONWN AND NOT INCLUDED.

APPENDIX F | **CONFIDENTIAL** IMPLEMENTATION, OPERATIONS, + MAINTENANCE

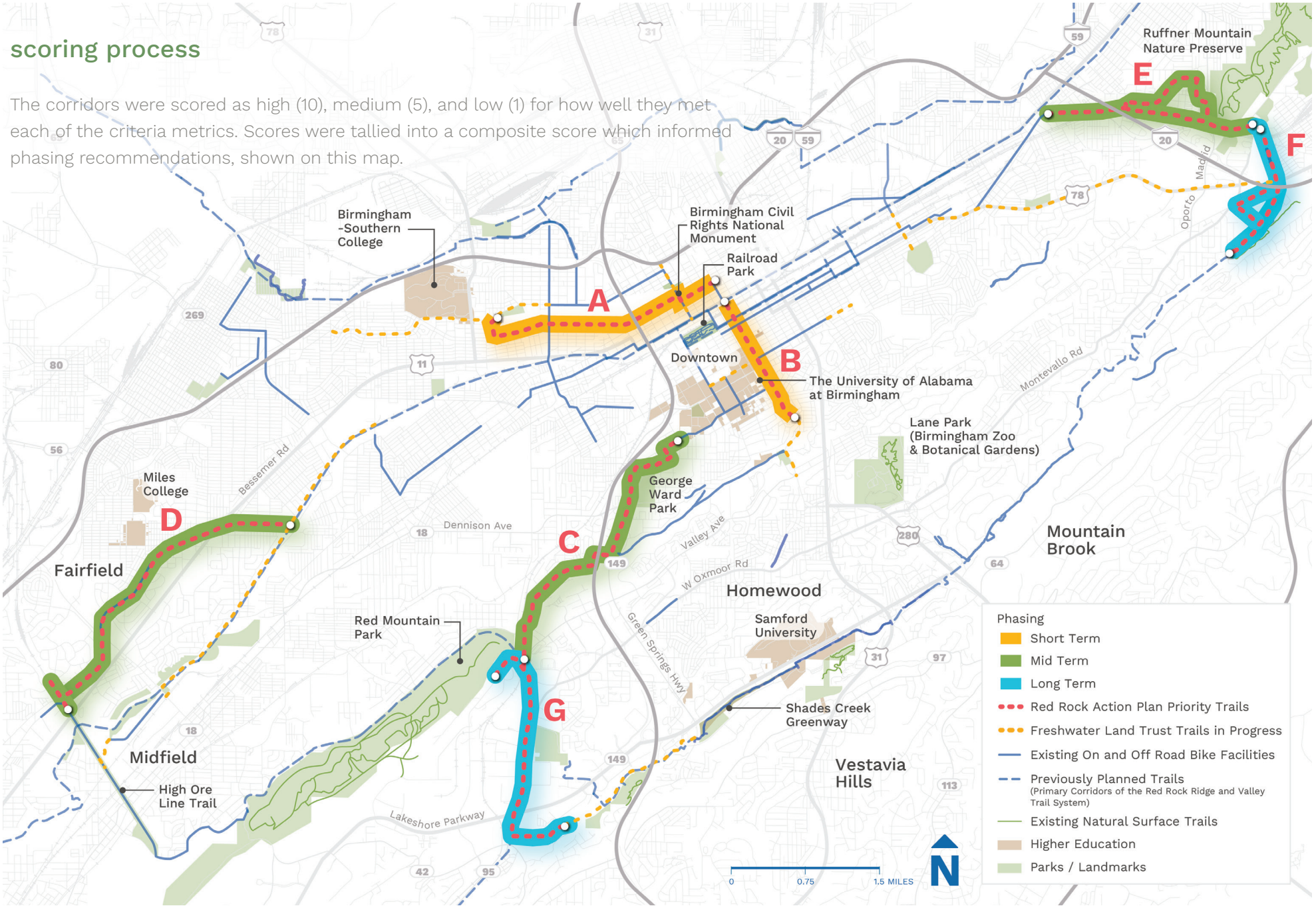
prioritization scoring matrix

CORRIDOR ID	CRITERIA SCORE: demand	equity	connectivity	user experience	safety	feasibility	COMPOSITE SCORE
A: SMITHFIELD TO DOWNTOWN	HIGH	HIGH	HIGH	MEDIUM	HIGH	MEDIUM	50
B: 20TH ST	HIGH	MEDIUM	HIGH	MEDIUM	HIGH	MEDIUM	45
C: RED MOUNTAIN PARK TO UAB	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	30
D: HIGH ORE LINE TO JONES VALLEY GREENWAY	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	HIGH	27
E: RUFFNER MOUNTAIN RAIL TRAIL	LOW	HIGH	MEDIUM	HIGH	LOW	MEDIUM	32
F: IRONDALE	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	26
G: RED MOUNTAIN TO SHADES CREEK	LOW	LOW	LOW	MEDIUM	LOW	LOW	10

RED ROCK TRAIL SYSTEM® PHASING MAP

scoring process

The corridors were scored as high (10), medium (5), and low (1) for how well they met each of the criteria metrics. Scores were tallied into a composite score which informed phasing recommendations, shown on this map.



funding for operations + maintenance (o+m)

FUNDING FOR O+M

Several types of funding sources can be identified and it is likely that a combination will offer the best solution. Following are potential funding sources:

- Budget Allocation Commitments
- Partnerships
- Dedicated Tax
- Creating an Endowment
- Earned Income and User Fees
- Outside Funding Sources
- In-Kind Services

BUDGET ALLOCATIONS

These funds come directly from annual budget allocations by the respective municipality. Typically, this is the most reliable revenue source for project management, operations, and maintenance. This is the most common and likely source of O+M funding. Note that on most projects around the nation, private donors or other potential partners will want to see a strong long-term public commitment to management as a condition of awarding grants for capital trail improvements and management programs.

PARTNERSHIPS

Some the elements of the program serve multiple public and private benefits including access for floodway and stream bank upkeep, promotion of local businesses, utility access, school facilities, road maintenance, and enhancement of adjacent private properties. This may provide a number of opportunities for task sharing and cost sharing among the various beneficiaries. These options should be vigorously and creatively explored.

In addition, area businesses may have a vested interest in sponsoring and participating in trail maintenance along segments of the corridor.

DEDICATED TAX

A number of communities have specific dedicated tax programs in place such as open space sales tax or special districts with property tax based funding. To implement such a program, it will be important to have a specific visionary plan in place and build broad-based public support and partnerships with park, recreation, and open space advocacy groups. Pursuing this process should begin with an examination of the potential property, sales, lodging, and other potential tax bases.

For example, Johnson County Park and Recreation District in Shawnee Mission, KS raises approximately $1 million annually through a mill levy with 50% going to construction and maintenance of trail and open space facilities. Jefferson County, CO passed a ½ cent Open Space Tax in the late 1970's. This tax generates over $14 Million annual for acquisition and maintenance of open spaces, trails, and local park facilities. Voters in the St. Louis area approved a bi-state regional park district effort. They created the multi-county Metropolitan Park and Recreation District on the Missouri side and the Metro East District on the Illinois side. With a 1/10-cent sales tax allocation the 2 districts raise approximately $10 million annually ($9 million on Missouri side and $1.5 million on the Illinois side). A portion of the funds will go toward building and maintaining an extensive regional trail and greenway system.

CREATING AN ENDOWMENT

An endowment is a set-side account held strictly to generate revenue from investment earnings. The endowment could be held by a non-profit. Funding of the endowment could come from a percent of capital grants and from an endowment campaign. The endowment could also be funded by bequests and deferred giving such as donations of present or future interests in stock or real estate. To have an effective impact the endowment should have several million dollars in its "corpus" (asset holdings). This endowment could be built up gradually in tandem with project development. Some private organizations, such as the Yakima River Trail System Foundation in Washington State, earn funds through bingo and special events.

EARNED INCOME + USER FEES

This is a revenue stream created by the use of the amenities such as a user permit for trails and open space facilities. This might be an annual pass that can be purchased online or at grocery stores, community centers, etc. Cannon Falls, MN raises funds through a “Wheel Pass “ program where users 18 and older must purchase a user permit providing funds for trails maintenance. Another community near Saratoga, NY, a $35/year membership fee subsidizes trail maintenance. Another option would be leasing trail rights-of-way for fiber-optic and other utility corridors. The Niagara River Trail (Canadian side) and the W+OD Trail Corridor in Virginia (Northern Virginia Regional Park Authority) receive several hundred thousand dollars annually in lease revenue for telecommunications cable license fees.

In most cases, however, earned income revenue streams are not likely to fund more than a fraction of the total management costs, though the fraction could be substantial. Note that these programs have an administrative cost. Furthermore, it is also important to avoid compromising or commercializing the quality of the trail.

OUTSIDE FUNDING SOURCES

Outside contributions include outside public and private sector grants that can be applied toward management including routine and remedial maintenance. Presently the Federal ARRA “Stimulus” program has funded trail replacement projects in a number of locations, though availability of such programs in the future are hard to predict. Private contributors might help fund seasonal youth “trail ranger” programs or purchase equipment such as a sweeper. Creation of a trail advocacy/land conservancy non-profit might offer a way to raise money through “membership” donations. Note that, with the exception of remedial projects, generally, private donors are not interested in funding operations and maintenance. Many forms of outside funding may be unpredictable year after year and therefore is “uncontrollable income.”

IN-KIND SERVICES

Management services might be supported and enhanced by available non-cash resources such as volunteers, youth, student labor, user groups (such as cyclist associations), correctional services, and seniors. In-kind support may also include donations of materials and equipment. Groups may be encouraged to “adopt” a park or a trail and hold annual fundraisers. The corridor might also be eligible for youth programs such as AmeriCorps.

Note, however, that volunteer and in-kind participation will likely meet only a fraction of the operations and maintenance needs and funding of these programs may be sporadic. The management program will still need a base of trained professionals and proper equipment. These programs require staff time to coordinate.

Volunteers offer a cost effective method for maintaining certain aspects of Red Rock Trail System®. For example, local Eagle Scouts can work with local government staff to build or repair bridges and help with other small construction projects. The Federal Volunteer Protection Act of 1997 protects the volunteer worker. This act protects volunteers of nonprofit organizations or governmental entities. The Act states that such volunteers are not liable for harm caused by their acts of commission or omission provided the acts are in good faith.

THIS PAGE LEFT INTENTIONALLY BLANK FOR PRINTING PURPOSES