Cycle Atlanta: Phase 1.0 Study

A supplement to the Connect Atlanta Plan

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CONTENTS

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Introduction

An overview of findings and recommendations

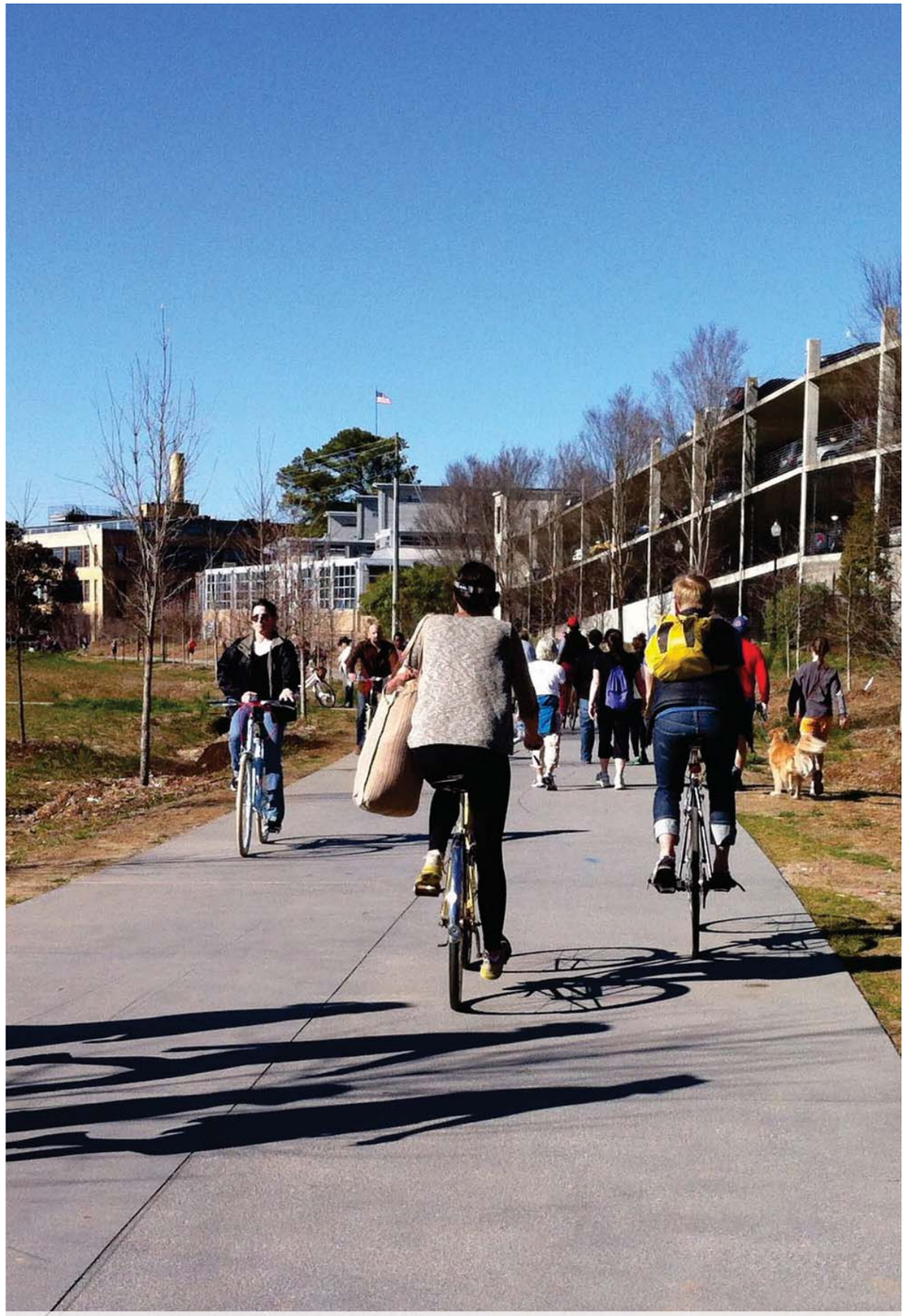
Overview

The *Cycle Atlanta: Phase 1.0 Study* represents **a strategy to create a complete and connected network of high-quality bicycle facilities in the core of the city.** The focus of the study is on five cycling corridors that extend from the Atlanta BeltLine into the center of the city. Completing the bikeway network along each of these corridors will **improve cycling conditions and expand route options that are desirable for a wide range of cyclists.** When implemented, the improved and expanded bikeway network will **enhance connections between neighborhoods, job centers, transit stations, tourist attractions, shops, and restaurants, as well as other daily destinations.**

The *Cycle Atlanta: Phase 1.0 Study* is a supplement to the *Connect Atlanta Plan*, which is the adopted transportation plan for the City of Atlanta. While the *Connect Atlanta Plan* includes a city-wide network strategy to improve cycling routes, it does not provide specifics related to facility types and alignments along the five corridors that are the focus of this study.

Additionally, since the adoption of the *Connect Atlanta Plan*, the City of Atlanta has continued to experience tremendous growth in cycling rates and bikeway facility design has advanced considerably. Now, new and innovative bikeway facility treatments go beyond shared lane markings and standard bike lanes, which were the main bikeway facilities described in the *Connect Atlanta Plan*.

To address the growing demand for better cycling conditions and provide more specific details for implementation, this study was developed. **In short, the *Cycle Atlanta: Phase 1.0 Study* is an implementation strategy to develop dedicated, high-quality bikeways in the core of the City.**



The Atlanta BeltLine Eastside Trail supports recreation and transportation needs in Atlanta.

The 10th Street cycle track provides a protected bikeway facility connection between the Atlanta BeltLine Eastside Trail, Piedmont Park, and Midtown Atlanta.

Study Highlights

The *Cycle Atlanta: Phase 1.0 Study* is a comprehensive implementation strategy for bicycling improvements in the core of the City. Important facts and features include:

Expand network of high-quality bicycle facilities - When implemented, the *Cycle Atlanta: Phase 1.0 Study* will add 31 miles of bikeway facilities that will include bike lanes, cycle tracks and multi-use paths. This addition more than doubles the existing network of 30 miles of bikeway facilities in the *Cycle Atlanta: Phase 1.0 Study area*.

Create a complete and connected bikeway network - When implemented, the proposed network will "fill the gaps" in the existing bikeway network by providing cyclists with a contiguous bikeway network in the city center.

Connect bicyclists to transit - The *Cycle Atlanta: Phase 1.0 Study* corridors connect to all of the MARTA stations within the Atlanta BeltLine loop as well as the Atlanta Streetcar. In total, the corridors connect directly with 12 of the 24 MARTA stations in the City of Atlanta.

Connect people to jobs - The study corridors connect two of the largest job centers in the Atlanta Region – Midtown and Downtown – as well as major employment hubs including universities, hospitals, and other civic institutions.

Connect people to neighborhoods - The study corridors pass through 35 neighborhoods. The proposed bikeway network will help people who live in the core of the city connect to jobs, parks and green spaces, and other daily destinations.

Develop new data metrics for cycling in Atlanta - In coordination with the Atlanta Regional Commission and the Atlanta Bicycle Coalition, researchers at the Georgia Institute of Technology worked with the City of Atlanta to develop a cycling-specific app. The app is being used to identify who is riding, where are they riding, and track changes in cycling rates over time as investments in cycling infrastructure are made.

Connect people to and from the Atlanta BeltLine - The Atlanta BeltLine is becoming a destination as well as a route option for people biking to different destinations in the City. The *Cycle Atlanta: Phase 1.0 Study* bikeway network improves cycling connections to the Atlanta BeltLine by providing dedicated bicycle facilities along major street corridors.

Support a healthy and positive city image - The image of a 21st century city is one where people are active, healthy, and social. Completing the bikeway network will help the City increase cycling rates, which will in turn create an positive and active image of Atlanta.

Expand sustainable transportation options - The City of Atlanta is committed to expanding mobility options and reducing the carbon footprint of people living in, working in, and visiting the City. Cycling is a clean mode of transportation that reduces the need for fossil fuels and minimizes the impacts of transportation on air quality.

Create supportive cycling environment for a bike share system - One of the city-wide cycling goals for Atlanta is to launch a bike share system. Building the recommended bikeway network will create a supportive cycling environment for the wide range of bike share users.

Goals

The goals for *Cycle Atlanta: Phase 1.0 Study* support the larger city-wide goals for cycling and transportation. As mentioned previously, this study is a supplement to the larger transportation strategy for Atlanta, which is outlined in the *Connect Atlanta Plan*.

City-Wide Transportation Goals

The overall goals defined in the *Connect Atlanta Plan* include:

- **Build Transit Infrastructure**
- **Improve Existing Transit Service**
- **Promote Sustainable Travel Modes**
- **Untangle 'Hot Spots'**
- **Achieve a State of Good Repair**
- **Develop New Funding Sources**

The *Cycle Atlanta: Phase 1.0 Study* supports these larger goals by improving access to transit and expanding infrastructure that supports bicycling. It improves and expands travel options for residents, workers, and visitors, while improving street conditions and taking advantage of new or previously untapped funding sources.

City-wide Cycling Goals

Looking specifically at cycling in Atlanta, this planning study is part of an overall effort by the City of Atlanta to improve cycling conditions and rates in Atlanta. City-wide goals for cycling improvements include:

- **Double bicycle commute to work mode share to 2.2% by 2016**
- **Become top ten city in US for cycling to work (#23 in 2012)**
- **Become top ten city for cycling safety (#17 in 2012)**
- **Double miles of high-quality bicycle lanes/cycle tracks to 60 miles**
- **Double miles of high-quality linked shared-use paths to 60 miles**
- **Secure Silver or Gold Bicycle Friendly Community status**
- **Introduce bicycle sharing program that supports local economy**
- **Address several strategies in Power to Change, the City's long-term sustainability plan, including: air quality, community health/vitality, jobs and competitiveness and transportation**

Cycle Atlanta: Phase 1.0 Study Goals

In addition to the city-wide cycling goals, several specific goals were developed for *Cycle Atlanta: Phase 1.0 Study*. They include:

- **Prioritize "high quality" bikeway projects**
- **Design bikeway networks and facilities to attract riders that categorize themselves as "interested but concerned"**
- **Expand bicycle connectivity to all segments of the city**
- **Emphasize connectivity and accessibility for bikeway networks and facilities**
- **Develop baseline data for cycling rates, activities, and users to track impact of investment in bicycle infrastructure**
- **Raise awareness of the bikeability of Atlanta with education and promotional activities**

The design and implementation strategies presented as part of this study support all of the goals outlined above.

Design Cyclists

Development of route options and the types of facilities for this project focused on the type of cyclists that should be accommodated with new investments in bike infrastructure. The Handlebar Committee, along with the public, developed the following criteria for the type of cyclists that bike facilities should accommodate:

- **Women**
- **Parents and their children**
- **College students**
- **Seniors and older adults**
- **Minorities**
- **Youth – Make it safer for elementary, middle, and high school students to ride a bike to school**
- **City residents and workers that commute to job centers or to or from MARTA stations by bike**

The overall focus with these cyclists is that cycling is something everyone should feel comfortable doing, regardless of their skill level, race, economic background, or age. Additionally, if facilities are designed that accommodate people that are more cautious about riding in traffic, you can also improve the riding experience for those that are more skilled or willing to ride in traffic. This approach was a key factor guiding the development of the *Cycle Atlanta: Phase 1.0 Study* bikeway network and corresponding bikeway facilities.

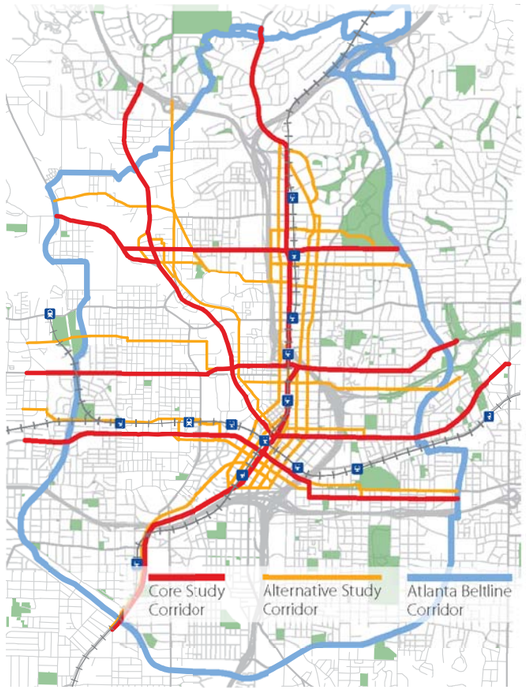
Network Overview

The overall goal for network design with this project is to develop five high-quality corridors that are complete and extend from the Atlanta BeltLine to the core of the city. Additionally, the goal is to develop a network that includes higher quality facilities that accommodate a wider range of cyclists.

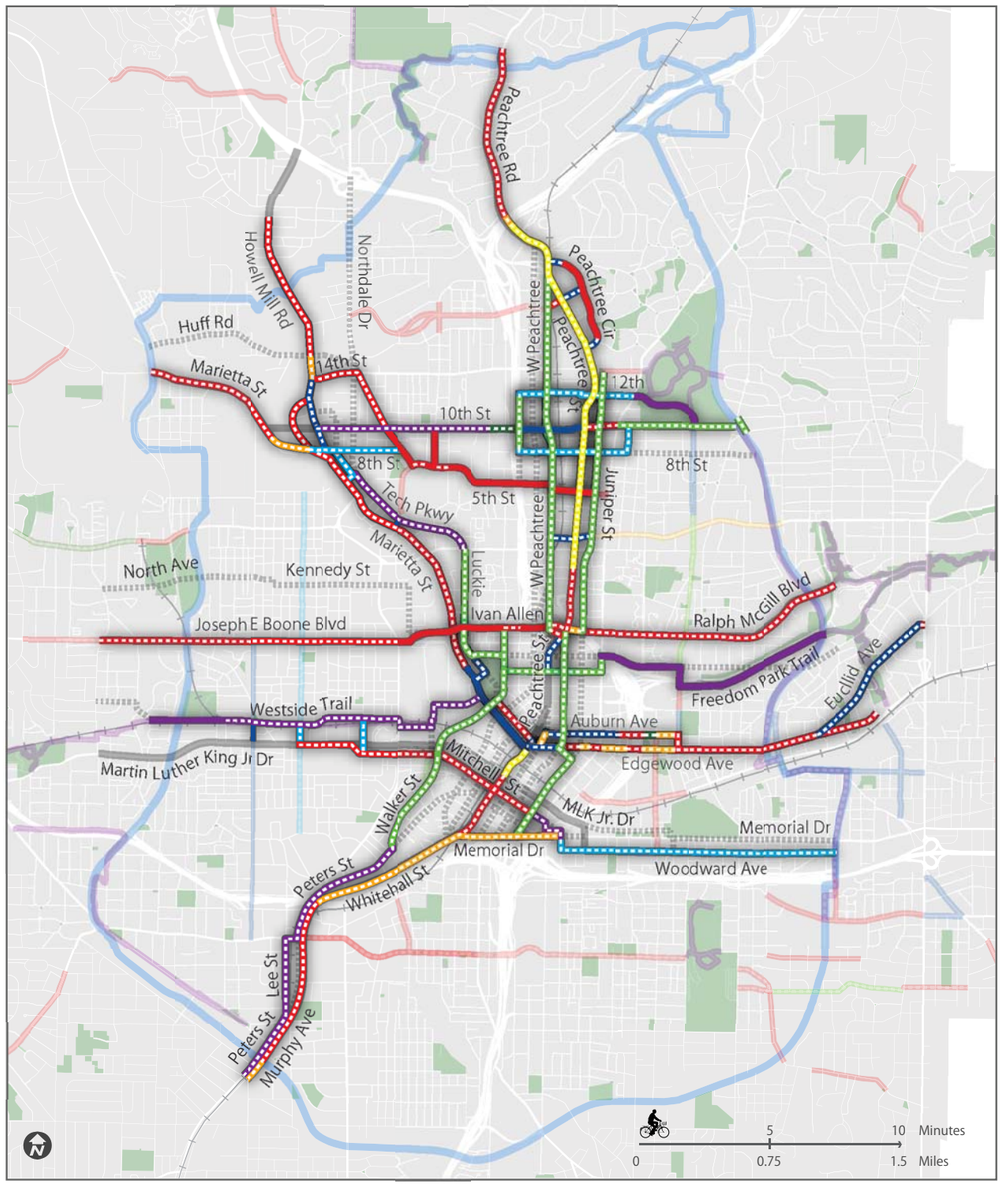
Each of the five corridors analyzed and designed as part of this study were identified as "Core Bicycle Corridors" in the *Connect Atlanta Plan*, the City of Atlanta's Comprehensive Transportation Plan. Additionally, each of the five corridors include "Secondary Bicycle Corridors" that offer alternative alignment options for each corridor. Each of the five corridors are summarized on the subsequent page and described in detail in their respective chapters of this report.

The maps on this page highlight the Connect Atlanta routes that established the study area and the refined network map that presents the proposed alignments and associated facility types proposed for *Cycle Atlanta: Phase 1.0 Study*.

Connect Atlanta Route Alignment Map



Cycle Atlanta: Phase 1.0 Study Network Map

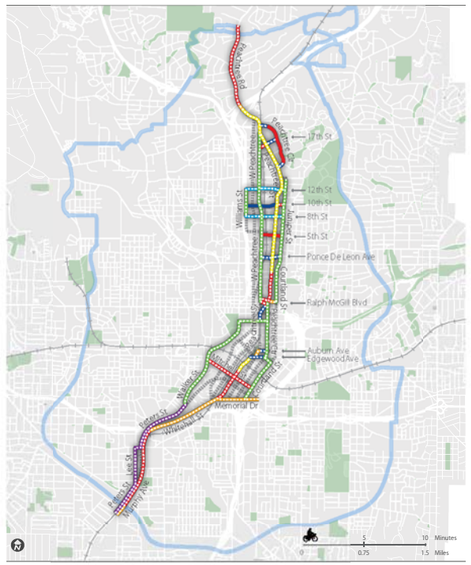


Corridor Summary

The core bicycle facilities and their alternative route options were used to guide the alignments for each corridor. Below is a summary of the context for each corridor. Additionally, each corridor has a stand-alone chapter in this report that describes the proposed network and facility designs in detail.

Corridor A

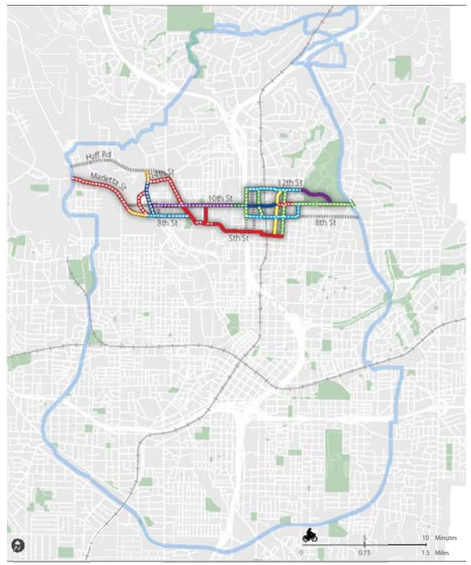
Peachtree Rd – W Peachtree St (US 19/SR 9) – Peachtree St – Whitehall St – Murphy Ave



- **7.1 miles** or **47 minutes** by bike
- Connects **8 MARTA stations**
- Connects **14 neighborhoods**
- Connects **5 NPUs**
- Connects **7 council districts**

Corridor B

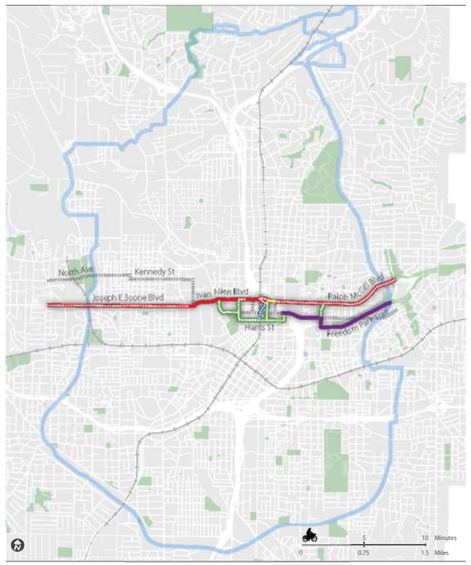
W Marietta St – 10th St



- **3.6 miles** or **24 minutes** by bike
- Connects **1 MARTA station**
- Connects **6 neighborhoods**
- Connects **3 NPUs**
- Connects **3 council districts**

Corridor C

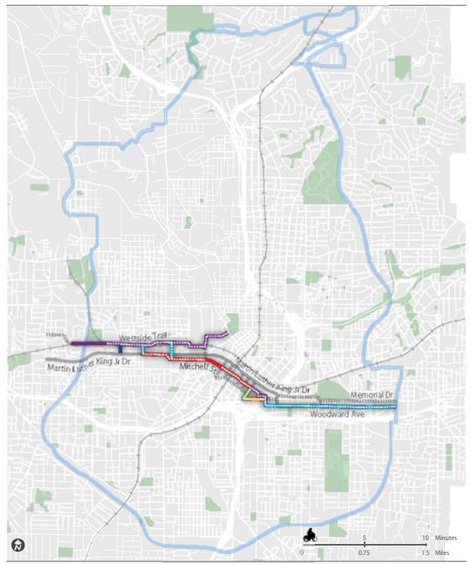
JE Boone Blvd – I Allen Jr Blvd – R McGill Blvd



- **4.5 miles** or **30 minutes** by bike
- Connects **1 MARTA station**
- Connects **9 neighborhoods**
- Connects **3 NPUs**
- Connects **2 council districts**

Corridor D

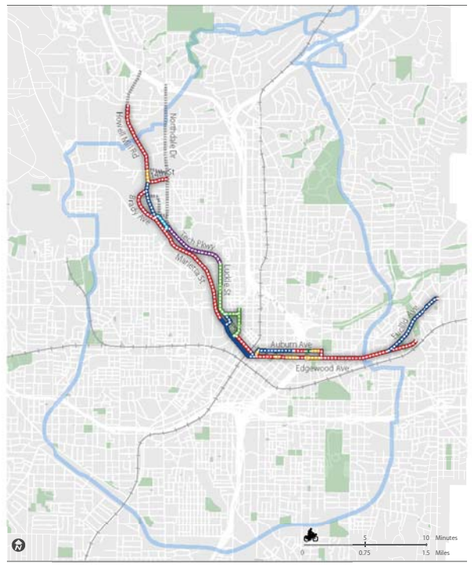
ML King Jr Dr – Woodward Ave



- **4.3 miles** or **28 minutes** by bike
- Connects **3 MARTA stations**
- Connects **11 neighborhoods**
- Connects **5 NPUs**
- Connects **5 council districts**

Corridor E

Howell Mill Rd – Marietta St – Edgewood Ave – Euclid Ave



- **6.7 miles** or **45 minutes** by bike
- Connects **3 MARTA stations**
- Connects **11 neighborhoods**
- Connects **4 NPUs**
- Connects **3 council districts**

Expanding the Network

When implemented, the *Cycle Atlanta: Phase 1.0 Study* recommendations will expand the existing bikeway network and "fill the gaps" between existing facilities. The completed network will increase the number of miles of bikeway facilities within the *Cycle Atlanta: Phase 1.0 Study* area by 103%, from 30 miles to 61 miles. The sections and charts below summarize existing conditions in the study area as well as the distribution of facility types. The recommendations will expand the number of miles of bikeway facilities available for cyclists and the type of facilities cyclists can use.

Within the study area, there are...

30 miles of existing bikeways.

31 miles of proposed bikeways.

The proposed bikeways will expand the study area network by...

103%

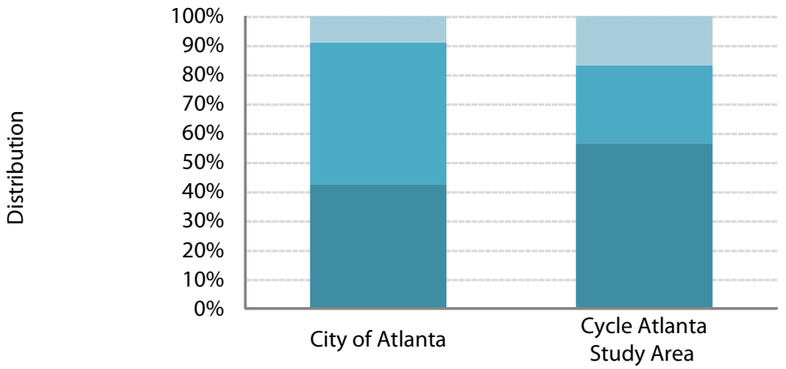
when implemented.

Existing Bikeway Facilities

At the end of 2012, the City of Atlanta had 69 miles of bikeway facilities. These facilities included shared lane markings, bike lanes, and multi-use paths. Within the study area, there are 30 miles of bikeways. Additionally, the facilities within the study area represent 44% of all of the facilities in Atlanta.

By facility type, the majority of facilities city-wide and within the study area are bike lanes and multi-use paths. Within the study area, the majority of facilities are multi-use paths, followed by bike lanes and shared lane markings.

Existing Bikeway Facilities



	City of Atlanta	Cycle Atlanta Study Area
Shared Lane Marking	6	5
Bike Lane	34	8
Multi-Use Path	29	17
Total	69	30

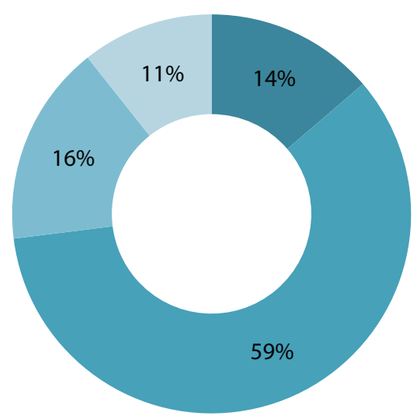
Proposed Bikeway Facilities

By implementing the recommendations for this study, the City of Atlanta will double the bikeway network in the core of the City. In total, the recommendations for *Cycle Atlanta: Phase 1.0 Study* represent 31 miles of new bikeway facilities.

By facility type, bike lanes represent the majority of the bikeway facilities with 18 miles, or 59%, recommended. Shared lane markings represent 16%, or 4 miles, of recommended bikeway facilities.

The recommendations also significantly expand the amount of separated facilities, including cycle tracks and multi-use paths. These facilities are desired by a wider range of cyclist skill levels, particularly those not comfortable riding in traffic. The recommendations add 5 miles of cycle tracks and 3 miles of multi-use paths. These facilities represent 25% of the recommended bikeway miles for this study.

Proposed Bikeway Facilities



	Distance (miles)
Shared Lane Markings	4
Bike Lanes	18
Cycle Tracks	5
Multi-Use Paths	3
	31

Funding Strategy

The cost estimates for this project were developed to help the City of Atlanta and its partners prioritize the bikeway projects presented in this study. The cost estimates can be used to develop stand-alone projects for implementation or they can be incorporated into broader transportation projects. Example projects include resurfacing projects, streetscape projects, re-striping projects, or other transportation projects that present an opportunity to incorporate the bikeway recommendations in this study.

The subsequent sections on this page describe the cost estimate methodology, the distribution of cost by corridor and bikeway facility type, as well as a summary of the Peachtree Street alternative treatment options. Additionally, project cost estimates are summarized at the beginning of each corridor chapter and in the appendix.

Cost Estimate Methodology

The cost estimates for *Cycle Atlanta: Phase 1.0 Study* are planning-level cost estimates. They include an estimate of probable cost for construction, design, and contingency. Construction costs may include pavement marking removal, new pavement marking, bicycle signals and traffic signals, tubular markers, and multi-use path construction. Design costs are estimated to be 25% of construction costs and contingency is estimated to be 20% of construction costs.

The cost estimates do not include estimates for utility re-location, resurfacing, or right-of-way acquisition. These costs will need to be identified and developed as the projects go through the scoping, design, and construction phases. For projects that do need additional scope development, it has been noted in the *Design Schematics* section for each corridor chapter.

Resurfacing costs were specifically not included because not all of the streets with proposed bikeways require resurfacing. Some of the facilities can be implemented simply with removal of existing lane markings and the application of new pavement markings, signage, or signals. To estimate an order of magnitude cost, the City of Atlanta uses $250,000 per mile for resurfacing planning-level cost estimates.

Peachtree Street Alternative Treatment Options

For this study, two cost estimates for Peachtree Street, from Interstate 85 to Linden Avenue, were developed. One option is for bike lanes and the estimated cost is $376,163. A second option is for shared lane markings and the estimated cost is $75,235. The cost estimate summaries on this page include the bike lane option and do not include the shared lane marking option. Additionally for more detailed information about the considerations associated with each option, see the *Corridor A* chapter.

Cost Summary

Overall, the cost estimates for all *Cycle Atlanta: Phase 1.0 Study* projects is $8,819,965, or $284,515 per mile. The most expensive corridor to implement will be Corridor A. It is also the longest corridor and will cost $4,216,955, or 48% of the total estimated cost for this study. The least expensive corridor to implement is Corridor D. It is also the shortest corridor and will cost $322,502, or 4% of the total estimated cost for this study.

Cost By Corridor

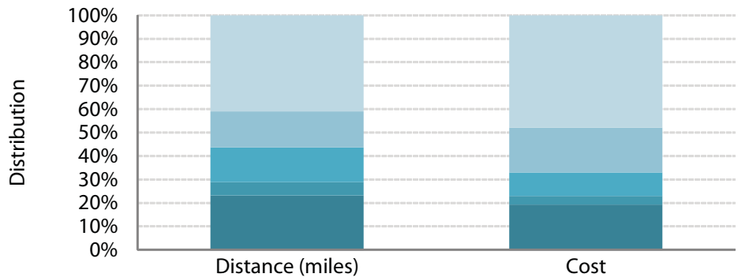
By cost, Corridor A is the most expensive corridor but also the longest corridor. It will costs $4,216,955, or 48% of the total estimated cost for this study, to implement. Corridor D is the least expensive corridor but also the shortest. It will cost $322,502, or 4% of the total estimated cost for this study, to implement.

Cost by Facility Type

By facility type, bike lanes are the most expensive bikeway facility and represent 41% of the total estimated costs for this study. However, they also represent 58%, or 18 miles, of the total new bikeway miles for this study. Shared lane markings are the least expensive bikeway facility and represent just 5% of the total estimated costs for this study. However, they represent 13%, or 4 miles, of the total new bikeway miles for this study.

It should be noted that there is a balance between cost and level of protection or separation between cyclists and vehicles. In relative terms, the cost per mile is higher for cycle tracks and multi-use paths. However these facilities offer greater comfort and safety for cyclists. Likewise, bike lanes and shared lane markings have lower costs per mile but offer less protection and separation between vehicles and cyclists. As projects are prioritized, these considerations will need to be taken into account.

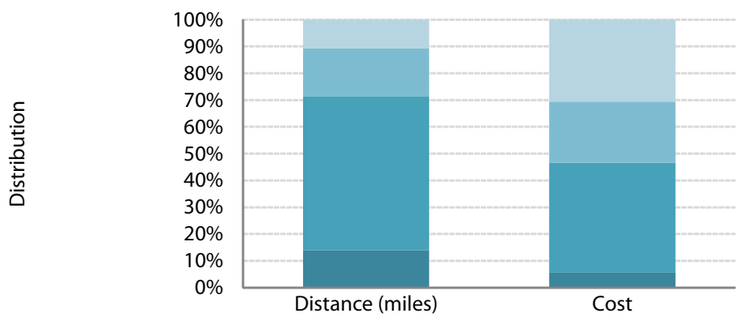
Proposed Facilities Length and Cost by Corridor



	Distance (miles)	Cost
Corridor A	13	$4,216,955
Corridor B	5	$1,703,098
Corridor C	5	$882,881
Corridor D	2	$322,502
Corridor E	7	$1,694,529
Total	31	$8,819,965

Note: Costs include construction, design, and contingency.

Proposed Facilities Length and Cost by Facility Type



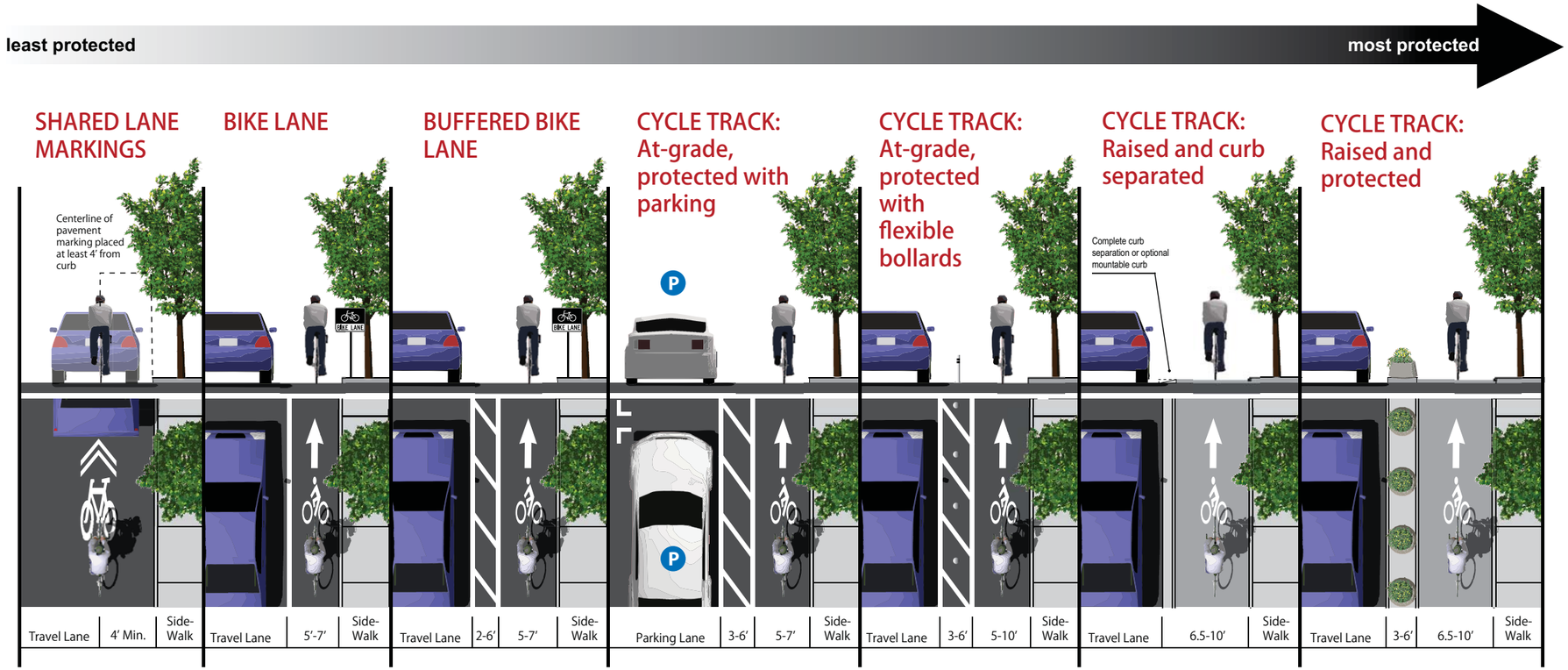
	Distance (miles)	Cost
Multi-Use Paths	3	$2,697,748
Cycle Tracks	6	$2,015,132
Bike Lanes	18	$3,615,899
Shared Lane Markings	4	$491,186
Total	31	$8,819,965

Notes: Costs include construction, design, and contingency.; Bike lane category includes bike lanes, contra-flow bike lanes and buffered bike lanes.

On-Street Marked Bikeway Continuum

As a general rule, the level of comfort for cyclists is a balance between traffic volumes, speeds, and physical separation from vehicular traffic. On streets with lower traffic volumes and speeds, people can feel safe sharing travel lanes with vehicles. For these streets, shared lane markings can suffice to improve the level of comfort for cyclists. However, along streets with higher traffic volumes and speeds, and dedicated and protected space for people, cycling helps improve safety and the perception of safety for interested cyclists.

The diagram on this page provides a graphic summary of the continuum of on-street marked bikeway facilities. For this project, a full range of facility types was selected to create a balanced bikeway network that can accommodate a wider range of rider types.



- Positions bicyclists in the travel lane
- Alerts motorists to the presence of bicyclists
- Encourages bicyclists to ride an appropriate distance away from the "door zone" on streets with parking
- Should never be used as a replacement for bicycle lanes

- Exclusive bicycle travel lane increases safety and promotes proper riding
- Reduces possibility that motorists will stray into bicyclists' path
- Visual reminder of bicyclists' right to the road
- 6' width recommended. 5' width in constrained locations
- Bike lanes wider than 7' may encourage vehicle loading in bike lane

- Provides cushion of space to mitigate friction with motor vehicles on streets with frequent or fast motor vehicle traffic
- Allows bicyclists to pass one another or avoid obstacles without encroaching into the travel lane
- Increases motorist shy distance from bicyclists in the bike lane
- Requires additional roadway space and maintenance
- Reduces risk of 'dooring' compared to a bike lane

- Dedicates and protects space for bicyclists and improves perceived comfort and safety
- Reduces risk of 'dooring' compared to a bike lane, and eliminates of the risk of a doored cyclist being run over by a motor vehicle
- Low implementation cost through use of existing pavement using parking lane as a barrier
- Use along roadways with high motor vehicle volumes and/or speeds
- Best on streets with parking lanes with a high occupancy rate

- Provides similar benefits as a cycle track with an on-street parking buffer
- Best used on roads with high speeds and long distances between intersections and driveways
- Innovative bicycle-friendly design needed at intersections to reduce conflicts between turning motorists and bicyclists
- Width should never be taken from the pedestrian zone to make room for a cycle track

- Change in level clearly demarcates space for different users and reduces conflicts between bicyclists and pedestrians
- Where bicyclists may enter or leave the cycle track, or where motorists cross at a driveway, the curb should be mountable with a small 45 degree ramp, allowing cyclist turning movements

- Cycle track should be two or three inches above street-level, and the sidewalk should be an additional two to three inches above cycle track
- Maintenance of the cycle track requires specialized sweepers
- Where opportunities exist, the buffer zone may be expanded to include bicycle parking

Cycle Atlanta: Phase 1.0 Study Facility Types

A variety of bicycle facilities have been used to develop the *Cycle Atlanta: Phase 1.0 Study* network. The facilities were selected with the overall goal of providing the most protection and separation possible given the conditions along each corridor. Below is a description of the facilities that are described throughout this document in maps and graphics.

Shared Lane Marking

Shared lane markings, or "sharrows," are road markings used to indicate a shared lane environment for bicycles and automobiles. Among other benefits, shared lane markings reinforce the legitimacy of bicycle traffic on the street, recommend proper bicycle positioning, and may be configured to offer directional and wayfinding guidance. It should be noted that shared lane markings are not a facility type, but rather a pavement parking with a variety of use to support a complete bikeway network.

Bike Boulevard

Bicycle boulevards are streets with low motorized traffic volumes and speeds, designated and designed to give priority to bicycle travel. Bicycle Boulevards use signs, pavement markings, and speed volume management measures to discourage through trips by motor vehicles and create safe, convenient crossings of busy arterial streets.

Bike Lane

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and flows in the same direction as motor vehicle traffic. Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions.

Buffered Bike Lane

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. These lanes provide greater separation between bicyclists and motor vehicles, and appeal to a wider cross-section of bicycle users.

Contra-Flow Bike Lane

Contra-flow bicycle lanes are bicycle lanes designed to allow bicyclists to ride in the opposite direction of motor vehicle traffic. They convert a one-way traffic street into a two-way street: one direction of motor vehicles and bikes, and the other bikes only. These lanes are used along corridors where alternative routes include unsafe or uncomfortable streets with high traffic volumes and/or no bicycle facilities or where two-way connections between bicycle facilities are needed along one-way streets.

Protected Cycle Track

A cycle track is an exclusive bike facility that combines the user experience of a separated path with on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor vehicles and distinct from the sidewalk. Cycle tracks may be one-way or two-way. By separating cyclists from motor traffic, cycle tracks can offer a higher level of security than bike lanes and are attractive to a wider spectrum of the public.

Raised Cycle Track

A raised cycle track is a type of cycle track that is vertically separated from motor vehicle traffic. They may be at the level of the adjacent sidewalk, or set at an intermediate level between the roadway and sidewalk to segregate the cycle track from the pedestrian area. They may also be designed for one-way or two-way travel by bicyclists. A raised cycle track can provide additional separation and protection between bicyclists and motor vehicles.

Multi-Use Path

Multi-use paths are off-street bike facilities that are designed to accommodate bicyclists and pedestrians. Multi-use paths can be placed adjacent to a street and take the place of a sidewalk or be completely separated from a street, such as along a greenway. Multi-use paths for the *Cycle Atlanta: Phase 1.0 Study* are used to connect the off-street multi-use path network to on-street bike facilities.

Source: Text adapted from the *NACTO Urban Bikeway Design Guide*.

Network Design

The focus for this study was on five bicycle corridors identified in the *Connect Atlanta Plan*, the City of Atlanta's transportation plan. The proposed network design for this study presents a complete and connected network that links the five study corridors to each other, as well as other existing and proposed bikeway facilities. It should be noted that this study does not preclude the need to develop a city-wide bicycle network or to provide bicycle accommodations as part of complete street provisions on all streets in the City.

Several factors were considered when developing the alignments for the *Cycle Atlanta: Phase 1.0 Study* bikeway network. No one factor was given more weight than the others when considering the entire network design. However for different sections of corridors, some factors were given more priority than others.

For example, the corridor alignment along the southern portion of Corridor A provides two parallel route options. One alignment is a protected facility along the western edge of the rail lines and the MARTA lines as the corridor travels from the Atlanta BeltLine to the Centennial Olympic Park area. The other parallel alignment is a bike lane that runs along the eastern edge of the rail lines and MARTA lines as the corridor travels from the Atlanta BeltLine to Downtown. Because there are few places to cross the rail lines in this area, bike facilities are proposed along both sides of the rail lines.

This strategy was used for several reasons. For one, the alignments provide bike facilities for neighborhoods on both sides of the rail lines and accommodate different types of cyclists. The alignments also connect to different destinations once Corridor A enters Downtown.

Additionally, traffic volumes are relatively low along both routes, which allow for travel lane reductions to accommodate bike facilities within the existing curb-to-curb width. However, the street widths and the number of travel lanes along the western alignment more easily accommodate a protected facility while the same considerations along the eastern alignment more easily accommodate bike lanes. This balanced approach of considering a range of design factors was applied to each *Cycle Atlanta: Phase 1.0 Study* corridor when developing the bikeway network.

Network Design Factors

Existing facilities

Completing the network of existing facilities was a key consideration with the network development. The focus was on creating continuous bike facility routes along each of the five study corridors.

Connections to destinations

Providing people with the option of biking to major destinations in Atlanta using dedicated bike facilities was given significant consideration.

Transit connectivity

Improving connections to MARTA stations was an important factor in developing the route alignments. Whether traveling to or from a MARTA station, cyclists will have improved route options to get to their destinations by combining a bike and transit trip.

Route choice

The study alignments are designed to give cyclists more than one route option where possible. People may need to travel one way in the morning from home to work and another way from work to the grocery store in the afternoon. For a variety of reasons, people need more than one route option to get to their destinations by bike. Corridor alignments were developed with this consideration in mind.

Accommodating different rider types

Not every cyclist is comfortable riding along a street with bike lanes or shared lane markings. For some, having a protected facility or a route along a street with low vehicle volumes is preferred. Where possible, parallel route alignments were developed to provide a protected facility or "low stress" route option and a bike lane or shared lane marking route option.

Proposed projects and project coordination

There are many transportation improvement projects that have been proposed or are the process of being implemented. The proposed bike facilities were developed with consideration for previous planning studies, projects scheduled for construction, or projects currently being designed and developed.

Traffic volumes and speeds

Motor vehicle volumes and speeds along proposed routes were one of several factors considered when selecting corridor alignments and the facility type for each alignment. Where motor vehicle volumes and speeds are high, more separation between cyclists and motorists is warranted. Furthermore along many of the study corridors, travel lane reductions are necessary to accommodate bike facilities without moving the existing curb locations. The capacity of roadways to handle motor vehicle traffic with reduced travel lanes was reviewed.

Physical barriers

Physical barriers, such as interstates and rail lines, are a part of traveling in Atlanta. They limit the number of places one can cross from one side to the other and often concentrate all modes of travel to confined crossings, such as bridges or underpasses. Wherever possible, route alignments used existing bridges and underpasses to cross over or under these barriers. Additionally, parallel routes were designed to expand route options on either side of these barriers where possible.

Street network (one way vs two way, short trip vs long trip)

The street network in Atlanta can provide convenience or inconvenience depending on the type of trip and one's final destination. One-way streets can mean having to travel extra distances to get to one's final destination. Additionally, signal timing and the frequency of intersections along certain routes can speed up or slow down one's trip time. With innovations in bike facility designs, two-way cycle tracks and contra-flow bike lanes can create opportunities for two-way bicycle facilities along one-way streets for vehicles. These treatments are often used to provide alternative bicycle routes to major streets with confined right-of-way widths and high vehicular volumes. Additionally, some routes are designed with commuters or longer trips in mind, while other routes are designed to accommodate shorter or more localized trips.

Facility Design

Like the network design approach, several factors were considered when developing the facility designs along each corridor. No one factor was given more weight than the others when considering the entire network design. However for different sections of corridors, some factors were given more priority than others.

Facility design was developed parallel with the network design. For most of the proposed facilities along each corridor, cross sections have been developed for a particular segment. Where a facility type changes or the lane configurations and facility dimensions change, a new cross section was developed. With this project, every corridor has a proposed facility type with dimensions and associated cost estimates, has a project that is already designed and programmed for construction, or already has an existing facility.

Additionally, corridor segments that have already been designed or are going through the construction process do not have cross sections for this study because the designs have already been developed. Examples include the two-way cycle track along 10th Street between Monroe Drive and Piedmont Road, as well as the new streetscape project along MLK Jr. Drive from Ollie Street to Northside Drive.

Facility Design Factors

Right-of-way width

One of the primary considerations with facility design was 'what can be done within the existing right-of-way?' Moving curbs and relocating utilities can increase project costs and the amount of time it takes to design and build a project. For most of the projects developed, the strategy was to use the existing width between the existing curbs to install bikeway facilities and re-configure travel lanes.

Safety

Safety was considered for all roadway users. For many projects, adding bikeway facilities and re-configuring lanes improves street conditions for people driving, biking, and walking. For example, many of the projects include lane reductions that add a center turn lane and bike facilities to a street. The center turn lane can improve the safety of left turn movements for vehicles while the lane reduction creates dedicated space for bicyclists riding along a street. This same approach often has the added benefit of reducing vehicle speeds, which benefits everyone using the street from a safety perspective.

Likewise, important intersections were given extra consideration in order to develop treatments that mitigate conflicts between people driving and biking. The intersection designs are also developed to improve visibility of cyclists at intersections and help bicyclists cross through intersections more safely.

Lane configuration and alignment

Adding bikeway facilities along most of the corridors also required travel lane re-configuration or new alignments, particularly at intersections. The type of facility along each corridor segment, which side of the street they are applied, and how all of the bike lanes and travel lanes align as they change along the corridor was taken into consideration.

Intersection design

As mentioned with other facility design factors, intersection design was considered, particularly at key intersections. Issues like improving vehicular turning movements, improving bicycle turning movements, enhancing bicycle visibility, and improving wayfinding for bicyclists at intersections were all taken into account when developing intersection designs and facility cross sections.

On-street parking

The design strategy for on-street parking was to preserve existing on-street parking wherever possible. However, in select cases on-street parking needs to be removed or re-located to safely accommodate the addition of a bike facility. Where existing on-street parking is impacted, it is noted in the corridor schematics section of this report.

Additionally creating opportunities for on-street parking was also considered. On-street parking was added where it could improve access to businesses or residential areas or safety and comfort for cyclists (to create a buffer between cyclists and travel lanes).

Motor vehicular capacity

Balancing roadway motor vehicular capacity with the need of all street users was also a consideration. Many of Atlanta's streets have excess capacity and present an opportunity to remove a travel lane to accommodate a bike facility. For more on this approach, see the *Lane Reduction and Street Design Strategy* section of this chapter.

Cost

Managing cost was an important component of developing facility designs. Developing projects that work with the existing curb-to-curb width helps keep project costs down and reduces the time it takes to construct facilities. Moving street curbs adds additional cost because of construction requirements, the need to move utilities (above and below ground), or the purchase of right-of-way.

Lane Reduction and Street Design Strategy

In urban settings, street space is a premium and often has to be prioritized based on the needs of people traveling along the street as well as the businesses and residences that live and work along the street. As described and analyzed in the *Connect Atlanta Plan*, many of Atlanta's streets have been designed to accommodate high-speed traffic flow. Some of these street design strategies include one-way streets, reversible lanes, multi-lane streets with large spacing between signals among others. While these design strategies may have improved travel time for people driving, they have often created unsafe conditions for people using the street because of higher vehicle speeds and created "bottle necks" at key intersections due to the rate at which vehicles can travel from one intersection to another.

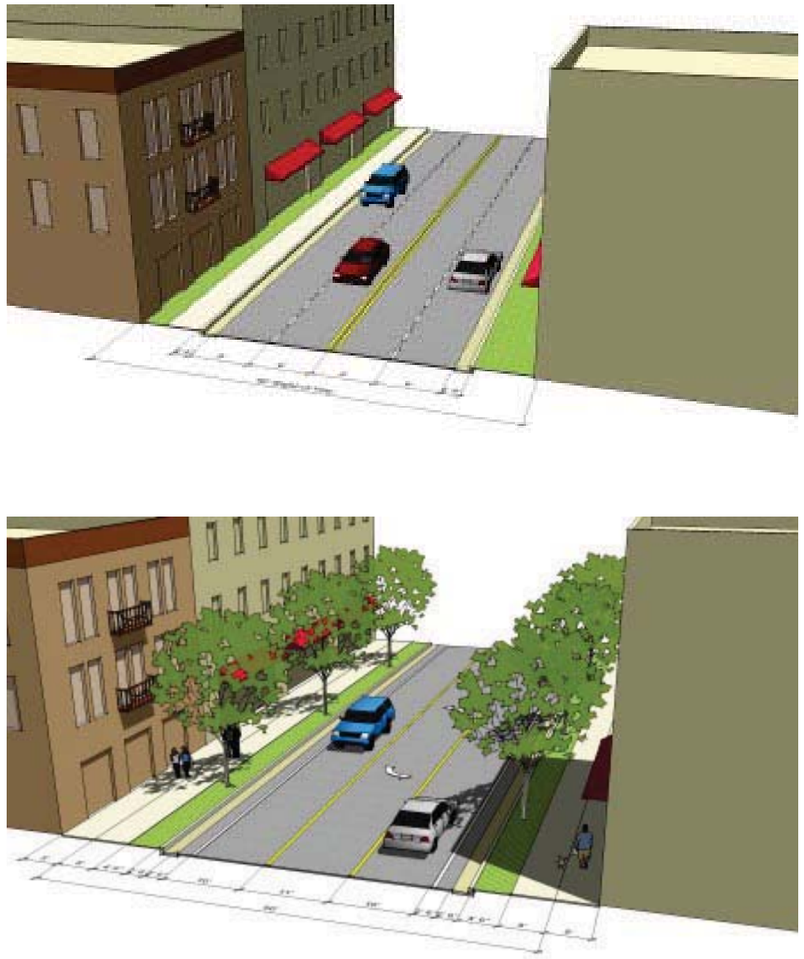
To improve safety and create space for a wider range of people using the street, *Connect Atlanta* outlined several strategies for travel lane reductions or travel lane re-configurations that can improve safety, mobility and access for the wider range of people driving, walking, biking, and taking public transportation.

One of the most cost-effective strategies is the removal of one or more travel lanes for vehicles. The removal of a travel lane can create street space for bike facilities or sidewalks and improve driving conditions all at the same time. As described and analyzed in the *Connect Atlanta Plan*, many of Atlanta's streets are candidates for lane reductions. For a four-lane street, the *Connect Atlanta Plan* threshold for consideration of a lane reduction from four to three lanes is 25,000 vehicles per day. For a six-lane street, the *Connect Atlanta Plan* threshold for consideration of a lane reduction from six to five lanes is 35,000.

For *Cycle Atlanta: Phase 1.0 Study*, these thresholds were used as a guide to consider street design strategies along the five study corridors. Many other factors were also considered and are outlined in the *Network Design* and *Facility Design* sections of this chapter. As is illustrated in the chapters for each corridor, many of the streets along each corridor are over-built and can have one or more travel lanes removed to accommodate the proposed bikeway facilities.

Beyond simply removing a lane, the *Connect Atlanta Plan* outlined several other street design strategies that can be used as part of a lane reduction or on their own to create space for bike facilities and improve safety for all street users. They include the following:

- **Left turn lanes to restore capacity** – Many of Atlanta's streets are four- or six-lane undivided streets with no medians or left turn lanes. In urban conditions where left turns can be frequent, the lack of dedicated space for left-turning vehicles can actually reduce the vehicular capacity of travel lanes and create unsafe conditions for people driving. Adding a left turn lane can actually improve vehicular capacity for outside travel lanes, which can preserve or improve vehicular capacity along a street. Additionally, the left turn lane can improve turning safety at intersections or midblock.
- **Correct lane imbalances** – Some streets in Atlanta have additional travel lanes for one direction of travel, e.g., one travel lane for north-bound traffic and two travel lanes for south-bound traffic. While these streets may have needed the additional lane in the past, often times these additional lanes are no longer needed and can present an opportunity to create additional space for bikeway facilities. Likewise, some of the imbalances have created confusion or awkward turning movements at intersections. Re-configuring the alignment of lanes, particularly at intersections, can often improve safety for people driving, walking, and biking through intersections. These strategies were used to create space for bikeway facilities and in some cases improve safety conditions for all users.
- **Re-calibrate speeds** – Posted travel speeds and actual travel speeds can often be different because of the street's physical design. Travel lane widths and the presence (or lack) of street elements, such as trees or on-street parking, can influence how fast people feel comfortable driving. Along some of Atlanta's streets, vehicular speeds are high because they are overly wide or have few street elements that would encourage people to slow down. The effect is that streets can be uncomfortable and unsafe for all users, including people walking and biking. Lane narrowing, adding on-street parking, reducing travel lanes, and adding bikeway facilities were all used as strategies to re-calibrate streets to be safer and more comfortable for all users.



In the illustration above from the *Connect Atlanta Plan*, the number of travel lanes is reduced from four lanes to three lanes. With one fewer lane, the extra street space can be used for expansion of sidewalks, street trees, or bikeway facilities. The addition of the center turn lane helps preserve vehicular capacity for the outside travel lanes while also improving safety for vehicles making left turns, either midblock or at intersections. This type of street design strategy was used frequently with this study to create space for bikeway facilities.

CycleAtlanta App

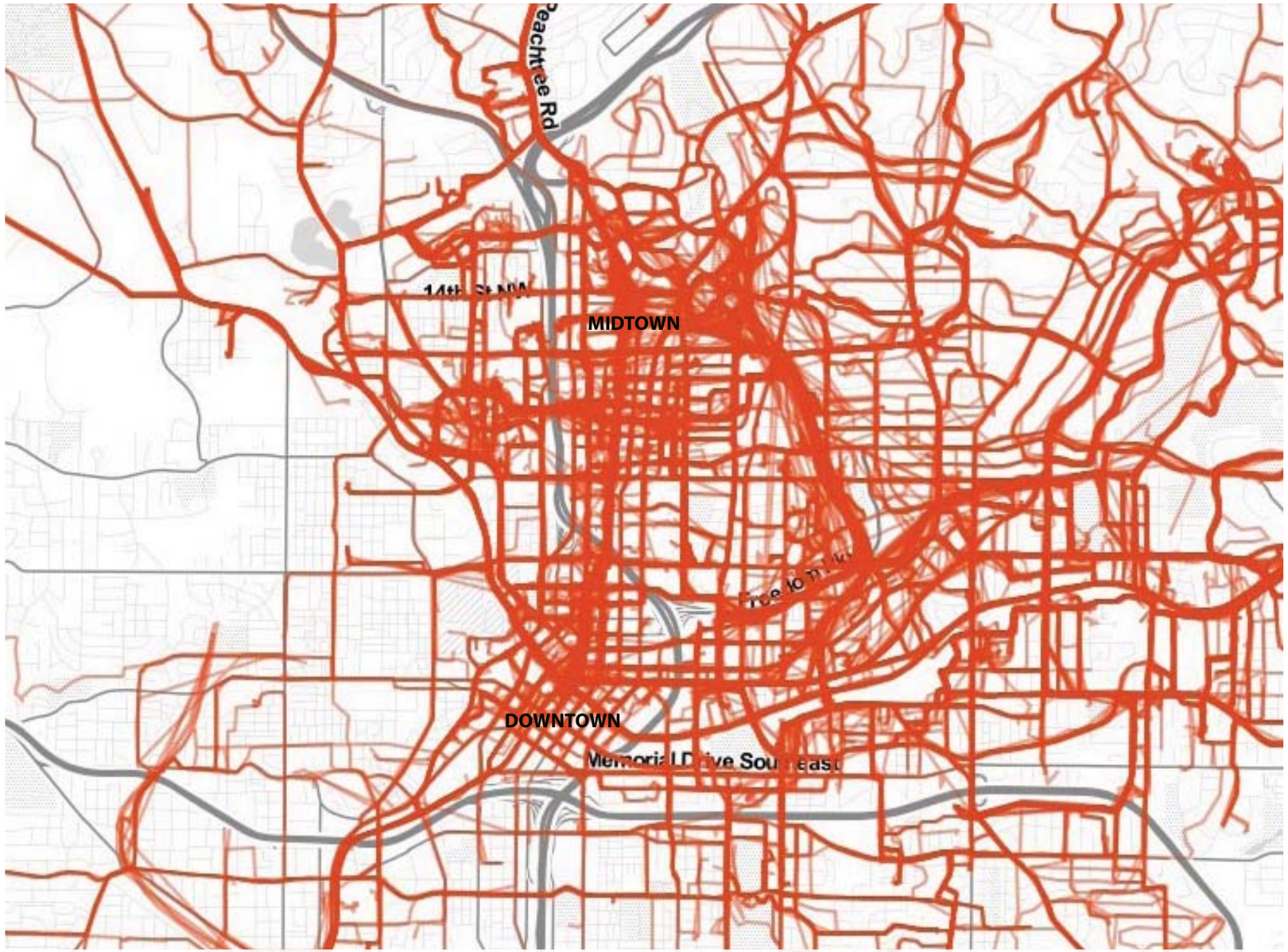
In tandem with this study, the City of Atlanta collaborated with the Georgia Institute of Technology (Georgia Tech), the Atlanta Bicycle Coalition (ABC), and the Atlanta Regional Commission (ARC) to develop an innovative smartphone app that can be used to collect information about the routes people are using to bicycle. The information collected through April 2013 was used to inform the network and facility design for this study. Below is a summary of the app and its development.

Preliminary analysis results are presented in the *Analysis* section of this report. The data collected as part of this effort will be used to track changes in cycling behavior in Atlanta as bikeway facilities are built and the *Cycle Atlanta: Phase 1.0 Study* bikeway network is completed.

What is the CycleAtlanta app?

CycleAtlanta (http://cycleatlanta.org/) is an application for iPhone and Android that collects data about cyclists' routes, origins, destinations, demographics, and features of note in the City of Atlanta. The initial version of the app uses a smartphone's geolocative capabilities to record a cyclist's bike route as she travels to her destination. This allows City of Atlanta transportation planners to see which roads are avoided and which are popular, and use this information to inform future decisions about where infrastructure is needed to create bike-friendly routes through the city. The app also allows cyclists to enter their demographic data, rider type, and ride frequency to further analyze data collected.

In the first major revision of the app, the CycleAtlanta team has added the ability to crowdsource issues and amenities found en route, allowing users to contextualize or elaborate on a specific route. Users 'pin' noteworthy spots along their route, such as amenities (bike parking, bike shops or repair kits, public restrooms, secret passages, and water fountains) or infrastructure conditions that need improvement (pavement issues, traffic signals, enforcement, bike parking or bike lane issues). The goal of the project is to connect citizens to local government through the app, allowing them to participate in the planning process without being inhibited by spatial or temporal limitations in existing participatory planning practices.



The CycleAtlanta app has collected thousands of trips that help illustrate the route preferences of cyclists in the CIty. Some riders have also provided demographic and other information that helps answer questions like "Who is riding?", "Why are they riding?", and "How can cycling conditions being improved?" All of the data collected is being used to establish base-line metrics. These metrics will be used to analyze changes in cycling rates, attitudes, conditions, and demographics over the next five years as the recommendations from this study are implemented.

How do cyclists use CycleAtlanta app?

Once the app is launched, cyclists simply tap "Start" to beging recording their ride. When the ride is over, they tap "Save" and add additional detail about trip purpose and optional comments. After the data is uploaded, CycleAtlanta displays the map of the ride, showing the route, distance travelled, and average speed. The app user can visit their previous trips details (date, time, distance, speed, CO_2 saved, and calories burned) by looking at "My Trips" in the app. To note an issue or amenity, the cyclist taps "Note that" and selects the feature from a rolling menu. Upon hitting "Save," they are able to enter additional details or upload a picture to the app. By clicking on "My Notes," the previously entered notes can be viewed. The app will allow users to optionally add input personal demographic information, select categories for their cycling frequency and rider type, and provide their email address to receive updates about the study from the City of Atlanta.

Why is CycleAtlanta app needed?

50% of all trips in the U.S. are 3 miles or less, yet only 1.8% of those trips are taken by bicycle[1]. Meanwhile, 35.7% of US adults are obese[2] and the transportation sector accounts for 32% of US greenhouse gases[3]. By increasing the use of bicycle transportation, we may begin to make an impact on the health and environmental issues facing our country.

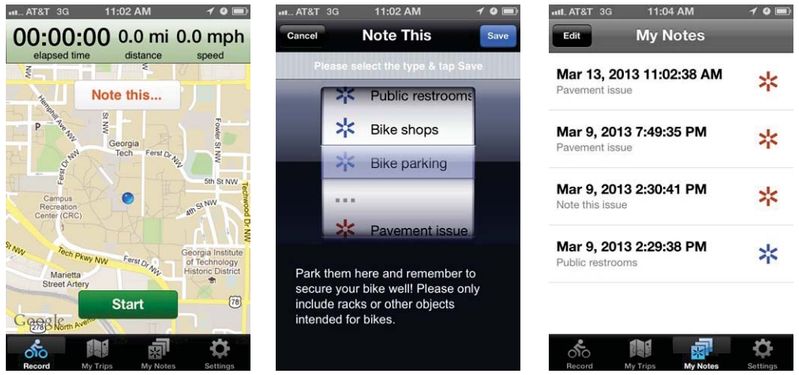
One of the main reasons citizens do not use the healthier mode of cycling is due to a lack of safe infrastructure—dedicated bicycle routes, roads with bicycle lanes, and other designated bicycle facilities. Cyclists in general prefer riding on dedicated infrastructure[4], and many demographic groups, particularly women, have specific preferences regarding bike infrastructure[5]. The City of Atlanta has a desire to put proper cycling infrastructure in place but needs information from citizens to prioritize improvements in a fiscally-constrained environment. Therefore, the purpose of CycleAtlanta is to involve citizens in bicycle infrastructure improvement decisions in the City of Atlanta, both to maximize the benefit of bike infrastructure funding and to empower citizens to be more active in transportation decisions.

Who is on the CycleAtlanta app team?

Dr. Kari Edison Watkins of Civil and Environmental Engineering and Dr. Christopher LeDantec of Digital Media, both Assistant Professors at Georgia Tech, are leading the project. Their team of students includes Mariam Asad, Anhong Guo, Aditi Misra, Alex Poznanski, and Caleb Southern. CycleAtlanta is a joint project between the City of Atlanta Department of Planning & Community Development, Georgia Institute of Technology, Atlanta Bicycle Coalition, and Atlanta Regional Commission (ARC). It is funded through a contribution from the Atlanta Bicycle Coalition and the Atlanta Regional Commission's Livable Centers Initiative planning program. Additional support is provided by the GVU Center and the Institute for People and Technology at Georgia Tech.

CycleAtlanta is based on the open-source CycleTracks application originally developed for San Francisco, CA, and adopted in Austin, TX and Charlottesville, NC[6]. The Cycle Atlanta project team has already contributed substantial revisions to the code base and plans to continue to do so throughout the project.

CycleAtlanta app users can use their smartphone to track their cycling trips.



In addition to tracking route information and other information like trip purpose, version two of the app has additional features like making notes about conditions that need to be improved or cycling-supportive community features, such as bike shops.

1. League of American Bicyclists, 2010, http://www.bikeleague.org/resources/reports/pdfs/nhts09.pdf
2. Centers for Disease Control and Prevention, 2012, http://www.cdc.gov/nchs/data/databriefs/db82.pdf
3. International Transport Forum, 2010, http://www.internationaltransportforum.org/jtrc/environment/CO2/USA.pdf
4. Tilahun, N. Y., D. M. Levinson, and K. J. Krizek. Trails, lanes, or traffic: Valuing bicycle facilities with an adaptive stated preference survey. Transportation Research Part A: Policy and Practice, Vol. 41, May 2007, pp. 287–301.
5. Krizek, K. J., P. J. Johnson, and N. Tilahun. Gender Differences in Bicycling Behavior and Facility Preferences. Research on Women's Issues in Transportation, Transportation Research Board of the National Academies. 2004.
6. http://www.sfcta.org/content/category/12/97/483/

CycleAtlanta App Data Analysis

One of the goals for this study is to develop baseline data for cycling rates, activities, and users to track the impact of investment in bicycle infrastructure. The CycleAtlanta App was developed to help with this effort. Since its initial launch, it has collected information about thousands of trips and rider information, which app users could elect whether to provide.

The information in the subsequent sections is a summary of findings developed by Alex Poznanski, one of the CycleAtlanta App team members. The findings are part of his thesis at the Georgia Institute of Technology.

The charts compare CycleAtlanta app data (CATL) to external data sets including the National Household Travel Survey (NHTS) and the 2012 Atlanta Bike to Work Challenge (BTW). Each chart notes the sample size for each data set used for analysis.

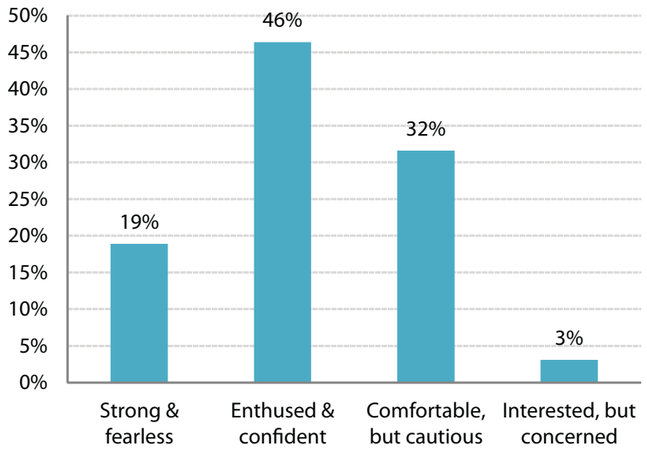
For more detailed analysis, see Alex Poznaski's thesis.

> Poznanski, Alex J. "Analyzing Demographic and Geographic Characteristics of "Cycle Atlanta" Smartphone Application Users." Thesis. Georgia Institute of Technology, 2013. Print.

What type of rider are app users?

Of the app users that provide information about the type of cyclist they consider themselves, the majority of themselves as "enthused and confident" or "comfortable but cautious." Another goal for this study is to increase the cycling rates for those that consider themselves "interested but concerned." More protected facilities and enhanced intersections can help increase the cycling rates for this portion of the community.

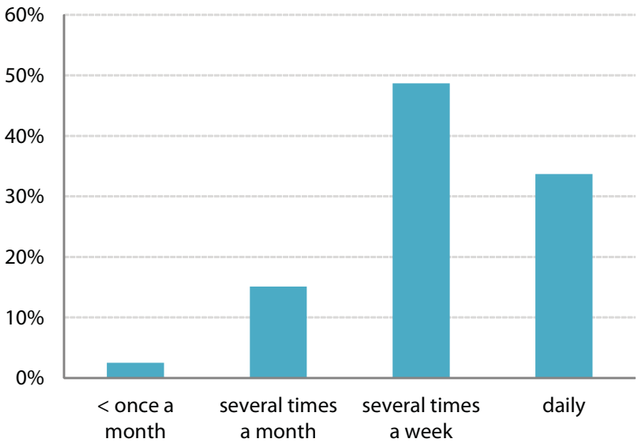
Cyclist Type



How often are app users riding?

The majority of CycleAtlanta app users ride often (several times a week or daily). One of the goals for this study is to increase the frequency of cycling in Atlanta to be a part of daily life. A more complete and connected cycling network in Atlanta can help make cycling a part of every day trips and recreation.

Cycling Frequency



Who is riding?

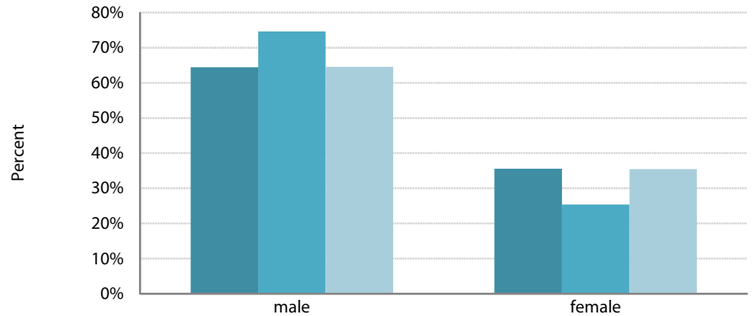
Cyclists in Atlanta today are predominately young men. However, surveys and the CycleAtlanta app data shows that people of all ages, races, and genders are riding. A major goal for this study and city-wide cycling is to increase the cycling rate for these minority groups. The goal is to make cycling a transportation option that is safe and convenient for anyone in the community, regardless of age, gender, or ethnicity.

NHTS - National Household Travel Survey

CATL - Cycle Atlanta

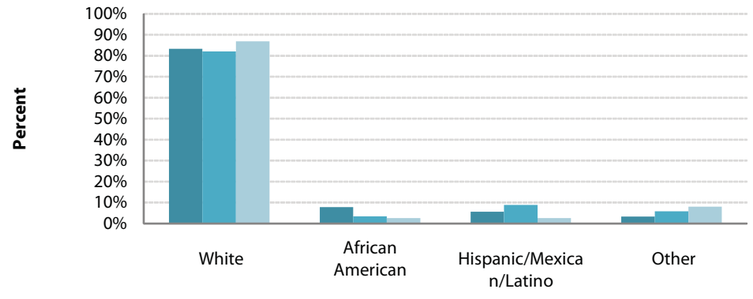
BTW - Bike to Work Challenge

Cyclist Gender



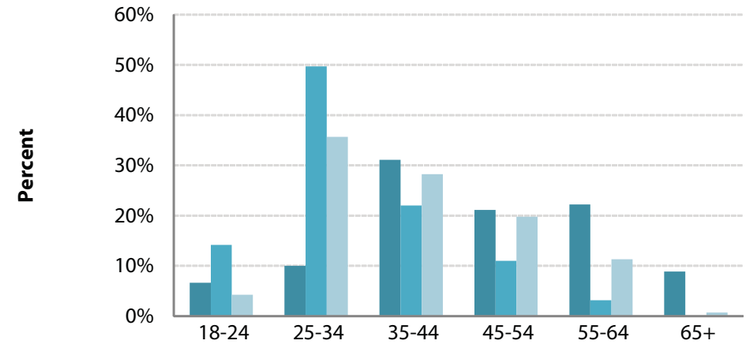
	male	female
NHTS (n=90)	64%	36%
CATL (n=311)	75%	25%
BTW (n=282)	65%	35%

Cyclist Ethnicity



	White	African American	Hispanic/Mexican/Latino	Other
NHTS (n=90)	83%	8%	6%	3%
CATL (n=295)	82%	3%	9%	6%
BTW (n=274)	87%	3%	3%	8%

Cyclist Age



	18-24	25-34	35-44	45-54	55-64	65+
NHTS (n=90)	7%	10%	31%	21%	22%	9%
CATL (n=318)	14%	50%	22%	11%	3%	0%
BTW (n=283)	4%	36%	28%	20%	11%	1%

Community Involvement

Community involvement for this study was a collaborative effort between the design team, City of Atlanta officials, stakeholders, and the public. The process was used to establish project goals, develop and refine concepts, and collect feedback and data as the study was developed. Input was collected through meetings with the public and stakeholders, as well as the CycleAtlanta app, an innovative smartphone application developed for this project to collect cycling data from users in real time. A summary of the community input opportunities used to develop this study are discussed in more detail below.

Handlebar Committee

The Handlebar Committee served as the technical review committee for this study. The group included city transportation officials, advocacy groups, university officials, and business owners, as well as transit and transportation partners. The Handlebar Committee met three times during the study including a project kick-off meeting in the Fall of 2012 (to establish the goals for the project), during the charrette (to review work in progress), and in the Spring of 2013 (to review the final plan).

Charrette

The *Cycle Atlanta: Phase 1.0 Study* charrette was held over a four-day period from Monday, February 11 to Thursday, February 14. During the charrette, the design team used a series of feedback loops between stakeholders, the public, and representatives from the City of Atlanta to propose, test, and refine recommendations for each study corridor. In particular, the design team:

- Reviewed and analyzed existing conditions along the study corridors
- Collected input from the key stakeholders and the public
- Developed initial concepts for each corridor
- Tested the concepts with field visits and assessments
- Refined design concepts for each corridor
- Developed a working list of treatments for each corridor based on input received

Stakeholder Meetings

Stakeholder meetings were conducted during the charrette and were conducted on a rolling basis over the four days. The stakeholder interviews allowed the design team to have one-on-one discussions with key stakeholders that have technical expertise or intimate knowledge about particular project corridors or projects along or near the study area that could impact the development of this study. Stakeholders included non-profits, such as the PATH Foundation, advocacy groups, such as the Atlanta Bicycle Coalition, business representatives, such as Coca-Cola, university leaders, such as campus planners from Georgia State University, as well as other city departments, such as the Department of Watershed Management.

Public Meeting

One public meeting was held at the Invest Atlanta office on Tuesday, February 12, 2013, which was in coordination with the second day of the charrette. Over 20 attendees received a presentation about the project and divided into smaller groups to provide detailed feedback on "work in progress" for the charrette. The input from the meeting was used to refine the proposed corridor alignments and facility types along each of the five corridors.

CycleAtlanta App

As of August 2013, the CycleAtlanta app had collected over 12,000 trips and over 1,000 users. The app data was used on a continuous basis through the project to identify routes cyclists are currently using, identify the types of routes cyclists are selected based on the self-assigned skill level, or routes based on other demographics, such as age and gender.

Stakeholders met one-on-one with the design team and city officials during the charrette to discuss project goals and proposed concepts in detail.

The public meeting provided an opportunity for the community to learn about the project, share their desires for better cycling conditions in Atlanta, and help the design team develop the plan recommendations.

Work by the design team during the charrette included field work to measure and test design concepts.