

CHAMBLEE

Self-Driving Shuttle Feasibility Study and Concept Plan

Chamblee, Georgia



2018

**Prepared for
City of Chamblee**



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Executive Summary

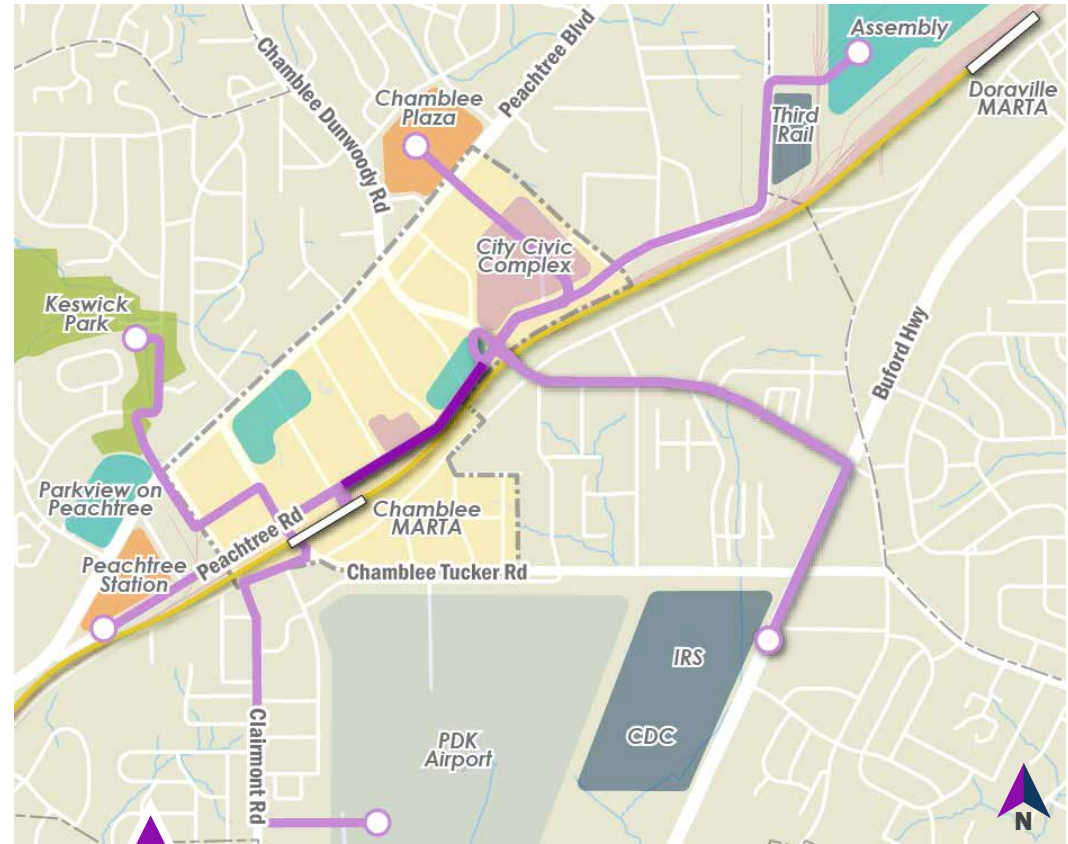
A team of employees from the Centers for Disease Control hop on a shared autonomous vehicle (SAV) to grab lunch in downtown Chamblee to celebrate a birthday. A teen summons an on-demand SAV to play ball at Keswick Park, instead of being shuttled by parents. A resident from downtown Atlanta hops off the train and takes an SAV to work at Third Rail Studios.

All of these scenarios may be possible in Chamblee’s near future. Together, Chamblee and Stantec collaborated on this feasibility study and concept plan to establish the framework under which these scenarios may become reality. This plan focuses on first/last mile connections to the Chamblee MARTA train station.

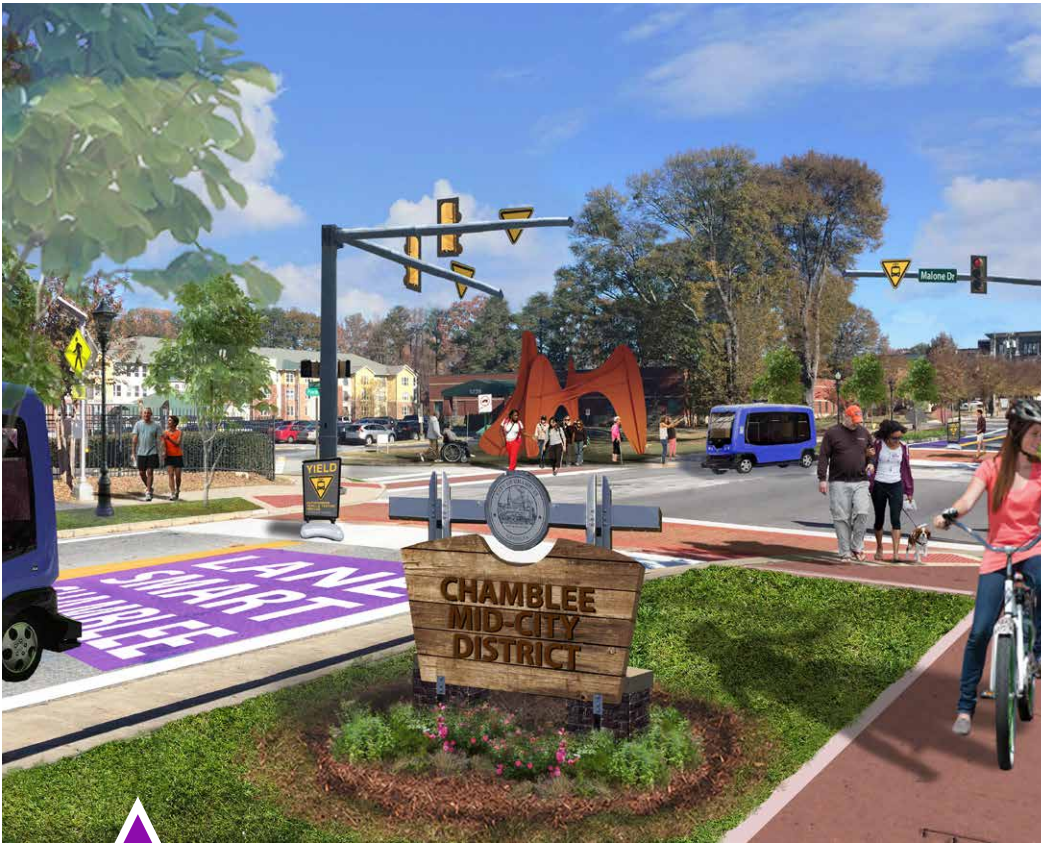
The study objectives are to:

- » Test the level of acceptance and general opinions of self-driving technology.
- » Develop route alternatives and evaluate them against measurable criteria.
- » Establish estimates of cost.
- » Expedite the study process to ensure Chamblee remains a smart mobility leader in the greater Atlanta region.
- » Incorporate findings and recommendations in the upcoming Comprehensive Transportation Plan.

LEGEND	
Major Office Centers	Major Retail Centers
Major Employment Centers	Park
Mixed-use Centers	Airport
	Alternative Routes
	Core Segment



Map showing all route alternatives to the following destinations: City Civic Complex, PDK Airport, Peachtree Station, Chamblee Plaza, Keswick Park, Third Rail Studios & Assembly, and CDC & IRS.



Conceptual rendering of what Peachtree Road might look like with SAVs and the streetscape improvements included in the City's Streetscape Plan.

The resulting route alternatives all share a core segment which directly supports the town center and Chamblee's revitalization plans. The extensions from this core route are evaluated independently, but could be combined in countless ways to form the ideal trial run.

While there is some variation between the alternatives, the high-level concept of a self-driving shuttle service along Peachtree Road (and beyond) is feasible. Cost estimates to operate a shared autonomous shuttle service are substantially below that of traditional transit, the service directly supports local priorities and goals, it is supported by diverse stakeholders and the public, and it integrates with and enhances the multi-modal network.

What defines success for a not-fully-vetted technology pilot project? One of the early lessons learned from SAV and AV pilot projects is that managing expectations is very important. These vehicles may have a higher probability of getting in accidents (usually very minor)—likely caused by other drivers who are not accustomed to operating alongside these vehicles. Having a fully documented process to respond to situations, clear communication protocols, a risk mitigation strategy, and a willingness to be a part of testing and improving this technology are all essential pieces to ensuring that success is defined clearly and achieved.

CHAPTER 01

Introduction

1.0 Introduction

Can an electric, self-driving shuttle (also called Shared Autonomous Vehicles (SAVs) service help Chamblee achieve a confluence of community, economic development, mobility, and environmental goals, in addition to addressing parking and infrastructure constraints?

Is it a better-fit and more attractive choice than traditional transit vehicles? Together, Chamblee and Stantec answered these questions through this feasibility study and concept plan which focuses on first/last mile connections to the Chamblee MARTA train station.

Community vision and goals. Improving mobility through increased transit and pedestrian services and infrastructure directly supports the City's Livable Centers Initiative (LCI) Plan, Chamblee's revitalization efforts, and the vision for Chamblee, as stated in the 2016 Comprehensive Plan:

The City of Chamblee aspires to be a healthy, vibrant, safe environment where residents live, work, play and grow in a diverse community valuing families and neighbors, respecting the historic qualities of our city.

Economic goals. Being one of the first in the region to pilot SAVs on public roads will strengthen the identity of Chamblee as a center for innovation and forward thinking. The cool and newness factors of the technology will attract people from across the region, helping to support a thriving business environment.

Mobility goals. An SAV pilot project also directly supports the fourth goal in the Comprehensive Plan: develop and maintain strong multi-modal connections. Convenient and attractive multi-modal options help reduce the parking challenges in Chamblee's historic downtown district, while also enabling residents to choose the mode most appropriate for each specific trip (walk to the grocery store, drive to work, transit to dinner, etc.).

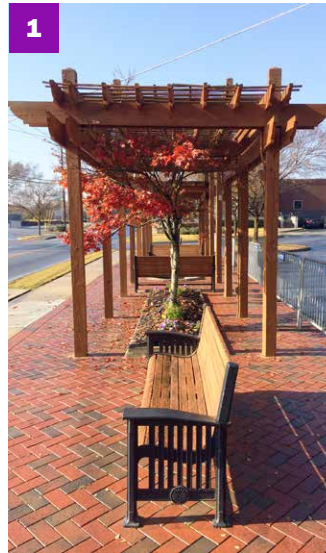
Environmental goals. Essential to supporting a healthy lifestyle is a healthy environment. Thirty-one percent of greenhouse gas (GHG) emissions in the Atlanta region come from transportation, as described by the Atlanta Climate Action Plan. As electric vehicles gain market share, reductions in transportation related greenhouse gas emissions will decrease, helping to achieve regional GHG reduction targets and improving air quality.

Parking infrastructure.

1.1 About the Document

The intent of this document is to define and objectively evaluate route alternatives for a potential SAV pilot project.

Key destinations are identified and potential alignments are created and analyzed using various metrics. This preliminary evaluation elevates a few options over the others, but they are all subject to refinement. The next phase of the project will define priorities, funding partners, and operational details—this refinement of options will bring clarity to the preferred route for the pilot project and identify future potential phasing opportunities. Using a data-driven approach that incorporates stakeholder input, this feasibility and concept plan first describes the technology and what is meant by SAVs or self-driving shuttles. It then evaluates the existing conditions in Chamblee and summarizes stakeholder input. Each route alternative is then defined and evaluated. Finally, illustrations are used to depict what Peachtree Road may look like at two points in time: during the pilot project stage, and sometime in the future when autonomous vehicles are more fully integrated.



Existing Conditions around Chamblee (Fall 2017)

1 Underutilized park-let along Peachtree Road / 2 MARTA Chamblee station / 3 Peachtree Road pedestrian realm with a wide sidewalk and street trees / 4 Connection opportunity at existing bus stop in front of City Hall / 5 Peachtree Road streetscape improvements include midblock crosswalks.

CHAPTER 02

Self-Driving Shuttles

2.0 Self-Driving Shuttles

What do we mean by self-driving shuttles or SAVs?

At this point in time, self-driving technology is making rapid advancements and is being tested around the world in diverse conditions including public streets, private office parks, and university campuses. These electric shuttles carry between 8-16 people and typically operate at a top speed of 25 mph. They are ideally suited for first/last mile solutions on quiet, lower speed streets and can operate in mixed-traffic. However, they can increase their travel efficiency if operated within a dedicated right of way, similar to bus rapid transit. Given their low speeds and somewhat limited carrying capacity, they are not particularly suited for long distance trips nor higher speed roads or highways.

Most self-driving shuttles on the market today have a tight turning radius (13-15 feet), and some operate in both directions, eliminating the need to turn around. They can work seamlessly with a mobile phone-based app, can be called on-demand, and monitored in real-time. Most are wheelchair accessible and are working to offer more accessibility features in compliance with Americans with Disabilities Act (ADA) regulations.

The aesthetic of the shuttles varies depending on the manufacturer, but the dimensions are generally 16' x 7' x 9', which is smaller than community buses. These electric vehicles can typically operate between 3-10 hours on a single charge—depending on operational environment and deployment strategy—and recharge via induction or by physically plugging them in. Given the rapid advances in battery technology, this range is being extended with each new version. Supportive infrastructure, such as a secure storage site, intersection treatments, Intelligent Transportation System (ITS) infrastructure, and transit priority treatment is generally less intensive than traditional transit, but this can vary greatly depending on local desires and conditions. In addition, if placemaking and permanency are important, installations would include fixed-point stations with interactive signage and fully dedicated lane(s).

Safety is paramount. Most of the vehicles have 3-4 redundant braking mechanisms in case one fails, including braking if the engine fails or loses power. Emergency stop buttons inside the vehicle and a direct telecom connection to a central command hub are also common.

Manufacturers and Self-Driving Shuttles in the process of testing and launching pilot programs.



Easy Mile
EZ10



Local Motors
Olli



Navya
Arma

Shuttle Details

Notable Features:

- » Tight enough of a turning radius (13-15 feet) to drive on existing streets
- » Operates in both directions, eliminates the need to turn around
- » Works with a mobile app for on demand calls and real time monitoring
- » Wheelchair accessible and working to offer more accessibility features and compliance with Americans with Disabilities Act (ADA) regulations
- » Redundant breaking mechanisms
- » Emergency stop button on-board
- » Direct telecom connection to central command hub for passengers

Self-Driving Shuttle Specifics



25 mph
top speed

8-16 people
maximum capacity

3-10 hours
amount of time on a
single battery charge

16'x7'x9'
typical size

Self-Driving Shuttle and Standard Bus Comparison



16 feet



40 feet

2.1 How Does the Technology Work?

Autonomous driving technology uses a combination of redundant sensor systems to ensure the precise location of the vehicle and its ability to accurately identify and negotiate objects.

Most of the sensing technology is fully integrated into the vehicle – hence its ability to operate autonomously. However, before the vehicles are deployed for public use, a high-definition, three-dimensional map is created of the corridor and stored in one of the vehicle’s computers to use as a frame of reference. This map forms the foundation from which the vehicle can detect differences in its operational domain (dog on the sidewalk, person crossing the road). It also acts as a security measure, ensuring the vehicle cannot be operated outside of its designated alignment.

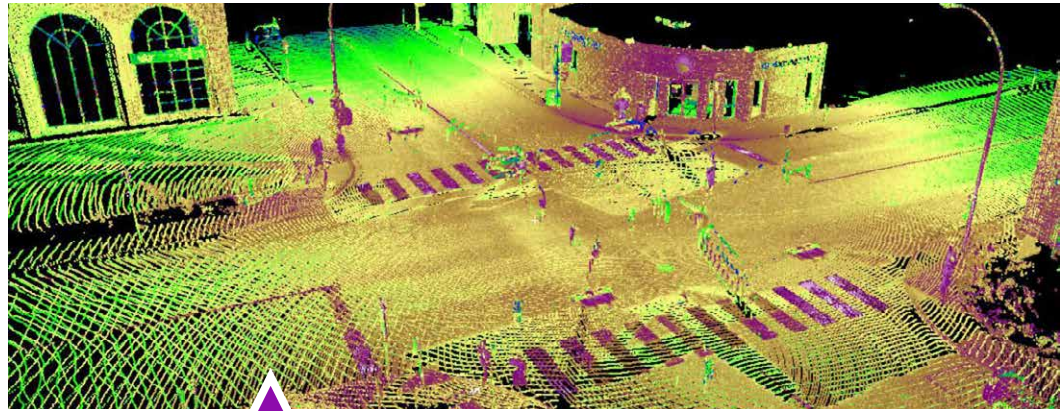
Autonomous driving technology uses a combination of redundant sensor systems to ensure the precise location of the vehicle and its ability to accurately identify and negotiate objects.

LIDAR (Light Detection and Ranging). The vehicles typically have both 360-degree and 180-degree LIDAR sensors. LIDAR continuously emits millions of laser beams (light) per second which bounce off the surrounding environment and return to the sensor. The time it takes to return to the sensor indicates the distance and type of object.

LIDAR creates a continuous picture of the vehicle’s surroundings, and identifies the vehicle’s position relative to these surroundings within an accuracy of about one inch in a range as great as 200 feet. LIDAR creates a robust, three-dimensional map of the surrounding area, enabling the vehicle to know

ahead of time when the lane curves to the left or when there is a stoplight coming up in a half-mile. LIDAR can also detect and track obstacles in motion, in addition to the static environment.

RADAR (Radio Detection and Ranging). These sensors are located in the front and back of the vehicles to help monitor traffic with a range of a few inches to 100 feet. RADAR uses radio (or electromagnetic) waves to determine the range, angle and relative velocity of objects. RADAR systems are upgrading from 24 GHz to the 77 GHz frequency band which improves both the accuracy and resolution by more than 20 times. This means that objects next to one another can now be distinguished as unique if they are 1 inch apart instead of the nearly 3 foot tolerances of the 24 GHz systems. The size of the antenna required for a 77 GHz band is one ninth the size of a 24 GHz band, increasing the space available on the vehicle for other things.



Example of 3D mapping technology creating an accurate model of the environment along a route from which the shuttle can detect differences. | Kelowna, Canada

Diagram explaining the locations of each sensor systems described below and the different factors each monitor within the shuttles surroundings.

Ultrasonic sensors. Similar to RADAR and LIDAR, these sensors use sound waves to detect objects and their location. Ultrasonic sensors are most effective at low speeds.

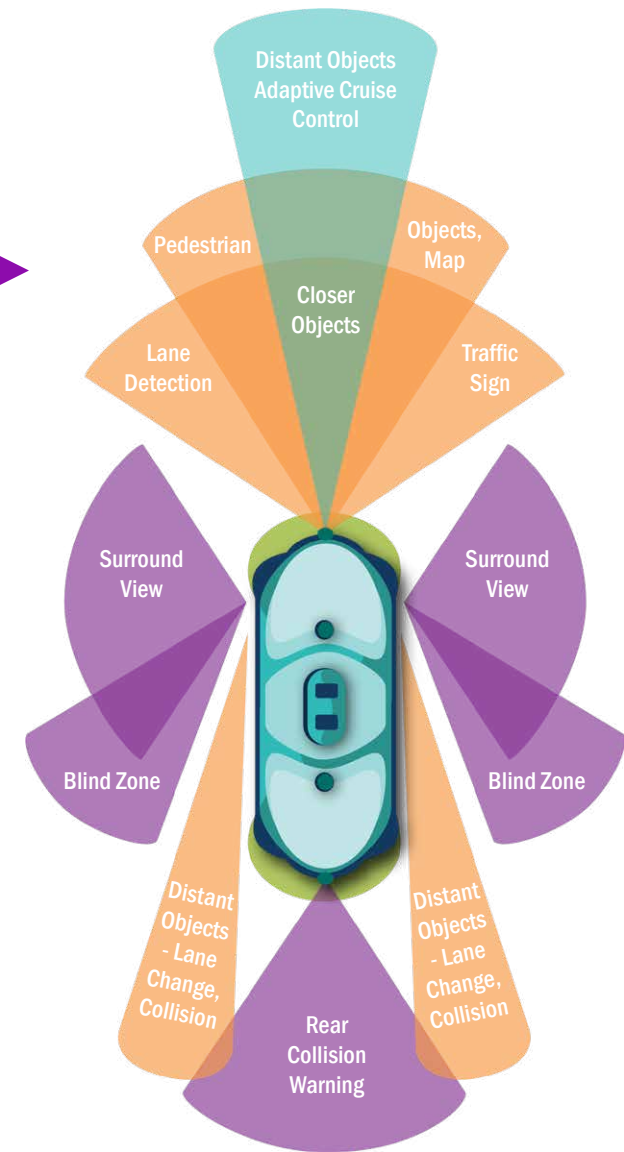
Cameras. Cameras are used to help detect traffic signals and signs since they are uniquely able to detect colors and fonts. They are another layer of technology used to ensure safe operations by providing redundancies in case of failure. Using mono and stereo cameras in combination with RADAR systems, they determine the precise evaluation of speed and distance. The cameras must have a very high dynamic range of more than 130 decibels in order to create a clear image in challenging lighting environments (direct sun). These digital cameras can create a 360-degree view of the vehicle's surroundings, not too dissimilar from the cameras used by Google to create their Street View imagery.

GNSS (Global Navigation Satellite System). Each vehicle uses a GNSS, usually Global Positioning System (GPS), to relay the vehicle's precise location to the remote supervisor and act as an input for localization processing.

Inertial Navigation System (INS). INS is comprised of a set of position sensors (accelerometer, gyroscope, magnetometer) to dead reckon the vehicle's location, speed, and direction without the use of satellite communication.

Sensor Fusion. The process in which a central computer fuses the information from all sensors using powerful processors to identify objects, and then make decisions based on that information using rules governed by a risk assessment, safety standards, and local traffic law.

Communication – DSRC, 4G/5G, LTE, WI-FI. Various radio communications technologies may be employed for different purposes, including vehicle-to-infrastructure communications, emergency communications, and navigation.



LEGEND

Long Range RADARs



Camera - Stereo, Monocular



LiDAR, SRR



Ultrasonic Sensors



CHAPTER 03

Chamblee Today

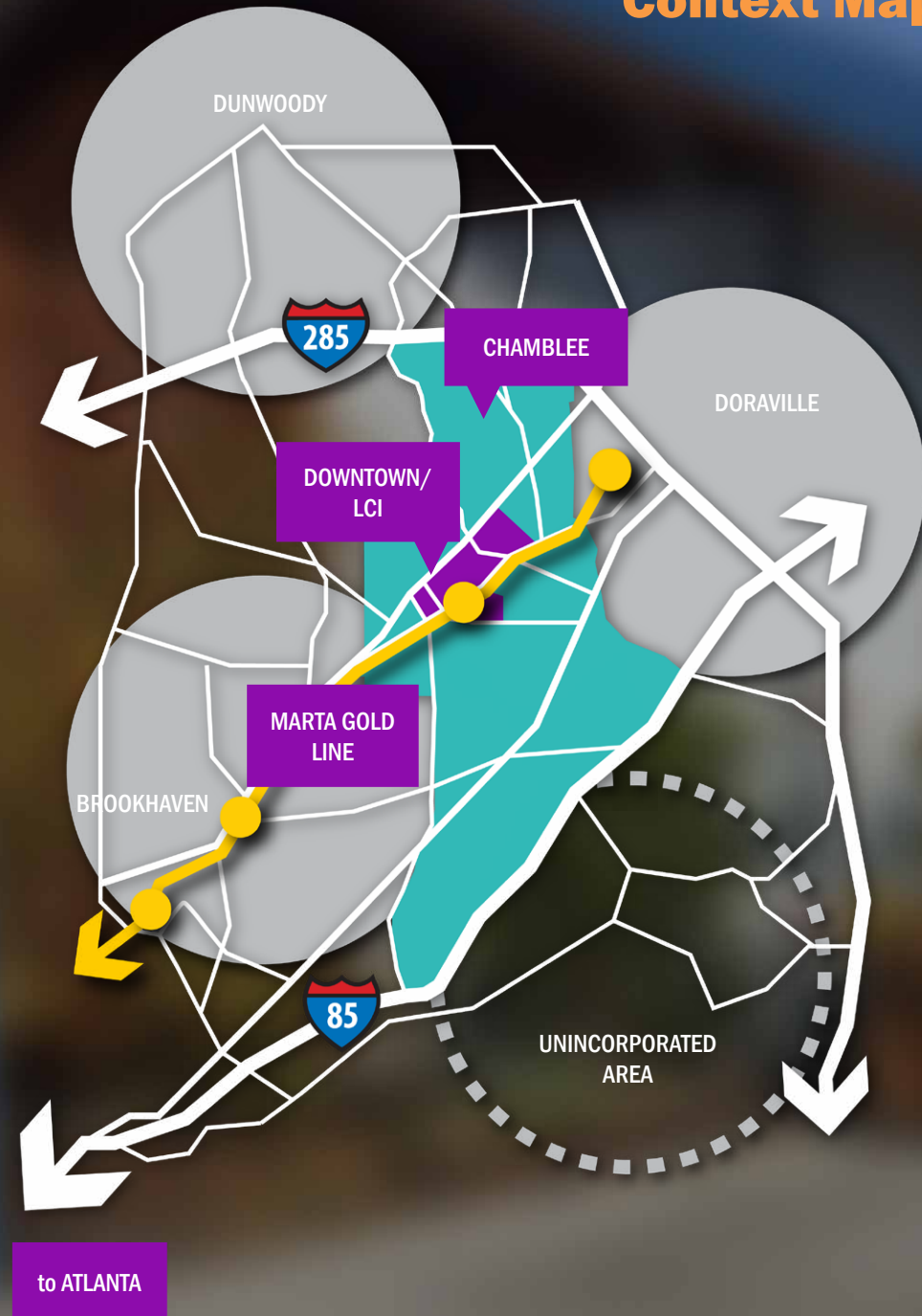
3.0 Chamblee Today

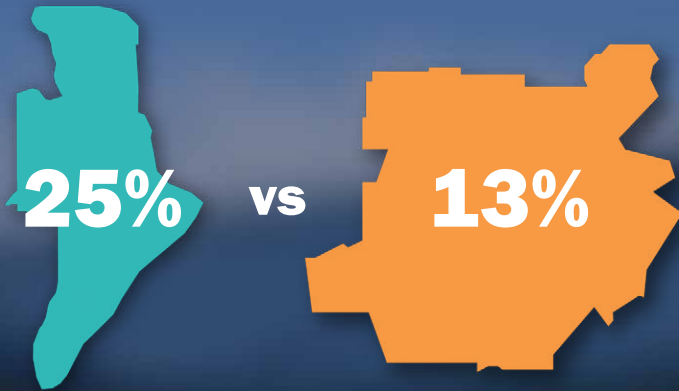
Chamblee is much more than a bedroom community—it is also an employment destination.

Chamblee is located just 14 miles from downtown Atlanta, and is surrounded by Doraville to the east, Dunwoody to the north, Brookhaven to the west, and unincorporated DeKalb County to the south. Two major interstate highways border it: I-285 and I-85. It is also bisected by the MARTA gold rail line which has a station at Chamblee Tucker Road and Peachtree Road. Located “inside the perimeter,” a term referring to its presence inside the I-285 interstate highway loop, Chamblee is much more than a bedroom community—it’s also an employment destination with more than 24,500 people working within the city limits. Chamblee, with a compact area of 7.85 square miles, has a population of 29,200 (less than one percent of the population in Metro Atlanta).

As shown on the adjacent page, the demographic composition of Chamblee is very unique in the Metro Atlanta region. Density and an increasing ratio of mixed use development is the primary feature that makes Chamblee a transit supportive city. Chamblee also has a significant population of millennials. We know that millennials prefer choice when it comes to transportation, and are more likely to use transit when it is more convenient than driving.

Context Map





Chamblee is far more densely populated than Metro Atlanta (3,720 v. 630 residents per square mile) and is slightly more densely populated than the City of Atlanta.

Demographics

Chamblee compared to Metro Atlanta

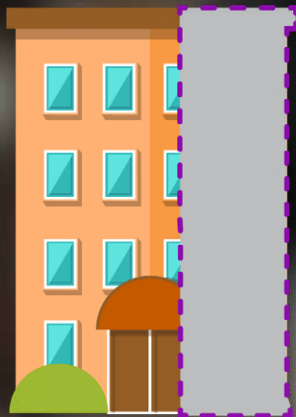
Nearly half of the population in Chamblee is single.

Only 29% of the population have children under 18 years old.



The percentage of millennials/young adults (25-34) who call Chamblee home is nearly double the metro area population of millennials.

The largest cultural group of residents in Chamblee are Spanish-speaking Hispanic (45%) compared to only 11% in Metro Atlanta.



Two-thirds of the Chamblee population, compared to one-third of the Metro Atlanta population rents.

The median home value is higher in Chamblee, but there are also fewer single family homes available (as a percent of total).

Chamblee has a similar proportion of residents with a high level of education attainment, but a noticeably higher percentage of residents with limited education attainment.



3.1 Employment

Chamblee is experiencing growth in the job market—the two largest employment bases are healthcare and social assistance.

The closing of the GM Assembly plant in 2008 coupled with the recession of the same year had a marked impact on the employment base in the region. Since 2008, Chamblee has and is continuing to experience growth in the job market. The two largest employment bases are healthcare and social assistance, and retail; however, the sector with the largest growth in jobs is management of companies and enterprises.

The four largest employers in Chamblee are the Centers for Disease Control (3,400), the Internal Revenue Service (2,600), Peachtree Dekalb Airport (762 aviation related jobs), and Wal-Mart (374). There is also a relatively strong concentration of several employers along the northern part of Peachtree Boulevard.

There are dramatic differences in commuting patterns both in and out of Chamblee. Residents who leave Chamblee typically travel to the southwest, towards downtown, midtown Atlanta and Emory University, while a surprisingly small number travels north towards Peachtree Corners, and jobs in and around Perimeter Center. Workers commuting into Chamblee come from all over the region, but primarily from the south and east.

Employment in healthcare and social assistance is growing in Chamblee. One major new project is Mercy Care, a non-profit medical clinic located on Peachtree Road.



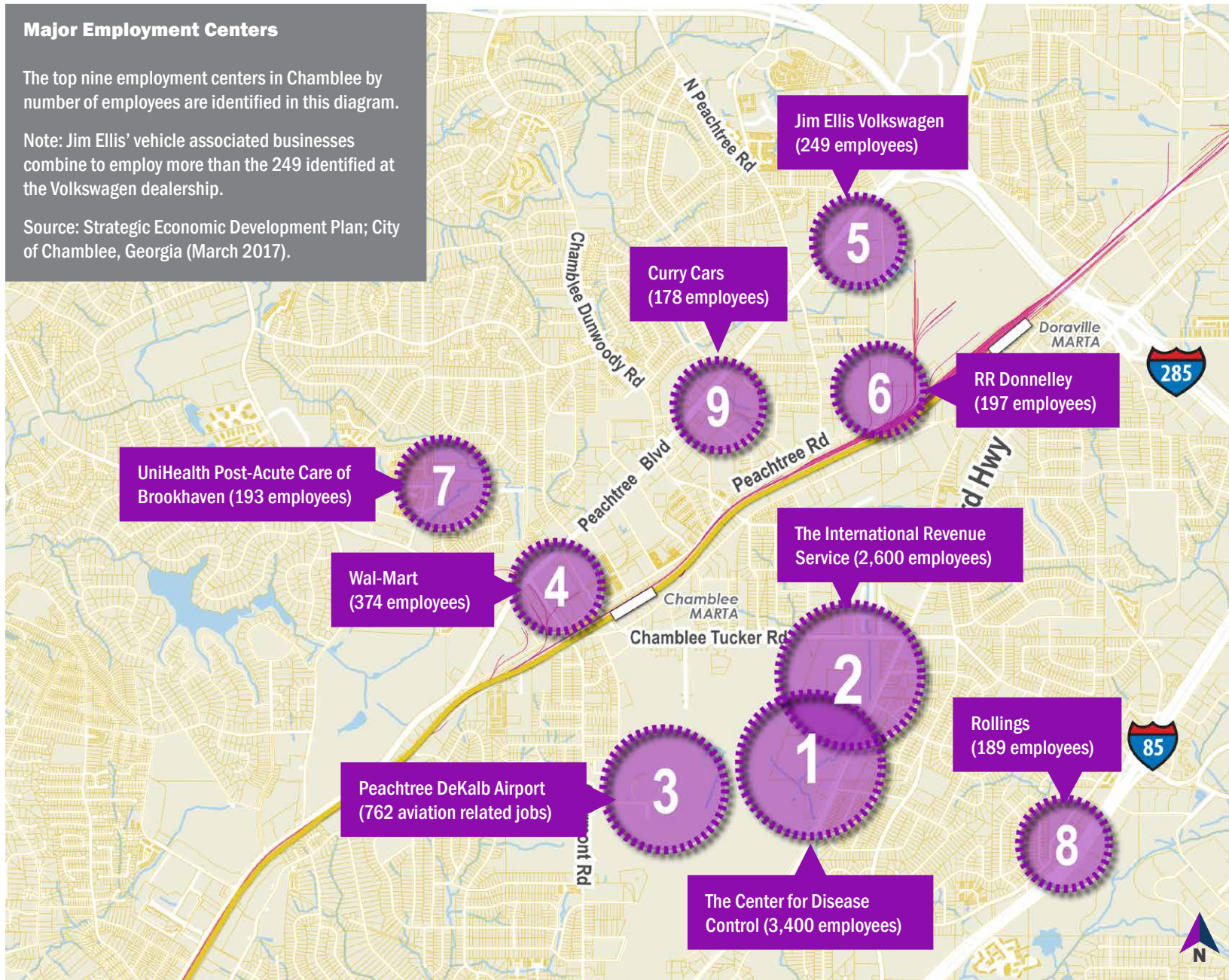
Another growing sector is retail trade. The new Whole Foods Market is an active node near the intersection of Peachtree Blvd and Peachtree Road, on the west side of Chamblee. Several restaurants, Starbucks and services including a waxing salon, dentist, pet hospital, chiropractor, and a pilates club populate Peachtree Station.

Major Employment Centers

The top nine employment centers in Chamblee by number of employees are identified in this diagram.

Note: Jim Ellis' vehicle associated businesses combine to employ more than the 249 identified at the Volkswagen dealership.

Source: Strategic Economic Development Plan; City of Chamblee, Georgia (March 2017).



3.2 Housing & Population

The greatest density of housing units is north of the rail line, including along the primary corridor of this study—Peachtree Road.

While the largest employers are south of the MARTA rail line, the greatest density of housing units is north of the rail line, including along the primary corridor of this study—Peachtree Road. Density and diversity are two key indicators of transit service potential. This indicates that trips may originate north of the rail line to the employment sectors in the south. However, the low density development in the south, combined with higher speed, wide roads makes it more challenging for transit to serve effectively and efficiently. Services that connect employees to jobs at the CDC and IRS would be limited to this single market, whereas services in the north, along a diverse and dense corridor, would facilitate multiple trip types. The former would support a peak hour commuter service, and the latter is more characteristic of a high frequency, all day, everyday service.

There is also a striking difference between the make-up of residents living north versus south of the MARTA rail line. The northern demographic tends to have higher incomes and higher levels of education attainment, while more than half of residents south of the tracks have a high school degree or less. The mobility needs and reasons for using transit are as diverse as the population. Ensuring the transit system connects workers to all employment centres including the service industry will help residents live and work in Chamblee.

Townhomes along Peachtree Road.



Corner of a mixed-use building along Peachtree Road across from the Chamblee MARTA station.

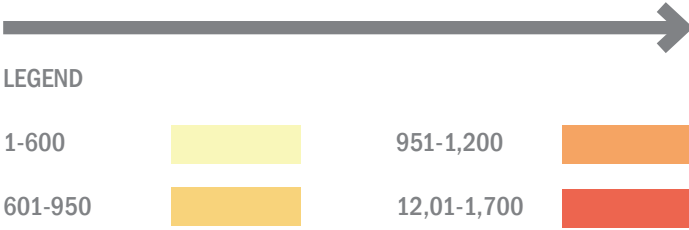


Mixed-use building by Chamblee-Dunwoody Bridge.

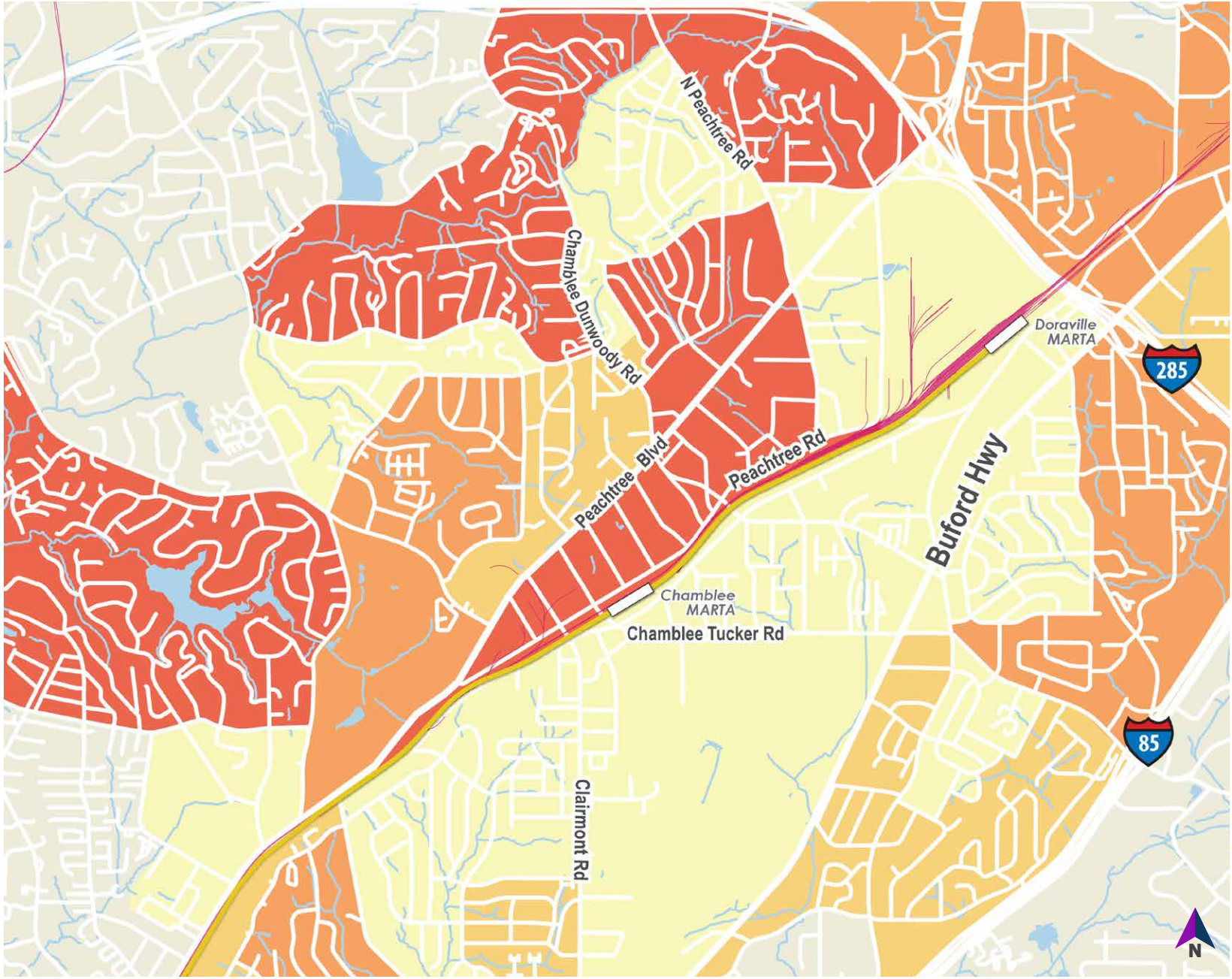


Mixed-use building with ground floor retail.

TOTAL HOUSING UNITS BY BLOCK GROUP



Data Source: ESRI Business Analyst (2017)



3.3 Transit Services

While there is a relatively strong saturation of transit services in Chamblee, there is room for more frequency to enable spontaneous travel, especially as density and diversity increases.

In the adjacent map, all MARTA routes that serve Chamblee are shown and are differentiated with line thickness to approximate frequency. The thickest lines represent routes with service every 30 minutes or better in the peak travel times.

Using a walk distance tolerance of one-quarter mile, and minimum service levels of at least 30-minute frequency in the peak, there are clear gaps in service:

- » No service connecting Chamblee MARTA station with Peachtree Station (Whole Foods and associated retail).
- » No service on Peachtree Road between N. Peachtree Road and Peachtree Boulevard, where Third Rail Studios and the Assembly development are located.
- » South of the train tracks, there is no service along New Peachtree Road between Chamblee Dunwoody Road and the Doraville MARTA station.

While there is a relatively strong saturation of transit services in Chamblee, there is room for more frequency to enable spontaneous travel, especially as dense and diverse development increases. Excluding

Route 39 - Buford Highway, all existing MARTA bus routes offer 30-45 minute headways in the peak period. This is not a service level which typically appeals to choice riders because it doesn't enable sufficient convenience. Customers using these routes must consult a schedule and time their trip to the bus schedule, instead of being able to travel spontaneously with minimal wait times (as is possible with 10 minute or better headways). Route 132, which operates along the majority of Peachtree Road, Chamblee's main street, offers 30-minute service during the peak, and 50 minute service in the off peak, including midday. It connects Chamblee MARTA station north along Tilly Mill Road to the Mt Vernon and Orchard Park shopping centers. As will be discovered in subsequent sections, all route options duplicate a portion of Route 132, however with proper integration and coordination with MARTA, the new SAV service will compliment Route 132 and enable an extremely attractive service. In some cases, the proposed route alternatives extend the reach of MARTA to new destinations.

This new technology has the potential to help transit re-brand its self, and attract "suits in seats"—or the demographic who does not rely on transit for transportation, but instead chooses to use transit.

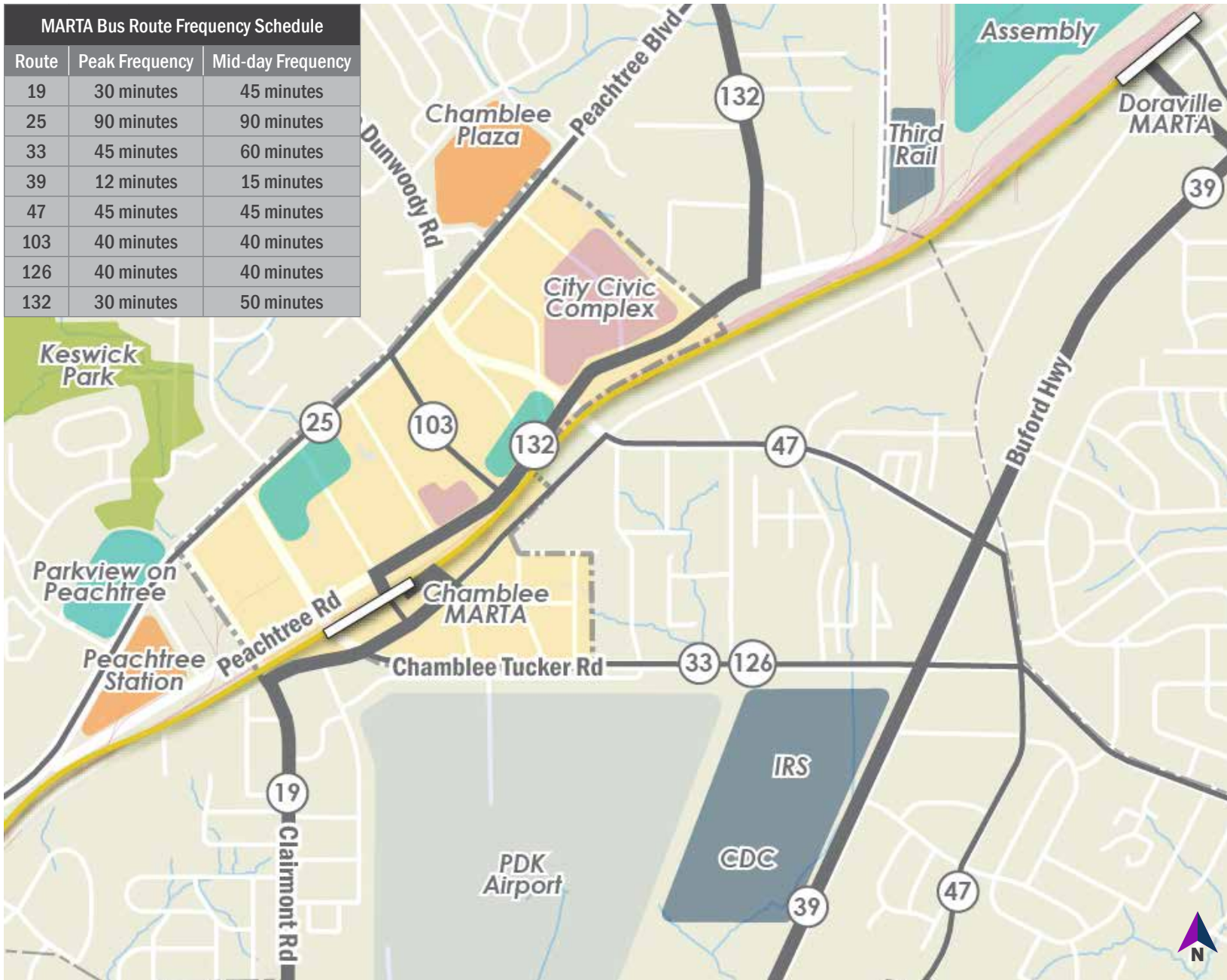
MARTA Bus Routes



LEGEND

Routes with service every 40 minutes or worse during peak travel times		Routes with service every 30 minutes or better during peak travel times	
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See Page 4 for background map legend. Data Source: www.itsmarta.com



3.4 The Changing Landscape

Chamblee is actively working to improve the community on multiple fronts including improving the pedestrian realm, increasing multi-use pathways, attracting mixed-use developments that include a diverse array of housing types, and encouraging new business investment.

The City of Chamblee has taken a proactive, intentional approach to revitalization, beginning in 2001, when Chamblee completed one of the Atlanta region's first Livable Centers Initiative (LCI) Plans, which was subsequently updated in 2007, 2012 and 2014. This initiative, funded by the Atlanta Regional Commission (ARC), is designed to incentivize local communities to create vibrant, walkable communities which foster healthy lifestyles. The 2014 10-Year Update was particularly important because it increased the scope of the LCI area from properties directly adjacent to the MARTA station, to the much broader, 180-acre area which extends just northeast of Broad Street. The LCI boundary area forms the primary focus of this feasibility study with particular attention being paid to the Peachtree Road corridor, where the service can directly connect to the MARTA station in addition to a number of businesses and redevelopment efforts.

Recent development has brought increased residential population and business activity to downtown Chamblee, starting the transformation of the historic railroad-oriented industrial core into a higher-density mixed-use center with employment, entertainment, and housing. This has led to an increased demand for travel to downtown locations, many of which operate in older buildings and sites without the suburban convenience of robust, available parking. For this reason, downtown Chamblee has sought creative strategies to manage parking more broadly and provide parking availability to support the needs of its downtown business district and encourage travel by other modes. Newer development, on the other

hand, has been planned and designed with these parking expectations in mind and has provided a much greater volume than what is currently available downtown.

In 2015, the Chamblee Downtown Renaissance Plan was created through a partnership with a University of Georgia landscape architecture student. The plan focuses on design concepts for the streetscape, public art and gateway concepts along the Peachtree Road corridor. Many of the ideas in this plan have already been implemented, including new signage, public art and the creation of the Peachtree Road Streetscape and Rail Trail Plan and implementation (2017).

The City recently adopted a Strategic Economic Development Plan (April 2017) which identifies a clear pathway to expand the economic base to improve the quality of life of the residents. Specifically, the plan identifies the need for a marketing and outreach campaign to raise awareness and proclaim the benefits of locating in Chamblee. It also encourages the development of additional office space in mixed-use developments and as infill along streets adjacent to Peachtree Road—helping to densify the town center.

Previous Plans



Covers of previous plans for Chamblee including: The Strategic Economic Development Plan (2017), City of Chamblee Comprehensive Plan (2015-2016), Peachtree Road Streetscape and Rail Trail Concept Plan (2017), and The Chamblee Downtown Renaissance Plan (2015).

CHAPTER 04

Stakeholder Involvement

4.0 Stakeholder Involvement

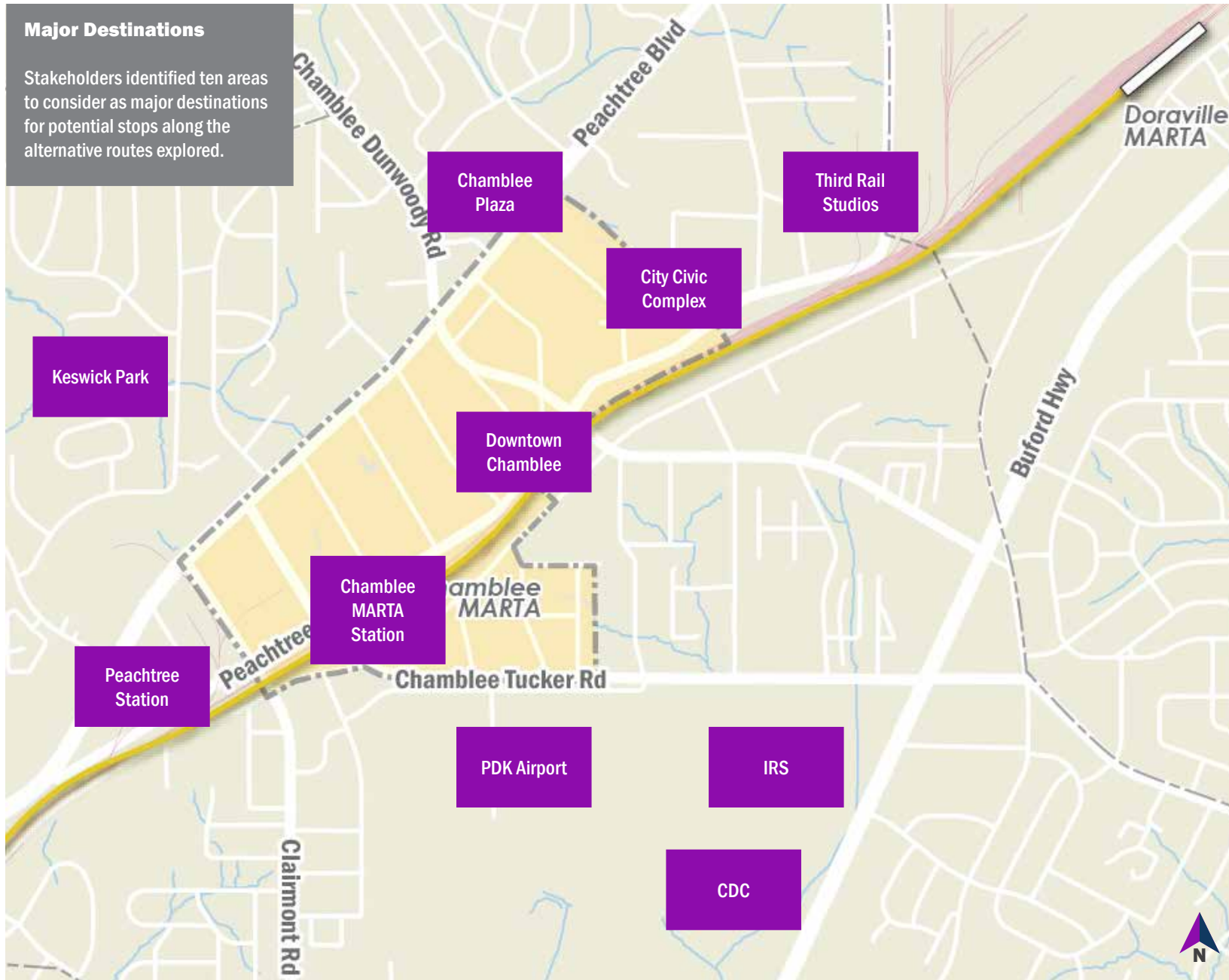
The general consensus about the prospect of autonomous shuttles operating in Chamblee was very positive, and even a “cool idea”.

A series of stakeholder workshops were held to engage various community groups and organizations including Metro Atlanta Regional Transit Authority (MARTA), Atlanta Regional Commission (ARC), the Chamblee Mayor and councilmembers, local businesses, developers, residents and city staff. Over the three-day period each focus group deliberated over mobility challenges, business development ideas/ concerns, parking/infrastructure, vehicle routing, key destinations and more. Each group identified key destinations, development opportunities, and mobility challenges. The general consensus about the prospect of autonomous shuttles operating in Chamblee was very positive, and even a “cool idea”.

Stakeholders understand automated transportation is the future and believe that even a small pilot project could have immediate benefits for Chamblee in terms of economic development, first/last mile connectivity, and reduced parking demand. There were common topics of concern as well, including general system usefulness and reliability, funding mechanisms, and the logistics of turning the vehicle around. Pilot projects are designed to address these concerns by allowing stakeholders to experiment with a temporary implementation while working towards a more long-term plan.



Stakeholder meetings at the City Hall Annex in November 2017.



The key themes from the stakeholder interviews are summarized below:

MARTA and ARC primarily had operational and logistical concerns over an SAV pilot operation, including funding, labor, fare collection, and multi-modal integration. They identified that the FTA will require involvement if the vehicle enters MARTA train station property. They voiced the need to plan for adequate curb space in the age of shared resources—including bus stops for this shuttle and existing MARTA bus routes. Particularly interesting is the fact that only MARTA staff mentioned the existing MARTA bus services. This may reflect the common stigmatization of public buses and the lack of adoption by choice riders. The enthusiasm generated by self-driving shuttles may be an opportunity for transit to re-brand itself. MARTA and ARC representatives also pointed out that the CDC and IRS are always looking for ways to increase non-driving commuting levels.

Elected officials shared their positive views of an SAV pilot project. They both think it will be great for business development and would blend nicely into the downtown core based on the walkable landscape. There was consensus that headways between 5 and 15 minutes would be ideal and providing riders with real-time pick-up/drop-off times is important. Destinations cited as being important include Peachtree Station (Whole Foods), the MARTA station, a future Assembly CID connection, and in even more distant future connecting to PDK airport, the CDC and the IRS was important. There is a need to define the value proposition for successful adoption, especially for first/last mile connectivity.

Another strong theme was parking. Elected officials want to know how SAVs could affect parking demand, and that the creation of a parking management district is under consideration—parking has and will continue to be a challenge for the downtown area. They believe a pilot project will be instrumental in helping the Atlanta region understand the technology and become familiar with seeing and using automated vehicles.

Representatives from the **Chamblee business community** thought the idea of an SAV pilot project brought a “cool factor” on which Chamblee could capitalize. They view the project as exciting and a great marketing opportunity. They are hopeful it could help knit the otherwise spread-out LCI study area together, while easing parking demand by possibly making remote supply available. To accomplish these goals and have a successful pilot, the service must directly connect with the MARTA station. Frequency and fares were also important for success – short headways are a must and low fares would be ideal. There were notions on the service slowing traffic along Peachtree Road and in pedestrian environments—would it abate speeding or aggravate drivers?

Local developers, including _____, viewed an SAV deployment positively, citing the high cost of building parking and minimum parking requirements as problems. Creating efficiency in parking by allowing multiple institutions to share spaces has been a successful strategy and they feel SAVs can make it even more appealing by connecting underutilized spaces with key destinations. They were concerned an SAV deployment could be a hard sell to riders if it doesn’t predictably and reliably provide access to jobs.

Residents along Peachtree Rd also viewed an SAV pilot project favorably. They saw the greatest opportunity in serving new apartments and retail along Peachtree Road, from Peachtree Station at Peachtree Boulevard to Broad Street. Along the route there are several more developments that could benefit from an SAV service including Mercy Care and Dryads Dancing. Serving the new mixed-use development, Parkview on Peachtree, and the baseball fields in Keswick Park would also be useful but logistically more complicated due to high-speed intersections. They were concerned about pedestrian safety at several intersections including that of Peachtree Road and Chamblee-Tucker Road.

4.1 Mid-City Stroll

The Mid-City Stroll was held on September 7th, 2017 with a station about self-driving shuttles at Bluetop restaurant

The Mid-City Stroll succeeded greatly in getting the public out along Peachtree Road and involved in the streetscape improvement planning process. Along the stroll route, a station was set-up for engaging the community’s level of understanding and comfort with self-driving shuttles. There were two informational boards that generally explained the difference between autonomous vehicles and shared autonomous vehicles, as well as where SAVs can be used, their benefits, existing manufacturer details, and a theoretical day-in-the-life of a future SAV user.

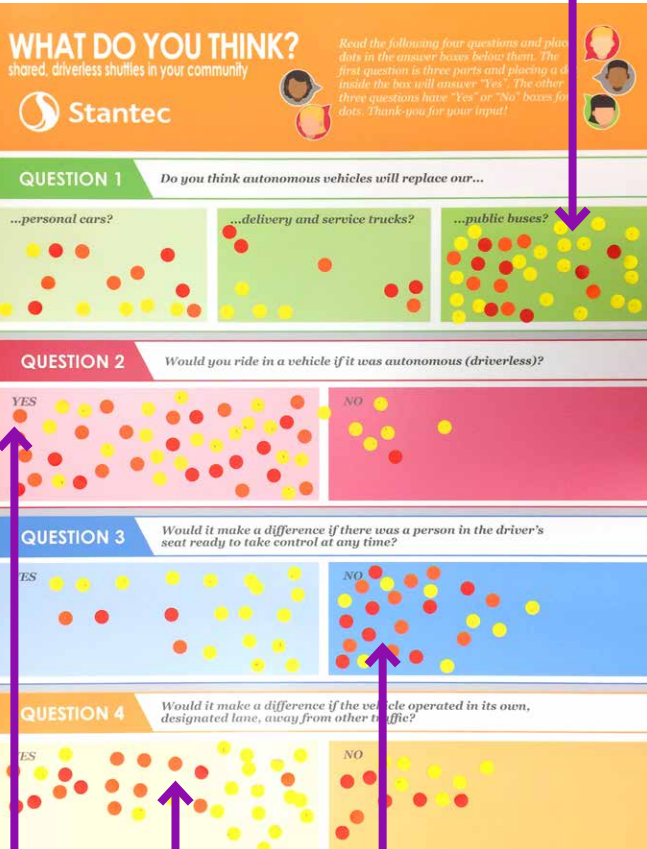
The last board included the following questions, in which participants could cast their votes with multi-colored dots:

- » Do you think autonomous vehicles will replace our...personal cars?...delivery and service trucks?... public buses?
- » Would you ride in a vehicle if it is autonomous (driverless)?
- » Would it make a difference if there was a person in the driver’s seat ready to take control at any time?
- » Would it make a difference if the vehicle operated in its own, designated lane, away from other traffic?

Mid-City Stroll participants cast their votes on four questions.



The majority of voters think autonomous vehicles will replace public buses before they replace personal cars or service delivery trucks.



Nearly 87% of voters **WOULD** ride in an autonomous vehicle.

71% of voters would rather have the shared vehicle operate in its own designated lane.

Voters were **split** on if having a person on-board the vehicle, ready to take control, would make them feel more safe.

4.2 Online Survey

Over 100 people participated in the on-line survey in November and December 2017.

An on-line, public survey was conducted to obtain a glimpse into Chamblee residents' general opinions of autonomous technology and to better understand their travel patterns.

Key themes from the survey include:

- » Most respondents have heard of autonomous vehicles, but fewer have heard of self-driving shuttles.
- » More than 80% of respondents have a positive opinion of self-driving vehicles, citing that the vehicles will have lower emissions and reduce the incidents of crashes.
- » The top three destinations in Chamblee are: Peachtree Station (Whole Foods, Starbucks, other retail); Peachtree Road (downtown Chamblee); and the MARTA station.
- » Most people drive as their primary mode of transport, and take MARTA once every few weeks or once every few months to travel to Hartsfield Jackson Airport or to a special event.
- » Most respondents live beyond a 10-minute walk of the Chamblee MARTA station.

Online Survey Results

Demographics of Respondents



How old are you?

35-44 years old
32% of participants



How many live in your household?

2 people
50% of participants



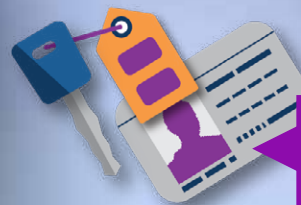
What is your annual household income?

\$150,000+
37% of participants



Do you own or rent your home?

Own
88% of participants



How many licensed drivers in your household?

2 drivers
73% of participants



How many cars for the household?

2 cars
61% of participants



Most common zip code for home and work were the same | 78% home; 33% work

Transportation Habits

10 minute walk

Peachtree Station

Chamblee MARTA station

Downtown Chamblee

70%

of participants live in Chamblee, but beyond a 10-minute walk from the MARTA station.

top 3

Chamblee destinations.



91%
drive alone

How do you normally travel?



42%
use MARTA less than once a month

How often do you use MARTA transit?



32%
at least once a month

How often do you use shared vehicle services? (Uber, Lyft, etc.)

77% use MARTA to travel to/from Hartsfield Jackson Airport.

58% drive and park to get to the stations or bus stops.

Only 34% have tried the carpooling options (UberPool, Lyft Line etc.)

Self-Driving Shuttles



87%

of participants had heard of autonomous vehicles before the survey

54%

of participants had heard of self-driving shuttles before the survey.

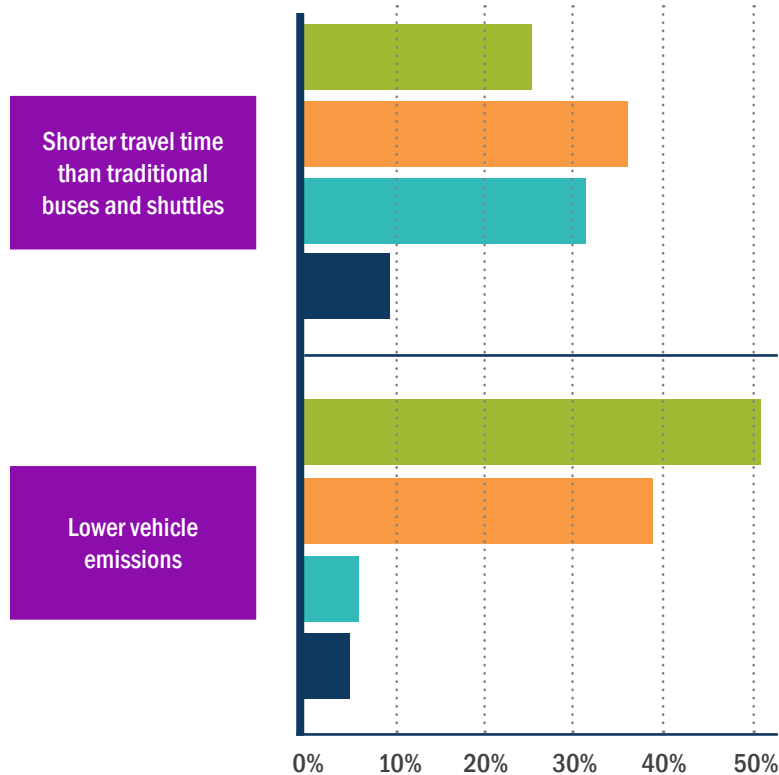
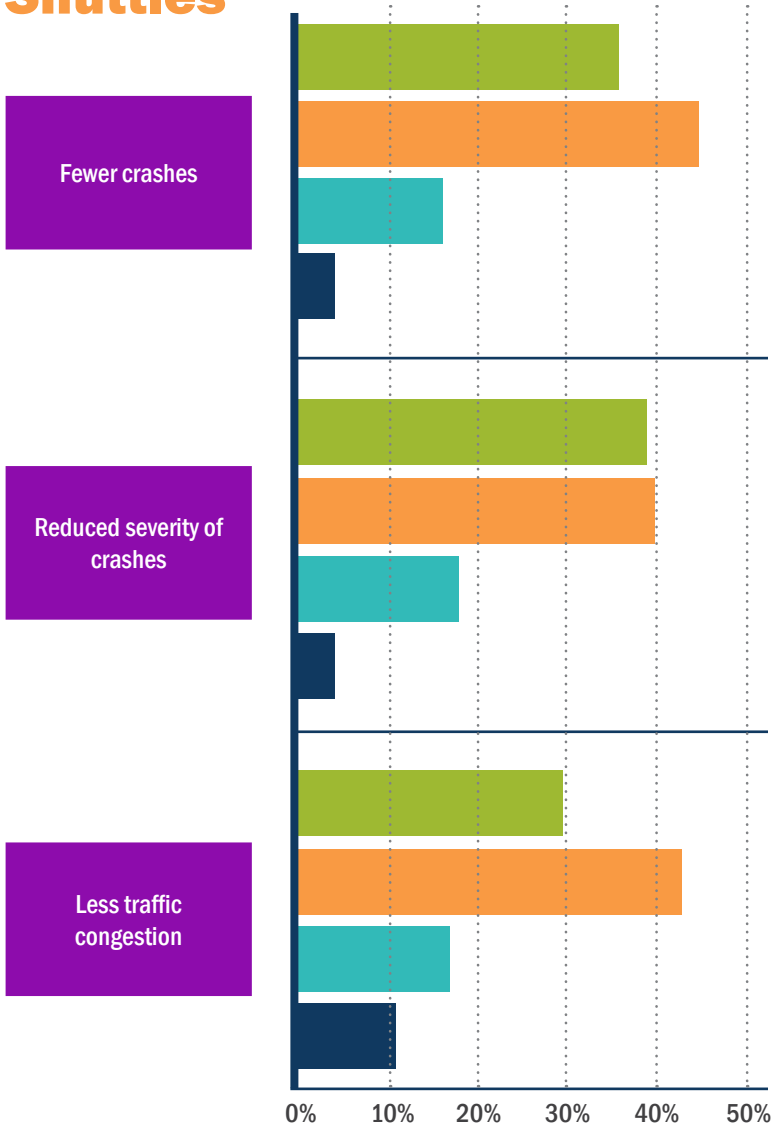


83%

of participants have a somewhat to very positive general opinion of self-driving shuttles.

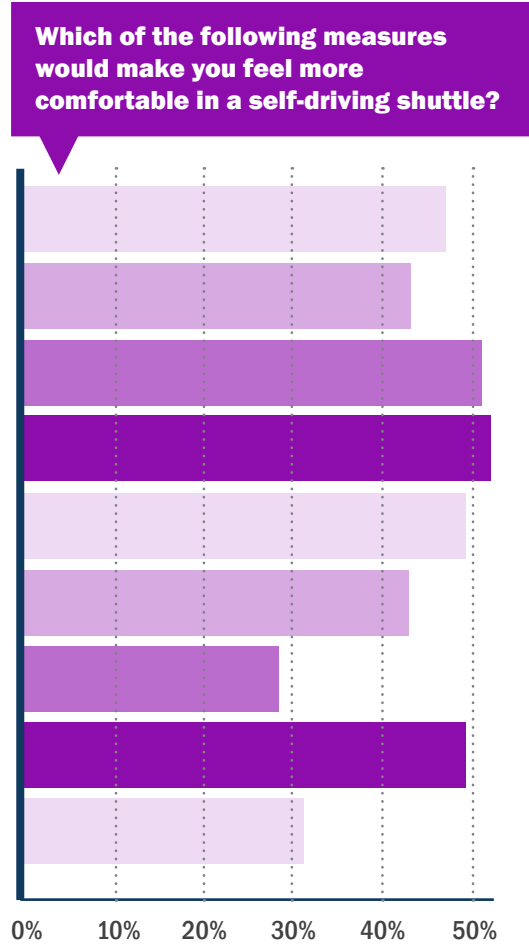
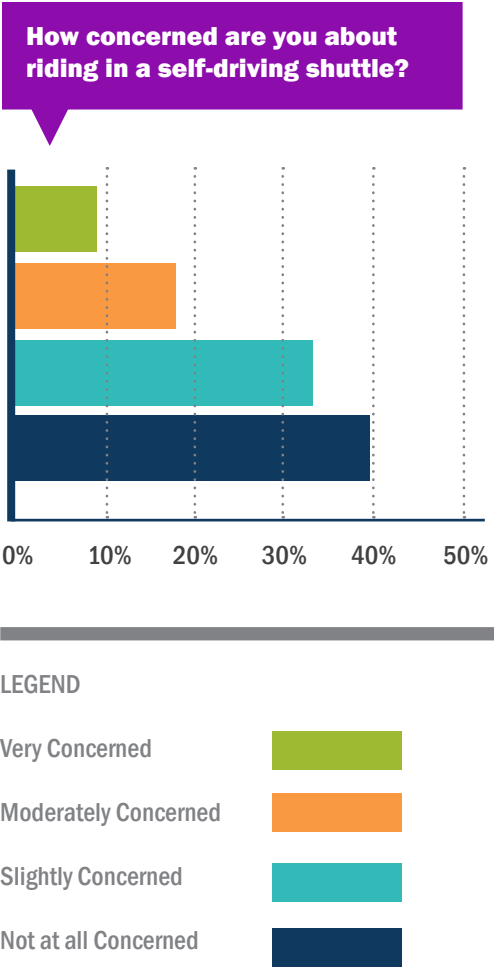
Self-Driving Shuttles

What do you think the benefits will be from self-driving shuttles and buses?



LEGEND

- Very Likely
- Somewhat Unlikely
- Somewhat Likely
- Very Unlikely



- ← Proven safer than driving your own vehicle or riding a standard bus.
- ← Impossible to hack or could enter a safety mode if hacked/computer malfunctions.
- ← A human present to monitor the vehicle regularly, maintain order, answer questions, etc.
- ← Faster and more convenient than current public transportation options.
- ← More affordable than current transportation options, including driving private vehicle.
- ← The self-driving shuttle travels in its own, designated lane, separate from other traffic.
- ← There is a person in the driver's seat ready to take control at any time.
- ← There are 'live' communications between the shuttle and control center with cameras for safety.
- ← I am already comfortable with riding in a self-driving shuttle.

General concerns include:

- » Integration issues with human driven vehicles.
- » Safety concerns with other riders and no driver responsible for intervening.
- » Too early to know of flaws in the technology and worries about the vehicle's computer getting hacked or malfunctioning.
- » Possibly less convenient than driving yourself.
- » Job loss for drivers.
- » Increasing congestion if not operating in its own dedicated lane.
- » Logistics of paying.

CHAPTER 05

SAV Route Alternatives

5.0 SAV Route Alternatives

Route alternatives were crafted by combining stakeholder and public input with transit design best practices and knowledge of self-driving technology limitations and capabilities.

Route alternatives were designed by combining stakeholder and public input, existing and future land use conditions, socioeconomic data, MARTA maps and performance information, and travel demand data. The alternatives were created using transit design best practices with knowledge of the vehicle's current technological limitations and capabilities. A light-touch approach is desired for a pilot project so it is both easy to implement and terminate; therefore, options requiring significant capital investment, such as a dedicated corridor, are not considered. The posted speed of each road is the primary constraint to ensure safe operations (i.e., traffic flowing at 45-mph approaching an 18-mph vehicle is a dangerous prospect). Posted speeds of 30mph or less were considered, knowing that 25mph will be recommended during operation of the pilot project.

Anticipating a successful pilot, the ability for the route to extend, or for another route to be added, is taken into consideration. The route profiles are identified based on the key destination they serve and are evaluated using a table of measurable criteria.

The 7 route alternatives are identified by the destination they serve, including

- » **City Civic Complex**
- » **PDK Airport**
- » **Peachtree Station**
- » **Chamblee Plaza**
- » **Keswick Park**
- » **Third Rail**
- » **CDC/IRS**

In addition to the destinations and route characteristics, each of these summary profiles discusses how SAV service could address Chamblee's known challenges with parking in its historic downtown district. Balancing availability and demand often determines this, but in nearly all cases the available parking that may contribute to the broader downtown supply when connected by SAV service is not in the City of Chamblee's control. In other words, it is privately owned and/or managed. Each route profile outlines potential parking opportunities but also notes where the City may need to take on additional coordination with property owners or managers to make parking more readily available during peak periods.

A comparative analysis of each route follows the individual descriptions to enable a side-by-side evaluation. Deciding which destinations to serve first should be framed in the context of phasing opportunities, not necessarily choosing one over the other. What makes sense to try first in regards to redevelopment, technology advancement, and affordability?

Imagery from Main Destinations for Each Route Alternative

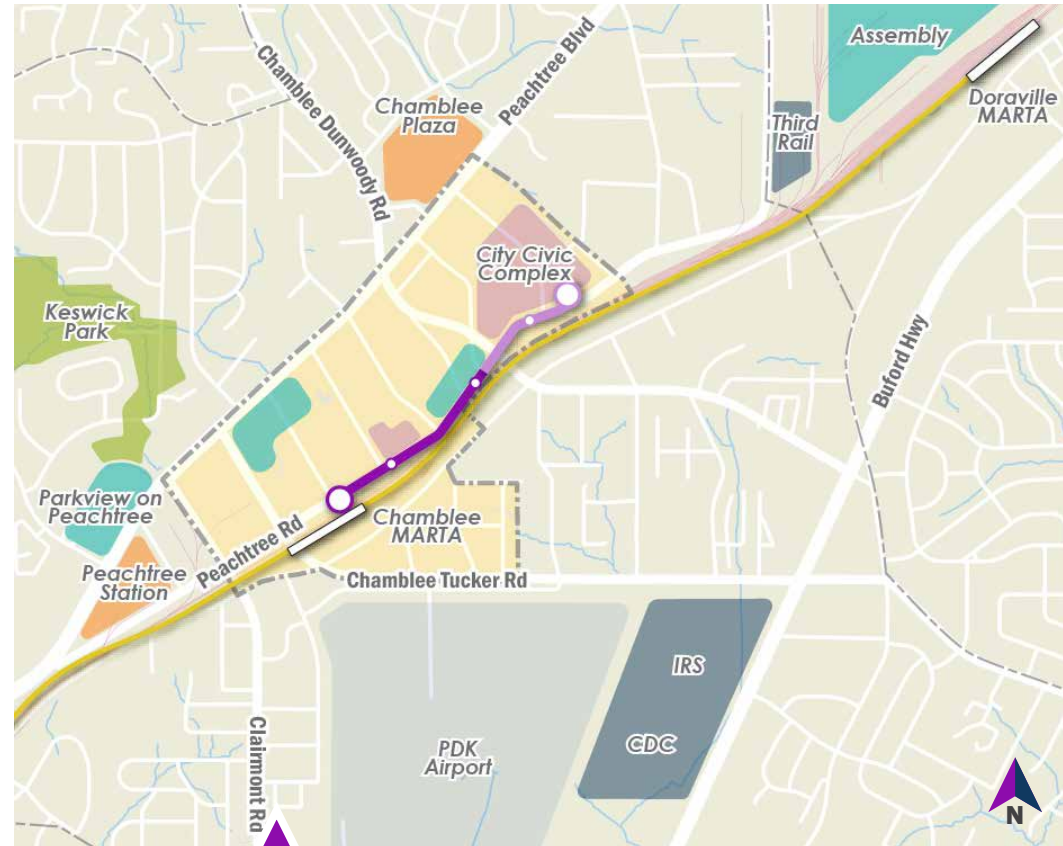
1 City Civic Complex with City Hall and the Chamblee Police Department / **2** At the PDK Airport with possible turn around space for this route / **3** Peachtree Station with Whole Foods and Starbucks / **4** Rendering of proposed renovations to Chamblee Plaza on Peachtree Blvd, which includes pedestrian improvements within and around the shopping center / **5** The Rail Trail extending towards Keswick Park, which could serve as the operational route for the SAV instead of busy Peachtree Blvd / **6** Bird's eye of Third Rail Studios / **7** The International Revenue Services Customer Service Building



5.1 City Civic Complex Route

The Civic Complex route connects the Chamblee MARTA station to the City Civic Complex at Broad Street, operating along Peachtree Road.

The Civic Complex route is the shortest option considered, connecting the Chamblee MARTA station to the City Civic Complex at Broad Street, operating along Peachtree Road in mixed traffic. It also forms the foundation for all other routes considered since it operates within the primary focus area of revitalization in Chamblee. It is only $\frac{3}{4}$ mile without turning movements. One of the challenges with operating low speed vehicles on a short route is that, depending on the frequency, many people could walk to their destination faster than by using the low speed shuttle. It takes the average person 15 minutes to walk $\frac{3}{4}$ mile. If the shuttle operates every 10 minutes, and the person just misses the shuttle, they can walk to their destination in the same amount of time. The shuttle could turn around at the MARTA station with FTA and MARTA coordination and approval. At the other terminus the shuttle may make a loop on existing streets or potentially make a full turn within the City Civic Complex. This route is already operated by MARTA route 132 every 30 minutes in the peak period, and every 50 minutes mid-day and in the evenings. This new local service should either be on demand, or coordinated with route 132's schedule so the services are complimentary instead of duplicative.



The City Civic Complex route including the core route (from the Chamblee MARTA station to Downtown Chamblee) extending north to reach City Hall, Chamblee Police Department, and more (see page 4 for background map legend).

Route Quick Facts

Population and Employment. The Civic Complex route serves the fewest number of residents and the fewest number of employees. The residents tend to be more educated, there are fewer people per household, and their median income is quite high.

Parking. This route provides connections to some remote parking locations but does not take advantage of the larger study area’s potential supply of parking. Critically, it would also not give riders in this area a non-driving connection to other destinations that currently experience high parking volumes at certain times of the day or week. However, it does provide a direct connection from MARTA to the burgeoning shopping and entertainment area encouraging patrons from around the region to take MARTA to downtown Chamblee instead of driving.

1.25 MILES



Route distance



8-10 MINUTES

Travel time (est)



Headway that can be achieved with two vehicles

7.5 MINUTES

1,624 PEOPLE

Population within 1/4 mile radius



1st

Ranking

3,592 PEOPLE

Employees within 1/4 mile radius



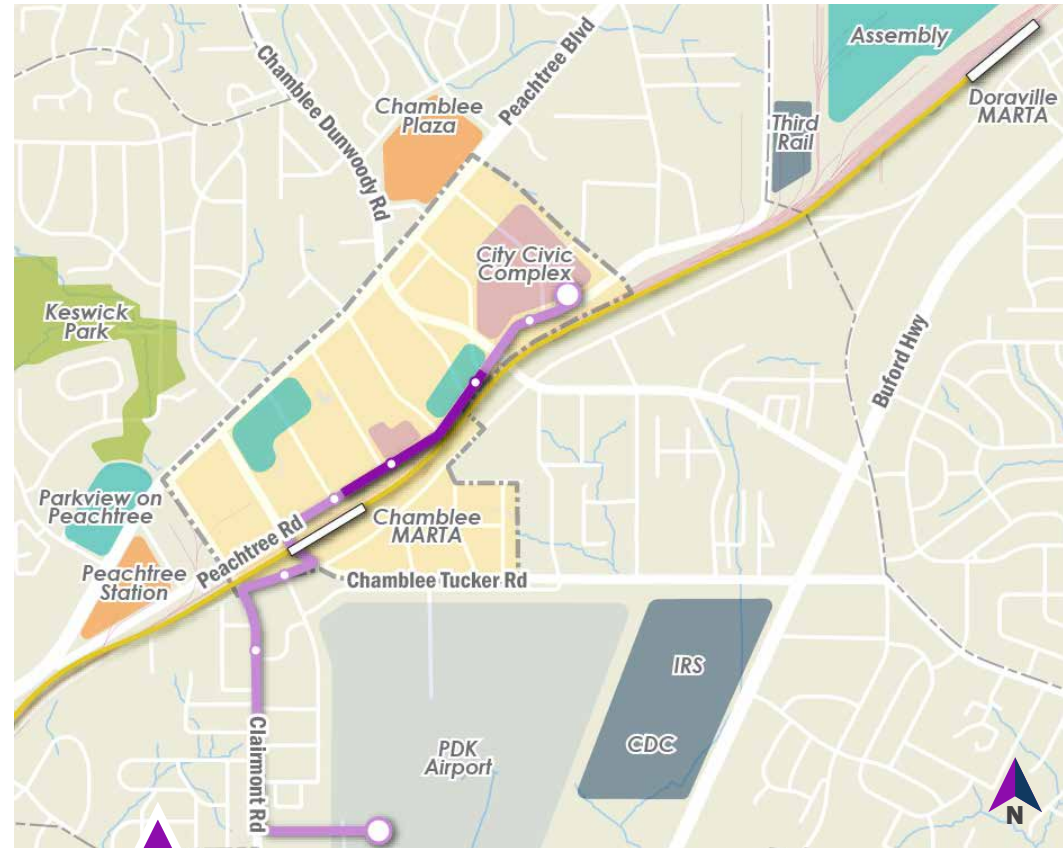
1st

Ranking

5.2 PDK Airport Route

This route provides unique economic development opportunities by making it easier for visitors from the airport to have direct service to businesses along Chamblee's Main Street as well as to MARTA.

This route extends service south of the MARTA rail line, connecting to the Peachtree Dekalb airport—Georgia's second busiest airport. It provides complimentary service to two MARTA bus routes (132 and 19), both of which provide 30-minute peak service. An agreement with the airport may be required to provide service directly to the main terminal. This route provides unique economic development opportunities by making it easier for visitors from the airport to have direct service to businesses along Chamblee's Main Street as well as to MARTA. In the future, when the shuttles are able to operate at posted speed limits, it will enhance the transit connection for employees of PDK airport and related industries. The posted speed limit along Clairmont is 45 mph, which is too high for these low speed shuttles to safely operate in mixed traffic requiring either a dedicated pathway or extensive signage (or both).



The PDK Airport route extends the core route north to reach the City Civic Complex and south, along Clairmont Road, to the airport (see page 4 for background map legend).

Route Quick Facts

Population and Employment. This route has the lowest population density of all options, and below average employment densities. Residents along this route tend to be older, wealthier and have fewer persons living in each residence. They tend to be highly educated with 62% having a post-graduate degree.

Parking. This alignment does not serve a large supply of underutilized parking today, and individual parking facilities along the route are reserved for current uses that their owners/operators are likely to protect.



Route distance



Travel time (est)



Headway that can be achieved with two vehicles

15 MINUTES

2,034 PEOPLE

Population within 1/4 mile radius



Ranking

4,222 PEOPLE

Employees within 1/4 mile radius

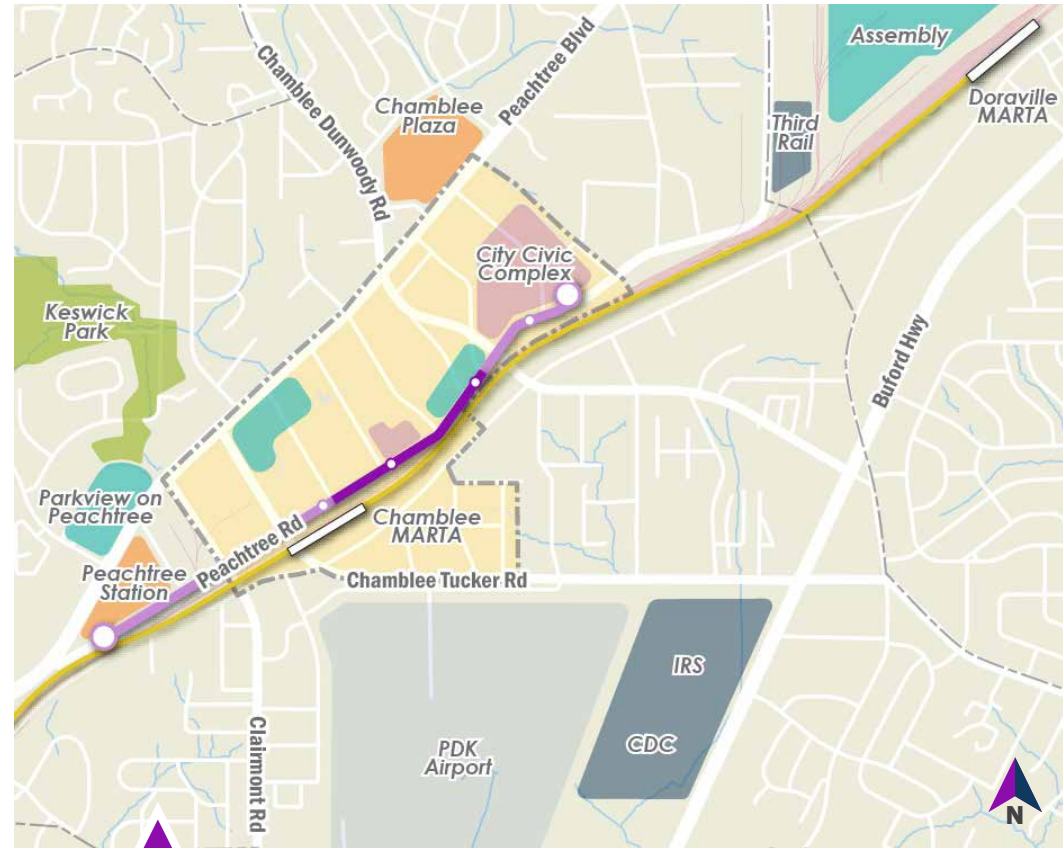


Ranking

5.3 Peachtree Station Route

This option extends the route to the southwest to Peachtree Station—the retail cluster which includes Whole Foods.

Whereas the prior option extends the core route south of the tracks, this option extends the route to the southwest to Peachtree Station—the retail cluster which includes Whole Foods. This route also provides a future direct connection to the rail trail at McGaw Drive. The extension southwest of the MARTA station along Peachtree Road is not served by existing MARTA bus routes, extending the reach of transit. Special attention must be paid to turning the vehicle around at Peachtree Station, given the higher speed on Peachtree Boulevard, and the busy, private parking lot in the shopping center. This also means that pick-up and drop-off points south of the MARTA station will need to be reviewed and confirmed. This new local service should either be on demand, or coordinated with route 132's schedule so the services are complimentary instead of duplicative.



The Peachtree Station route extends the core route north to reach the City Civic Complex and continuing south along Peachtree Road to Whole Foods, Starbucks, and more (see page 4 for background map legend).

Route Quick Facts

Population and Employment. The residential density along the corridor and the actual number of residents is low compared to the other options, however this is, at present, the growth corridor in the greater downtown area for both apartments and commercial activity. Residents along this route tend to be older, wealthier and have smaller household sizes. This could be indicative of empty nesters downsizing, which will be a key transit market as they continue to age. There are a considerable number of jobs along the corridor, having one of the higher job densities compared to the other routes. This route also directly serves Mercy Care and a senior’s center.

Parking. This alternative does not connect to parking locations that are less utilized—the City Civic Complex on the east end features a series of small parking facilities collectively supporting both employees and visitors of the City offices, and Peachtree Station on the west end is a popular retail center with regularly high levels of parking use. However, it does allow this broader corridor to function as a park-once district, which may bring more customers and visitors to these locations without needing to park at each trip-end. The City has an opportunity with this alignment (and others like it that terminate at the Civic Complex) to manage its own spaces and make these available outside of City business hours, particularly on evenings and weekends.



Route distance



Travel time (est)



Headway that can be achieved with two vehicles

12 MINUTES

2,050 PEOPLE

Population within 1/4 mile radius



Ranking

4,399 PEOPLE

Employees within 1/4 mile radius

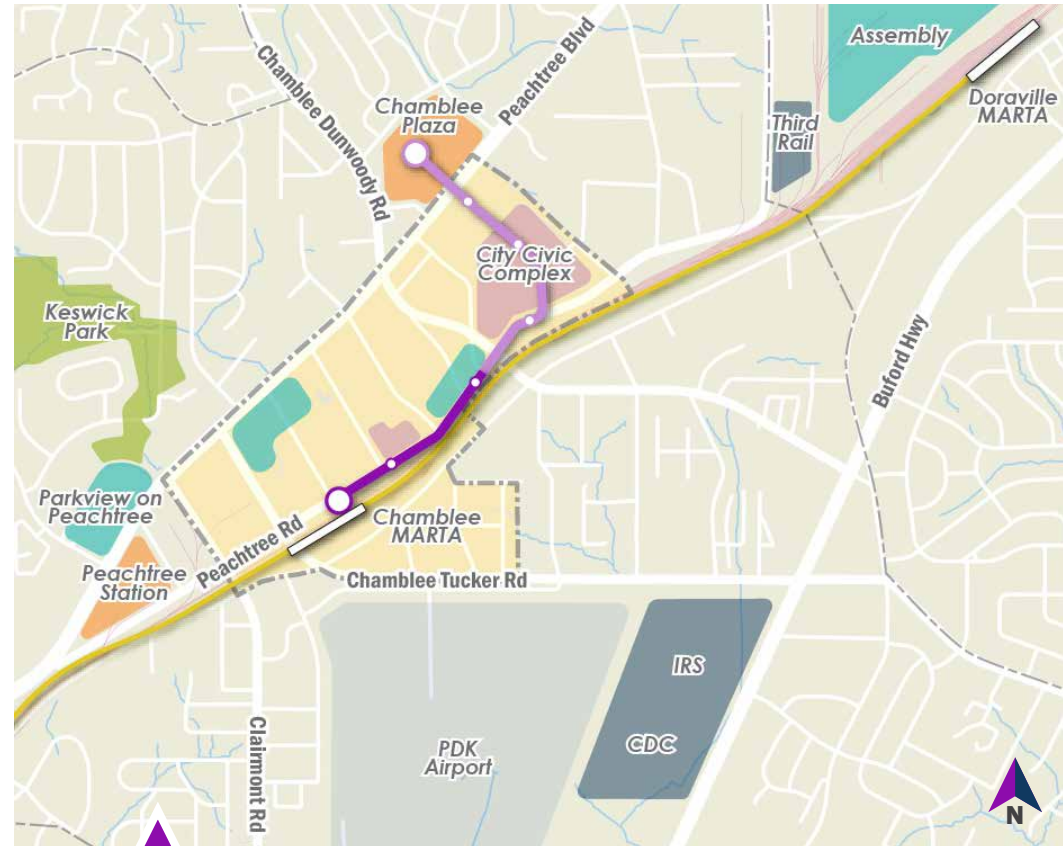


Ranking

5.4 Chamblee Plaza Route

This option extends the core route along Broad St to connect to the Chamblee Plaza, crossing Peachtree Boulevard.

This option extends the core route along Broad St to connect to the Chamblee Plaza, crossing Peachtree Blvd. Special consideration will need to be given for making a turn on private property in a busy parking lot, and for crossing 5 lanes of traffic at Peachtree Blvd. Transit service is not currently provided on Broad St, increasing the saturation of services in Chamblee. This also means that pick-up and drop-off points along Broad St will need to be reviewed and confirmed that they meet ADA requirements. This new local service should either be on demand, or coordinated with route 132's schedule so the services are complimentary instead of duplicative.



The Chamblee Plaza route extends the core route north-west along Broad Street, to serve Chamblee Plaza (Chick-fil-A, Himalayans Grocery, and more) (see page 4 for background map legend).

Route Quick Facts

Population and Employment. The route serving Chamblee Plaza has a job density second only to the city civic complex route, but due to the shorter route length, the total number of jobs it serves is substantially lower than other options. The same is true for residents - the population density is relatively high, but the total number of people within the walkshed is relatively low.

The Chamblee Plaza shopping center represents one of the study area's best opportunities for shared parking, especially during times of the day when its businesses are not in peak operation. Even during business hours, this parking is not fully utilized, and newer commercial outparcels that do generate higher levels of parking demand have provided their own separate parking spaces separate from those of the main shopping center. Additionally, a physical connection from the MARTA station through the downtown to this site could be a catalyst to spur redevelopment of the site. Lastly, an SAV connection to this site may unlock potential pedestrian extensions to the neighborhoods just behind Chamblee Plaza.

Parking. The City should explore sharing agreements with owners and property managers of the Chamblee Plaza property, especially in the two bays of parking closest to Peachtree Boulevard and located between the IHOP and Chick-fil-A outparcels, to allow parking by the general public in designated spaces to support activities and redevelopment in the downtown area.



Route distance



Travel time (est)



Headway that can be achieved with two vehicles

10 MINUTES

2,346 PEOPLE

Population within 1/4 mile radius



Ranking

3,843 PEOPLE

Employees within 1/4 mile radius

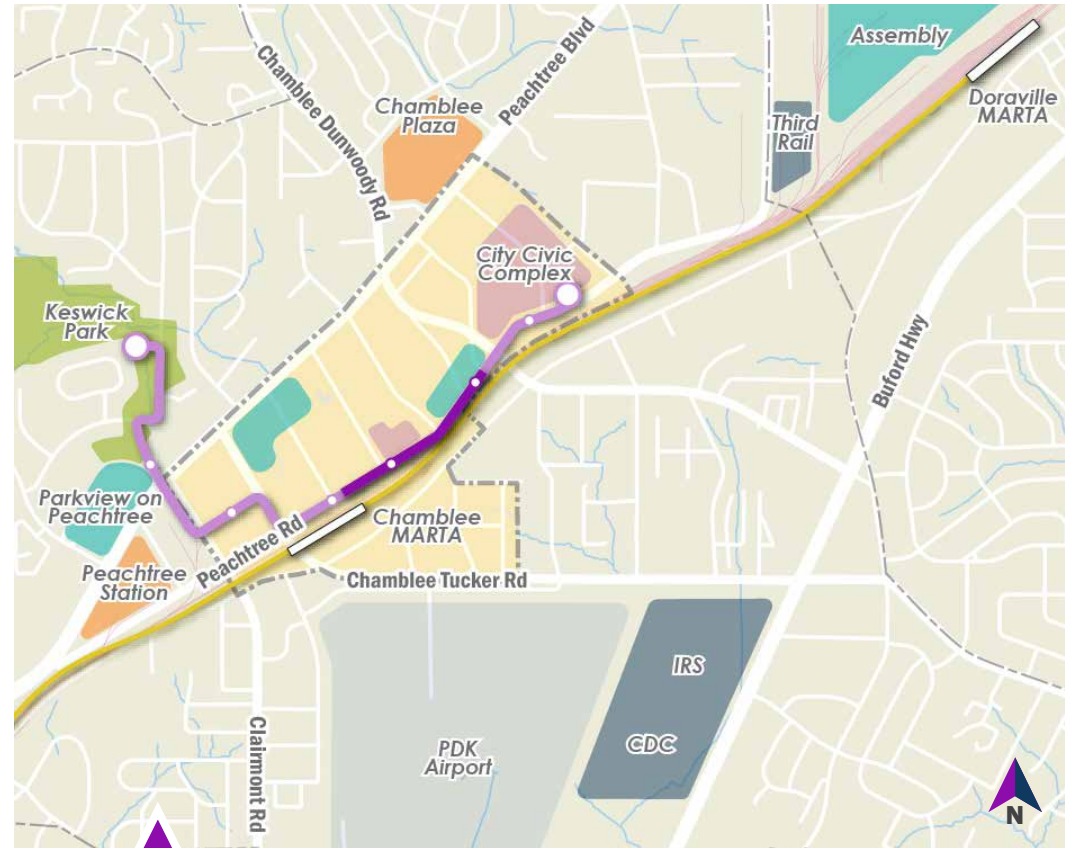


Ranking

5.5 Keswick Park Route

This route acknowledges Keswick Park and the mixed-use development along Peachtree Boulevard at Clairmont Road—Parkview on Peachtree.

The only way to access Keswick Park from Peachtree Road is either by operating along the higher speed Peachtree Boulevard or by accessing the multi-use path—both of which have their unique challenges. The routing shown in the map makes use of the multi-purpose trail that tunnels under Clairmont Road and Peachtree Boulevard, which is believed to be the option with fewer barriers to implementation. This is the second of two route options that provides a direct connection to the trail, while all other options provide access within one block. The current trail would need to be widened in certain segments to accommodate the vehicle, ideally in its own dedicated pathway. The specific width will depend on the vehicle and safety regulations, but may be in the order of 8 feet. There are some physical limitations to expanding the trail width, particularly as it traverses the overpass abutments and crosses the creek.



The Keswick Park route extends the core route north to reach the City Civic Complex and accesses the multi-use path to the west to reach Solis Parkview and Keswick Park (see page 4 for background map legend).

Route Quick Facts

Population and Employment. This route serves half as many people as the CDC/IRS route, but nearly twice as many as the core route—it falls right in the middle of all options. It does not serve as many jobs as many of the other choices, ranking third lowest in terms of the number of jobs and second lowest in employment density, but it supports key new developments which promote a walkable, multi-modal lifestyle. In addition, the connection to Keswick Park is the most viable extension into an existing residential neighborhood of all route alternatives considered in this feasibility study.

Parking. Because of the destinations on this alignment, particularly on its western end, there is limited potential for this shuttle to offer access to parking to areas that need additional supply.



Route distance



Travel time (est)



Headway that can be achieved with two vehicles

14 MINUTES

3,360 PEOPLE

Population within 1/4 mile radius



Ranking

4,030 PEOPLE

Employees within 1/4 mile radius

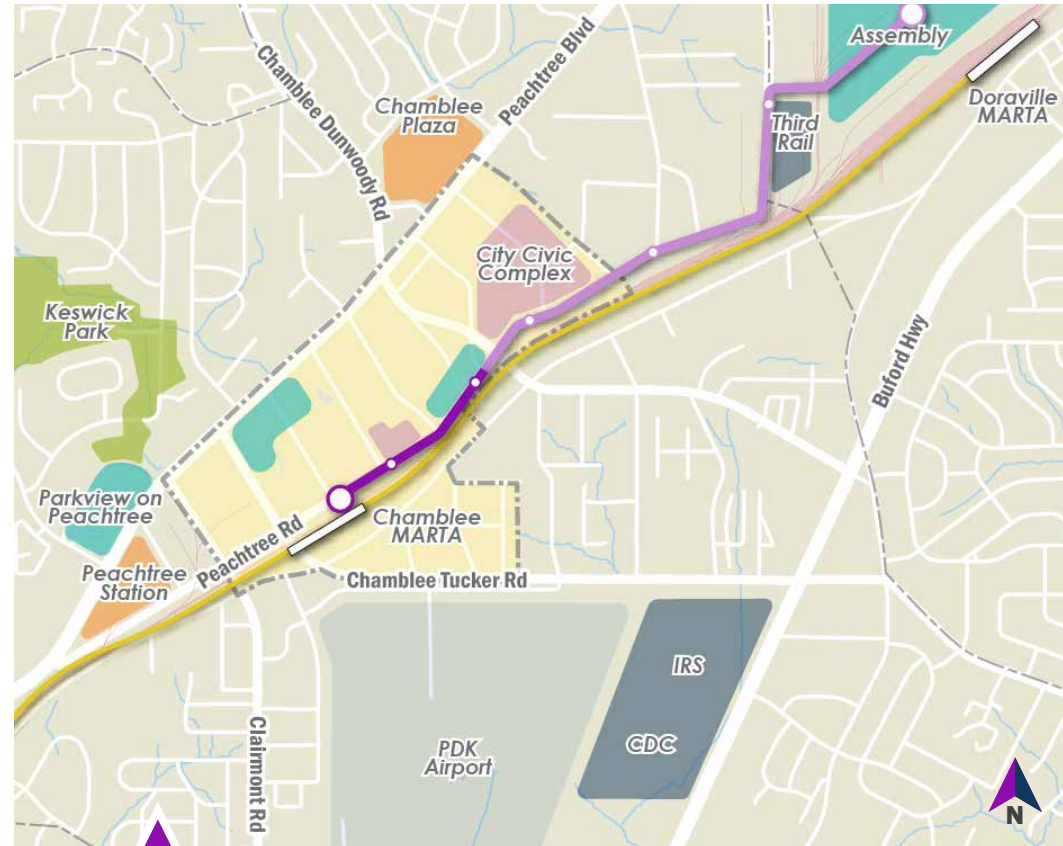


Ranking

5.6 Third Rail Studios and Assembly Route

This route connects Third Rail Studios to the MARTA station, which is currently not reachable by transit, and in the future, this route could extend to connect to the Doraville station.

This route, which extends the core route to the northeast, is the only route that crosses municipal boundaries and connects Chamblee with Doraville and the Assembly Community Improvement District (CID). It also is potentially one of the easier termini turnarounds to determine if the Assembly site owners are amenable to incorporating stops and a turnaround in the development plans. The opportunity to build the necessary infrastructure into the development is rare, given most other routes will need to retrofit. This route connects Third Rail Studios to the MARTA station, which is currently not reachable by transit, and in the future, this route could extend to connect to the Doraville station. In addition, it is important to note that a portion of this route could operate in a dedicated right-of-way east of North Peachtree Road.



The Third Rail Studios and Assembly route extends the core route north past Third Rail Studios and into the future Assembly redevelopment site (see page 4 for background map legend).

Route Quick Facts

Population and Employment. The socioeconomic route profile is very similar to that of the CDC/IRS option. The route serves the second highest number of residents and the second highest number of employees, even though it features the lowest density of employees (due primarily to the overall length of the route). Residents, at present, tend to be younger, have lower paying jobs, are not as educated and have more people per household, though again, this is expected to change significantly. This may indicate a high composition of young families and students. The future build-out of the Assembly site will further increase the ridership demand for this corridor. The growth of this destination is expected to radically change this entire part of the community with thousands of employees and residents slated to occupy new space in the coming decade. Future residents and employees will be an important pool of customers for the growing number of authentic retail and restaurants in downtown Chamblee.

Parking. The parking supply that the Assembly development is expected to add could serve as a remote resource to support additional visits to downtown Chamblee, but with this alignment connecting between two MARTA station areas, this alternative does not provide an immediate benefit to increasing access to parking except as a means to connect residents and employees to downtown Chamblee without the need to drive and park. The alignment does offer a greater reach between the major destinations—both present and future—along the Peachtree Road corridor and offers potential to reduce the need to drive between these destinations altogether.



Route distance



Travel time (est)



Headway that can be achieved with two vehicles

15 MINUTES

4,420 PEOPLE

Population within 1/4 mile radius



Ranking

4,470 PEOPLE

Employees within 1/4 mile radius

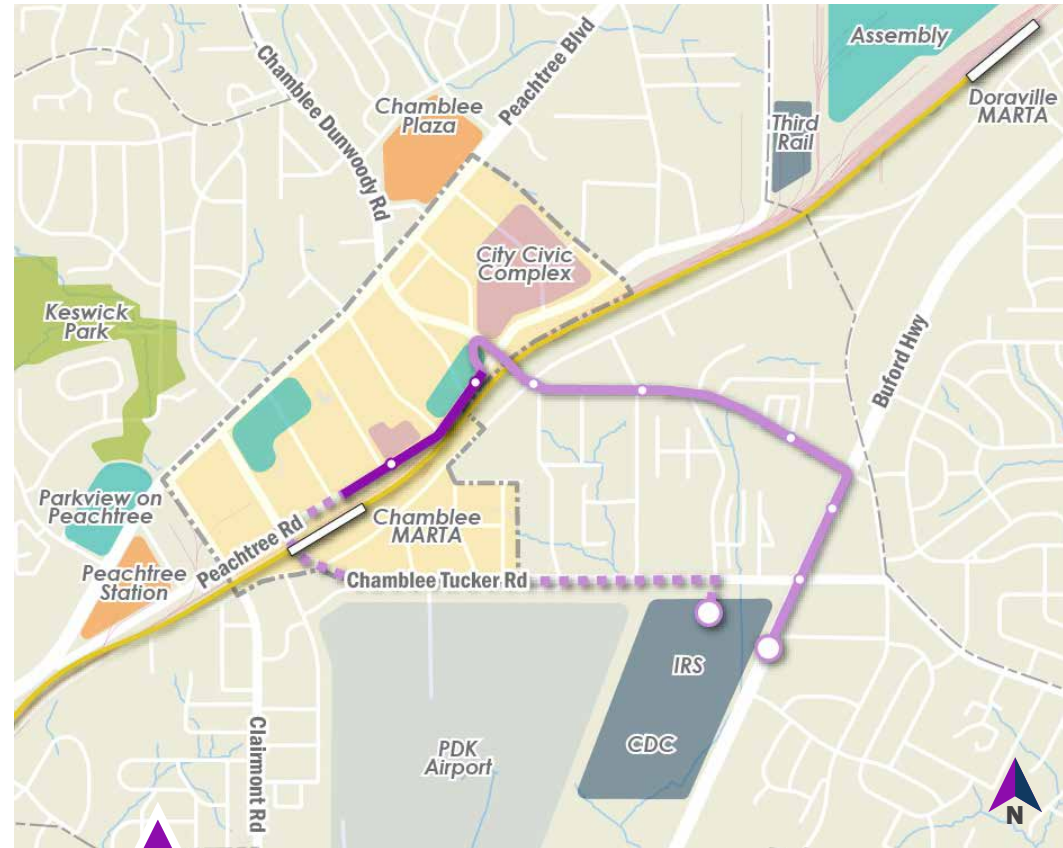


Ranking

5.7 CDC and IRS Route

The final route option connects the two largest employers in Chamblee (and in the immediate area at present), clustered next to the airport—the Internal Revenue Service (IRS) and the Center for Disease Control (CDC).

There are two variations for this route, largely dependent on where the route will terminate to the southeast. It is desirable for the route to avoid the busy and higher speed Buford Highway due to the vehicles' low operating speeds. Therefore, dedicated right-of-way should be considered, particularly as it interfaces with Buford Highway. Currently, there are private shuttles that connect the MARTA station to these employers, which may present opportunities for partnership on this new service.

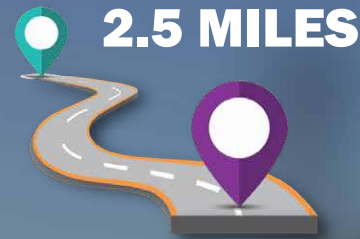


The CDC and IRS route extends the core route east and south to reach the largest employment centers in Chamblee (CDC and IRS) (see page 4 for background map legend; dashed light purple line is an alternative route option).

Route Quick Facts

Population and Employment. The route profile mimics that of the Third Rail route on all fronts, at least at present. This route not only serves the greatest number of residents, it is also the densest corridor in terms of population and jobs. The population along the corridor has the highest household size and youngest median age, suggesting that young families and younger residents live along the corridor. They also have the lowest median household income of all options considered. All indications point to this corridor having a strong propensity for transit use. It should be noted that there is no direct connection for CDC and IRS employees to visit businesses along Peachtree Road via transit.

Parking. The IRS/CDC campuses contain a significant supply of parking that is typically only utilized within business hours, although these are highly secure facilities with no public access. Potential for shared use of this parking is low. However, the concentration of employment at this campus does represent an indirect parking benefit for Chamblee’s core in that a nearby potential market for downtown Chamblee businesses would be connected by means other than driving and parking in downtown. This connection is too far to make by foot and does not feature fixed-route MARTA transit service to make it a convenient connection throughout the day. The Federal agency shuttle services are intended for employees only. Having a means to supplement this for non-employees could allow a greater area to be accessible without driving—for example, connecting to CDC and IRS via the Chamblee MARTA station but visiting downtown businesses on the return trip.



Route distance



Travel time (est)



Headway that can be achieved with two vehicles

15 MINUTES

6,790 PEOPLE

Population within 1/4 mile radius



Ranking

4,675 PEOPLE

Employees within 1/4 mile radius



Ranking

CHAPTER 06

Comparative Analysis

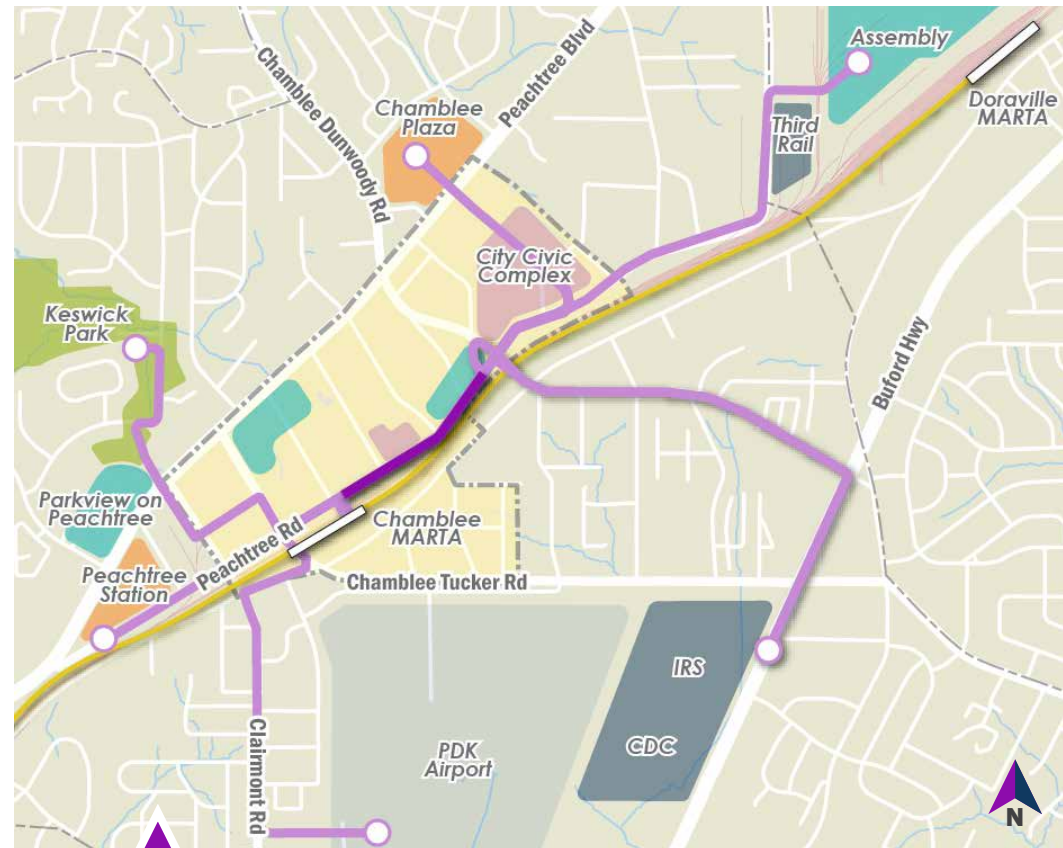
6.0 Comparative Analysis

The evaluation of the route alternatives is rooted in measurable criteria that supports the goals, values and priorities from existing Chamblee and Metro Atlanta plans and policies.

The routes serving the City Civic Complex, Peachtree Station, and PDK Airport have nearly identical socioeconomic profiles of the residents which live within the ¼ mile walkshed. Likewise, the routes serving Third Rail and the CDC/IRS, and the routes serving Keswick Park and Chamblee Plaza have nearly identical socioeconomic profiles concerning income, education, household size and job type.

The longest routes, which have the lowest frequency using two vehicles, still achieve a headway of 15-20 minutes, which is better than all but one existing MARTA bus route in Chamblee.

The evaluation of the route alternatives is rooted in measurable criteria that supports the goals, values and priorities from existing Chamblee and Metro Atlanta plans and policies. Once the route alternatives were created, the criteria were reduced from 25 to 5. Many of the criteria resulted in no difference between the options. Others were not able to be defined at the feasibility stage, but may be considered in the next, detailed design phase when more information is available. The number of vehicles are held constant for each option so that cost is fixed, and therefore the service levels change based on route length. The evaluation compares each alternative against one another, enabling a preliminary comparison of alternatives against key indicators. Details such as end of the line turn-arounds, funding, legal, partnerships, etc. will refine this initial analysis, elevating one alternative (or a mashup of two alternatives) to the top.



All alternative routes in the map above, and compared in the graphic chart to the right: the three highest ranked routes being Third Rail Studios & Assembly, Peachtree Station, and Chamblee Plaza (See page 4 for background map legend).

Comparative Analysis

	City Civic Complex	PDK Airport	Peachtree Station	Chamblee Plaza	Keswick Park	Third Rail/ Assembly	CDC/ IRS
Number of residents along route 	OK	OK	OK	Good	Good	Great	Great
Number of job along route 	OK	Great	Great	OK	Good	Great	Great
Number of trips per hour with 2 vehicles 	Great	OK	Great	Great	Good	Good	OK
Compatibility with low speed shuttle 	Great	OK	Great	Great	Good	Great	OK
Increase in transit service coverage 	OK	OK	Good	Good	Good	Good	OK

LEGEND

OK  Good  Great 

The two highest ranked alternatives connect Peachtree Station to Third Rail and future development at Assembly.

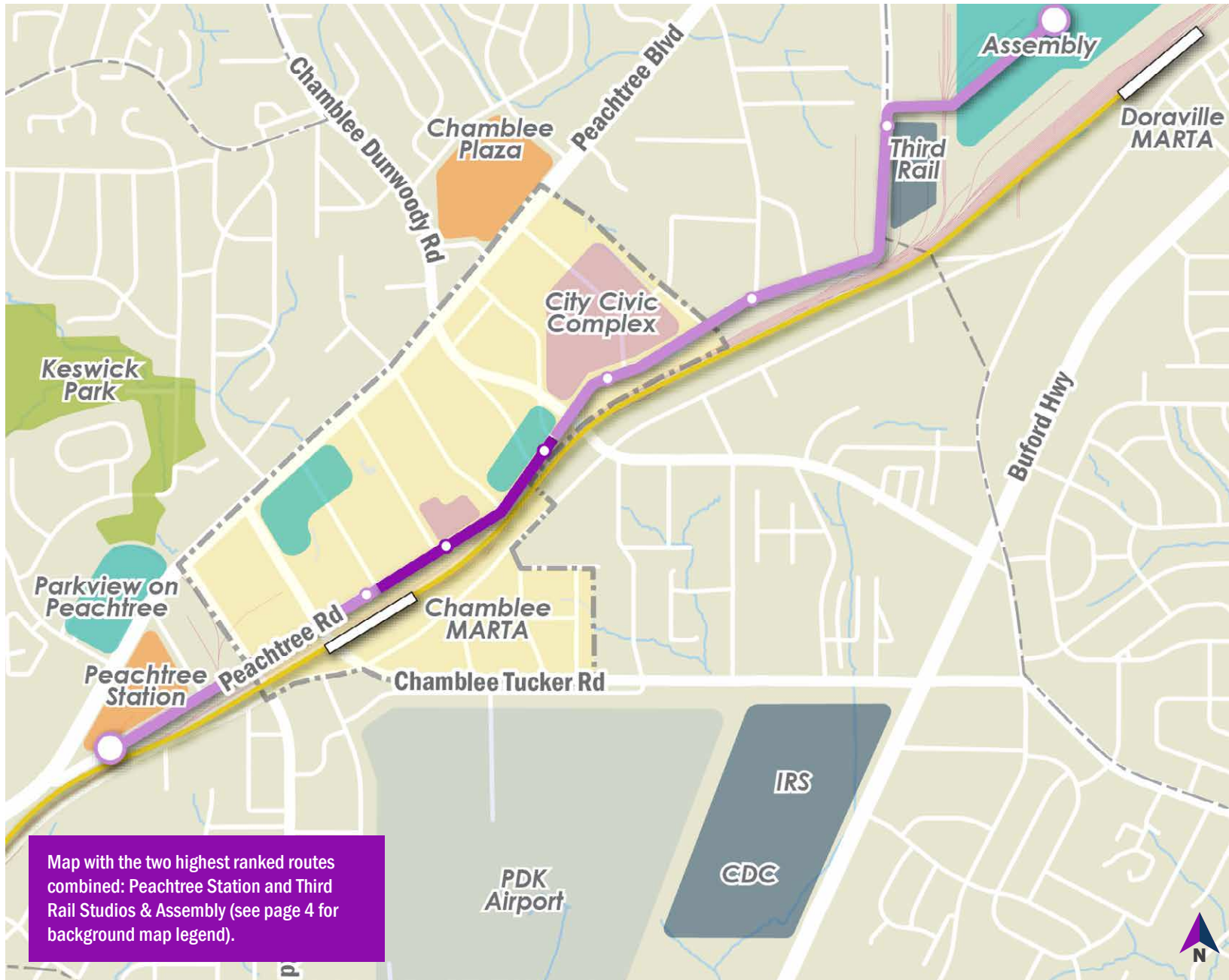
The two alternatives that stand out based on the select criteria above, operate along Peachtree Road, connecting Peachtree Station to the southwest to MARTA to Third Rail and future development at Assembly to the northeast. While they are shown as two unique options, they can easily be combined into one longer route. Alternatively, a portion of the route may be implemented first, and then extended as demand warrants. Both route options have a relatively high number of jobs along the corridor and are highly compatible with low speed shuttles. The future build-out of the Assembly site will further increase the ridership demand for this corridor.

The three lowest ranking routes duplicate existing MARTA bus routes, and two of the three are the options that extend south of the rail line, operating on higher speed corridors.

Turn around opportunity in the Peachtree Station overflow parking lot accessed by McGaw Drive, a low speed, low traffic volume, side street that connects Peachtree Blvd and Peachtree Road.



The Assembly site poses an opportunity to incorporate self-driving shuttles as part of the site redevelopment.



Map with the two highest ranked routes combined: Peachtree Station and Third Rail Studios & Assembly (see page 4 for background map legend).

CHAPTER 07

Cost Estimate

7.0 Cost Estimate

Cost estimates (2017) range from \$12,000-\$14,000 per month per vehicle.

Providing an estimate of cost in this early phase is particularly precarious given the rapidly changing technology and vehicle manufacturing environments. Brand new, unproven technology tends to be very expensive in the beginning. As adoption increases, these costs lower over time with improved production and experience.

There are two primary financing models for piloting SAVs: owner purchasing or third-party. While both options should be explored in more detail, the initial recommendation is to lease the vehicles for a set monthly fee. Typically, the leasing arrangement is an all-inclusive service: testing the vehicle, mapping the route, ongoing maintenance and vehicle inspections, vehicle replacement in the event of malfunction, and may include daily operations such as on-board attendants and nightly cleaning. Cost estimates (2017) range from \$12,000-\$14,000 per month per vehicle. If the vehicles operate six days a week from 6am - 8pm, this equates to \$30-\$40 per hour before revenue is taken into consideration. Most fixed route bus systems have an average hourly cost of \$136 (NTD 2016)

— a reduction in cost by 70%.



**Today, an SAV
is estimated
to be 70%
cheaper to
operate than a
regular bus.**



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CHAPTER 08

Determination of Feasibility

8.0 Determination of Feasibility

All options are feasible, but require detailed analysis to refine impacts to traffic, road design, signalization, cost and funding opportunities.

The principal elements that contribute to a determination of feasibility include:

- 1. Cost**
- 2. Multi-modal connectivity, especially to the broader transit network**
- 3. Alignment with local goals and priorities**
- 4. Local support**
- 5. Corridor characteristics**
- 6. Destinations and employment**
- 7. Population**

The first four determinants of feasibility do not show significant variation between the alternatives because:

- » Cost is held constant via fixing the number of vehicles – each alternative assumes two vehicles. The SAV is also estimated to be significantly cheaper than traditional transit options.
- » Every option includes service to the Chamblee MARTA train station, and is focused on Peachtree Road which is undergoing beautification and multi-modal redesign.
- » Implementing a SAV route aligns with multiple goals including community, economic development, mobility, and environmental goals.
- » Initial conversations with stakeholders, the public, and elected officials have all been favorable and generally supportive of the concept.

The final three feasibility determinants (corridor characteristics, destinations and employment, and population) vary amongst the alternatives, and will contribute to alignment selection in the next phase of work. At the conceptual level, the shared core route supports dining, retail, shopping and services along Peachtree Road which is low speed and has low traffic volumes—favorable conditions for a low speed shuttle. Each branch from the core route has unique corridor and operational challenges, and differences in potential ridership and employment destinations. All options are feasible, but require detailed analysis to refine impacts to traffic, road design, signalization, cost and funding opportunities.

As stated in the Introduction, this study sought to answer two questions: Can an electric, self-driving shuttle service help Chamblee achieve a confluence of community, economic development, mobility, and environmental goals, in addition to addressing parking and infrastructure constraints? Is it a better-fit and more attractive choice than traditional transit vehicles? While there is some variation between the alternatives, the answer is yes to both questions, in addition to fairing favorably against the determinants of feasibility.

The high-level concept of a self-driving shuttle service along Peachtree Road is feasible.

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CHAPTER 09

Envisioning the Future of Chamblee

9.0 Envisioning the Future of Chamblee

The following conceptual renderings illustrate the vision for Chamblee’s future with SAVs operating on the streets.

While transit services are common to Chamblee, autonomous vehicles are not. To better help residents, visitors and decision makers envision what Chamblee may look like with SAVs operating on the streets, we’ve created two sets of illustrations, showing two locations on Peachtree Road. Each pair of renderings depict the streetscape during the pilot stage (0-2 years from now) and a future stage (5-10 years), where autonomous vehicles are widely used and accepted. All images are planning level drawings, subject to change.



Existing photo of Peachtree Road looking towards City Hall.

Conceptual illustration of an SAV Pilot Project with improvements including: lane markings denoting the shared street as a “Chamblee Smart Lane” to alert drivers they are sharing the road with a self-driving shuttle, and proper signage informing pedestrians and drivers of the self-driving shuttle.





Future stage conceptual illustration with improvements including: lane markings denoting the shared street as a “Chamblee Smart Street”, proper signage for pedestrians and drivers, sharrows for cyclists to also share the road, street trees, pedestrian-scaled lighting, improved sidewalk conditions, strategically closed driveways to reduce unexpected interference with the self-driving shuttle, pedestrians, and cyclists alike, as well as new development opportunities.

The two locations along Peachtree Road were chosen due to their consistency in most route alternatives. The first is in front of City Hall and the second in front of the Chamblee MARTA station. Both display different streetscape and “Chamblee Smart Lane” branding opportunities along the main spine of all routes, Peachtree Road, including: pavement markings, SAV related signage, street trees, pedestrian-scaled lighting, way-finding and district branding signage, improved crosswalks, strategically closed driveways, enhanced bicycle and pedestrian facilities, a potential traffic signal, and opportunities identified for future development or art installations.

The future of these smaller vehicles may be a mix of scheduled service and on demand service enabling residents to reduce vehicle ownership and more easily rely on a diverse suite of mobility options.



Pilot stage conceptual illustration with improvements including: lane markings denoting the shared street as a “Chamblee Smart Lane” to alert drivers they are sharing the road with a self-driving shuttle and proper signage informing pedestrians and drivers of the self-driving shuttle.



Existing photo of Peachtree Road by the Chamblee MARTA station.

Future stage conceptual illustration with improvements including: lane markings denoting the shared street as a “Chamblee Smart Street”, proper signage for pedestrians and drivers, an off-street multi-use path for cyclists and pedestrians, new district identifying signage, street trees, pedestrian-scaled lighting, improved sidewalk conditions, art sculpture opportunities, and a high quality intersection with a traffic signal (only if found necessary upon further analysis).



CHAPTER 10

Next Steps

10.0 Next Steps

The high-level process for deploying these vehicles is similar to implementing a new transit route; however, there are unique nuances specific to this technology contained within the details of each step. This report documents the findings from phase 1, and leads into phase 2—preliminary planning and detailed design.

All content specific to the potential SAV service will be analyzed and confirmed in the future phase 2 of this process, such as alignment, priority treatment, number of vehicles, schedule, overnight storage and charging locations, infrastructure adjustments, signalization and other intelligent transport system (ITS) components. Funding and vehicle selection are also key components of the preliminary planning and detailed design phase. Phase 2 would also include public engagement.

Phase 3 defines the risk mitigation strategy, communication protocols, vehicle testing, public engagement and marketing, fare payment and processing, operations plan, etc. Once the vehicle is operational (phase 4), additional day to day tasks (phase 5) include service delivery, performance monitoring, farebox operations, and public relations (see process diagram on next page).

What defines success for a not-fully-vetted technology pilot project? One of the early lessons learned from SAV and AV pilot projects is that managing expectations is very important. These vehicles may have a higher probability of getting in accidents (usually very minor)—likely caused by other drivers who are not accustomed to operating alongside these vehicles. Having a fully documented process to respond to situations, clear communication protocols, a risk mitigation strategy, and a willingness to be a part of testing and improving this technology are all essential pieces to ensuring that success is defined clearly and achieved. Perhaps, the most important definition of success for any community seeking to implement these vehicles early in the adoption cycle is to accelerate the learning curve of the long-term adoption of an autonomous future. The more that the opportunities and the challenges are understood, the more well-positioned we will be to capitalize on the long-term value creation.

Perhaps, the most important definition of success for any community or organization seeking to implement these vehicles during the testing phase of their development, is to accelerate the learning curve of the long-term adoption of an autonomous future.

SAV Pilot Project Process



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City of Chamblee. Peachtree Road Streetscape & Rail Trail Concept Plan, City of Chamblee, Georgia. Fall 2017.

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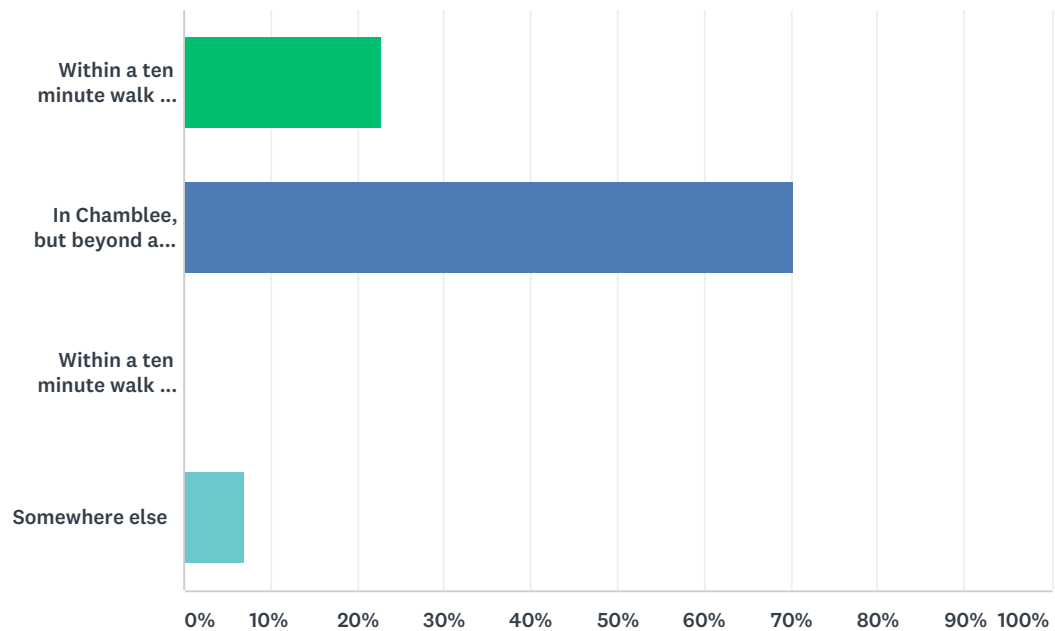
<https://news.voyage.auto/an-introduction-to-lidar-the-key-self-driving-car-sensor-a7e405590cff>

APPENDIX A

Online Survey Results

Q1 Where do you live?

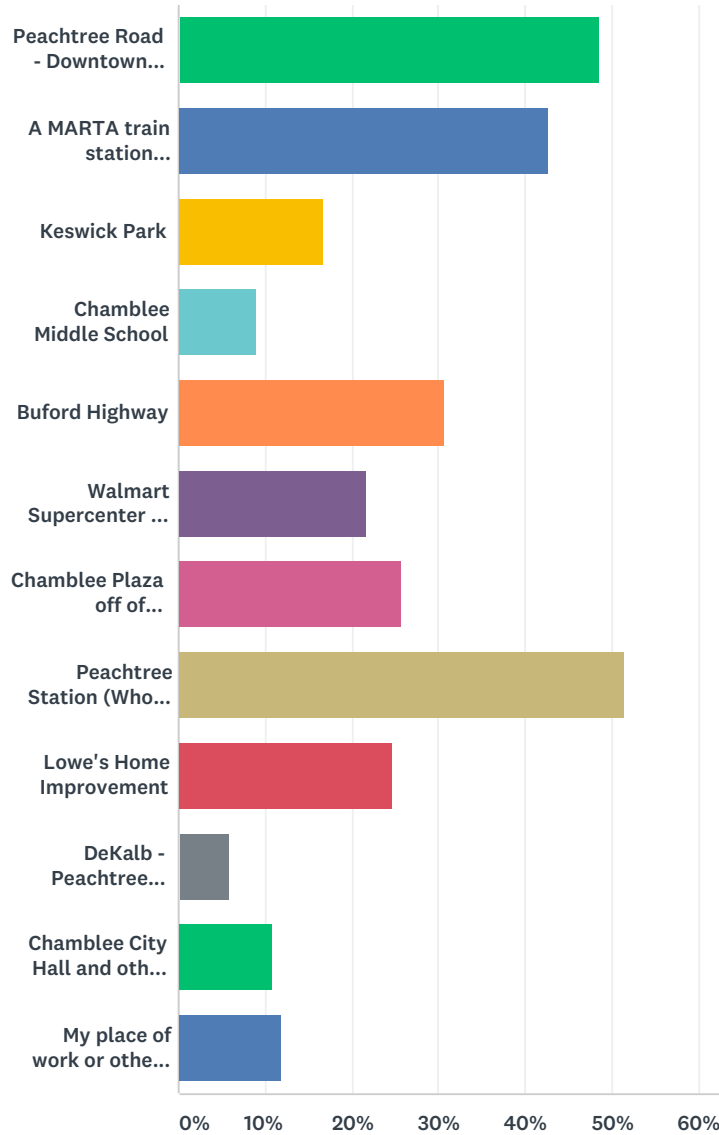
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Within a ten minute walk of the Chamblee MARTA station	22.77%	23
In Chamblee, but beyond a ten minute walk to the Chamblee MARTA station	70.30%	71
Within a ten minute walk of the Doraville MARTA station	0.00%	0
Somewhere else	6.93%	7
TOTAL		101

Q2 Please choose your top three Chamblee destinations:

Answered: 101 Skipped: 0

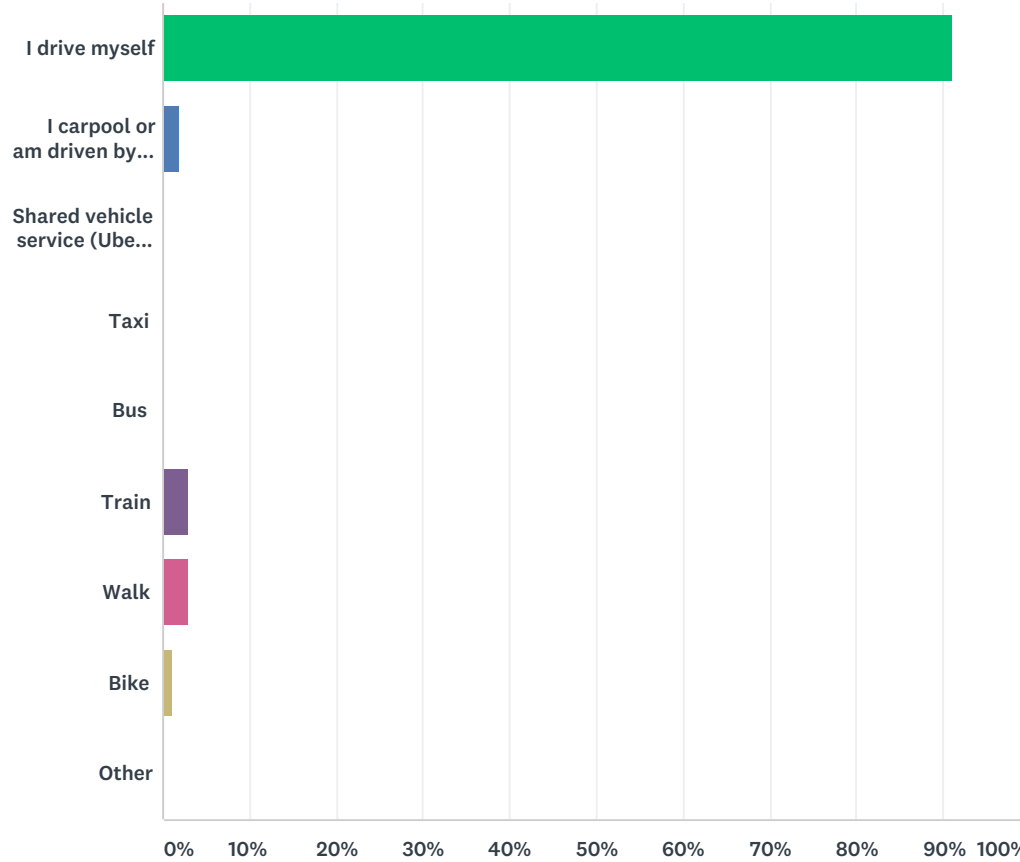


ANSWER CHOICES	RESPONSES
Peachtree Road - Downtown Chamblee	48.51% 49
A MARTA train station (Chamblee or Doraville)	42.57% 43
Keswick Park	16.83% 17
Chamblee Middle School	8.91% 9
Buford Highway	30.69% 31
Walmart Supercenter and adjacent shops	21.78% 22
Chamblee Plaza off of Peachtree Blvd (Dunkin Donuts, IHOP, Chick-fil-A, etc.)	25.74% 26
Peachtree Station (Whole Foods, Starbucks, associated shops, etc.)	51.49% 52
Lowe's Home Improvement	24.75% 25
DeKalb - Peachtree Airport	5.94% 6
Chamblee City Hall and other government buildings	10.89% 11
My place of work or other (please specify)	11.88% 12
Total Respondents: 101	

#	MY PLACE OF WORK OR OTHER (PLEASE SPECIFY)	DATE
1	Dunwoody	12/7/2017 3:43 PM
2	Chamblee Library	12/7/2017 1:00 PM
3	Chamblee library & postoffice on Broad Street	11/30/2017 12:18 PM
4	Chamblee Charter High	11/30/2017 9:27 AM
5	Chamblee Charter High School	11/30/2017 6:23 AM
6	Chamblee dunwoody Hart's mill	11/29/2017 7:17 PM
7	Any place outside the "center of the universe"	11/29/2017 6:52 PM
8	Publix, CVS	11/29/2017 4:45 PM
9	Century center	11/29/2017 4:21 PM
10	Chamblee High School	11/29/2017 4:10 PM
11	Georgetown Kroger shopping Center; and Savoy Drive	11/29/2017 3:08 PM
12	Chinatown Mall	11/29/2017 1:49 PM

Q3 How do you normally travel?

Answered: 101 Skipped: 0

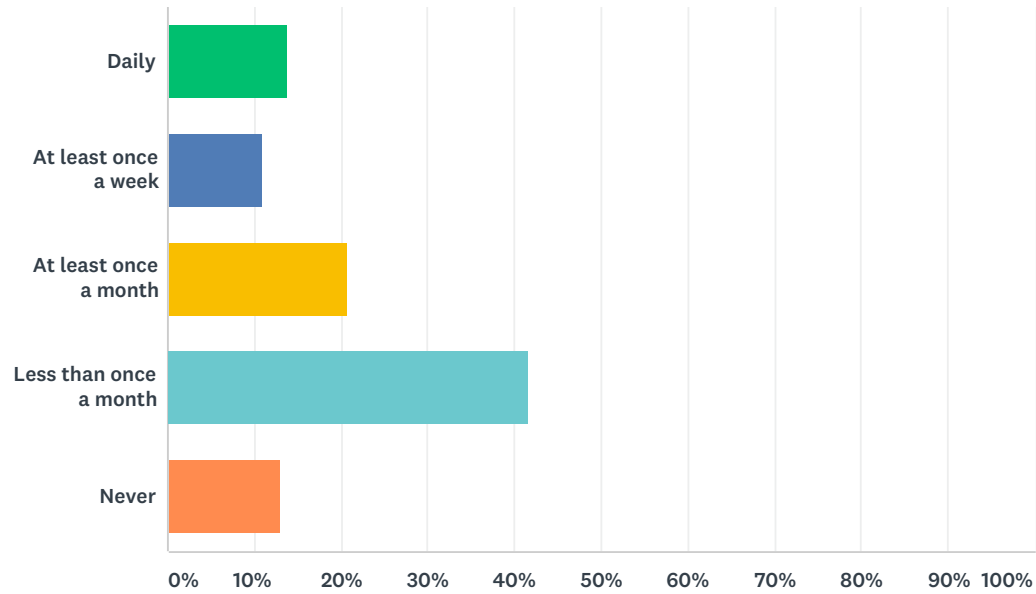


ANSWER CHOICES	RESPONSES
I drive myself	91.09% 92
I carpool or am driven by friend/family member	1.98% 2
Shared vehicle service (Uber, Lyft, etc.)	0.00% 0
Taxi	0.00% 0

ANSWER CHOICES	RESPONSES
Bus	0.00% 0
Train	2.97% 3
Walk	2.97% 3
Bike	0.99% 1
Other	0.00% 0
TOTAL	101

Q4 How often do you use the MARTA transit system?

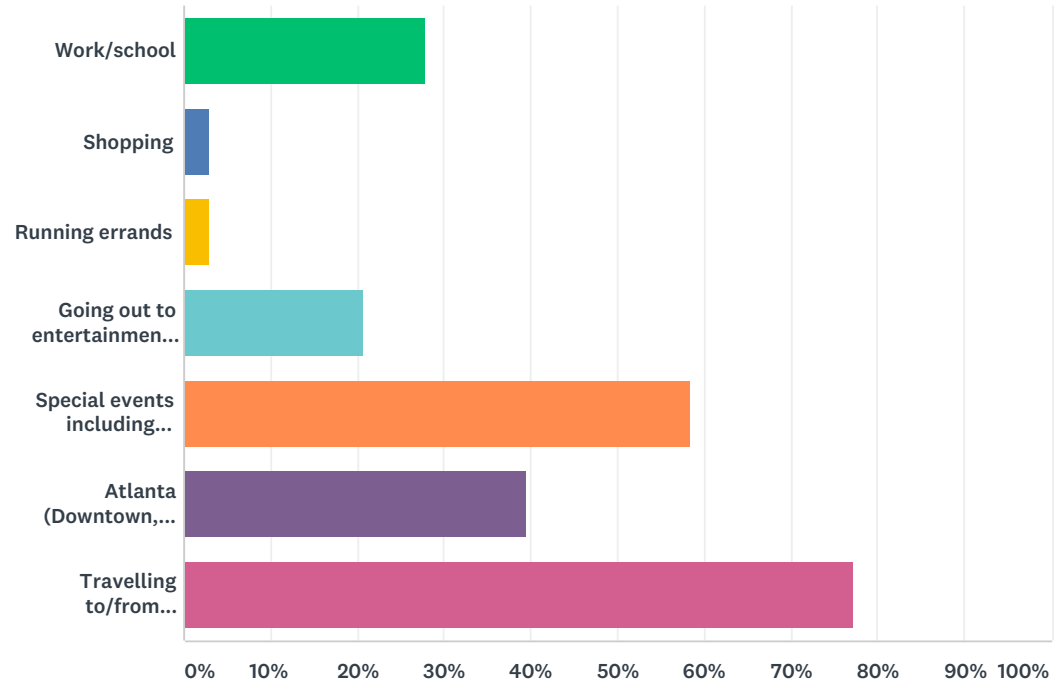
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES
Daily	13.86% 14
At least once a week	10.89% 11
At least once a month	20.79% 21
Less than once a month	41.58% 42
Never	12.87% 13
TOTAL	101

Q5 If you use MARTA, what is the primary purpose of the majority of your trips? (select all that apply)

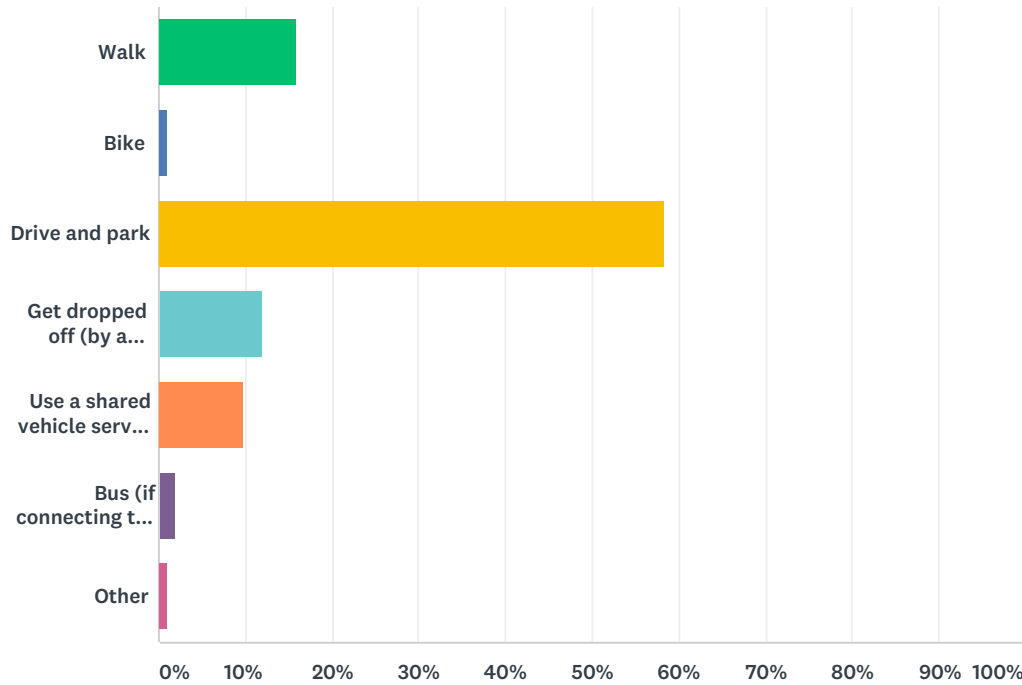
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Work/school	27.72%	28
Shopping	2.97%	3
Running errands	2.97%	3
Going out to entertainment areas with bars, restaurants, etc.	20.79%	21
Special events including concerts, sporting events, theater, etc.	58.42%	59
Atlanta (Downtown, Midtown, Buckhead, etc.)	39.60%	40
Travelling to/from Hartsfield Jackson Airport	77.23%	78
Total Respondents: 101		

Q6 If you use MARTA, how do you get to the station or bus stop?

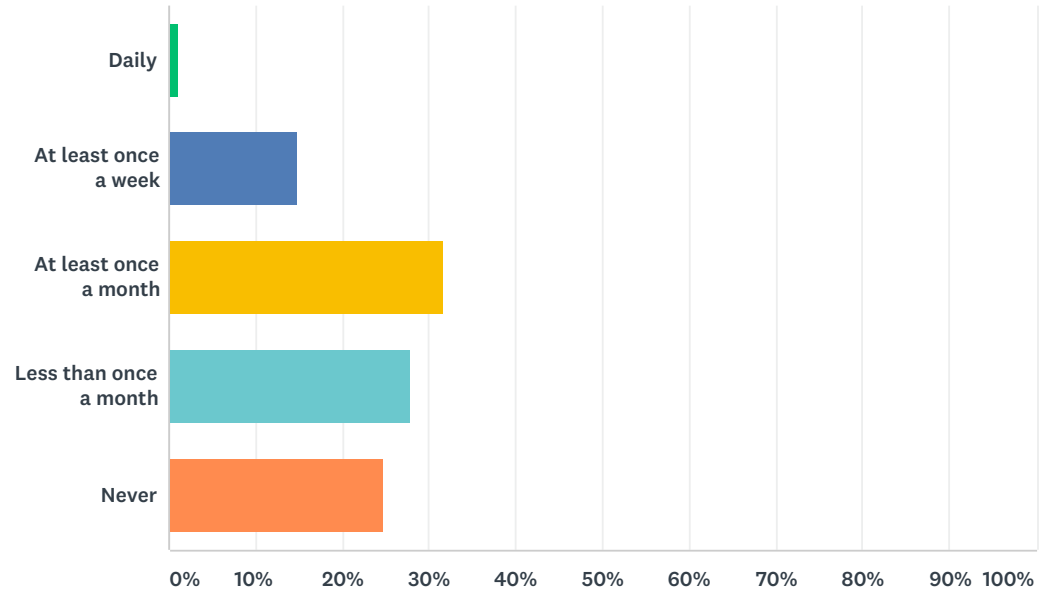
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Walk	15.84%	16
Bike	0.99%	1
Drive and park	58.42%	59
Get dropped off (by a friend, family, neighbor, etc.)	11.88%	12
Use a shared vehicle service (Uber, Lyft, Car-to-Go, etc.)	9.90%	10
Bus (if connecting to the MARTA station)	1.98%	2
Other	0.99%	1
TOTAL		101

Q7 How often do you use shared vehicle services like Uber, Lyft or a taxi?

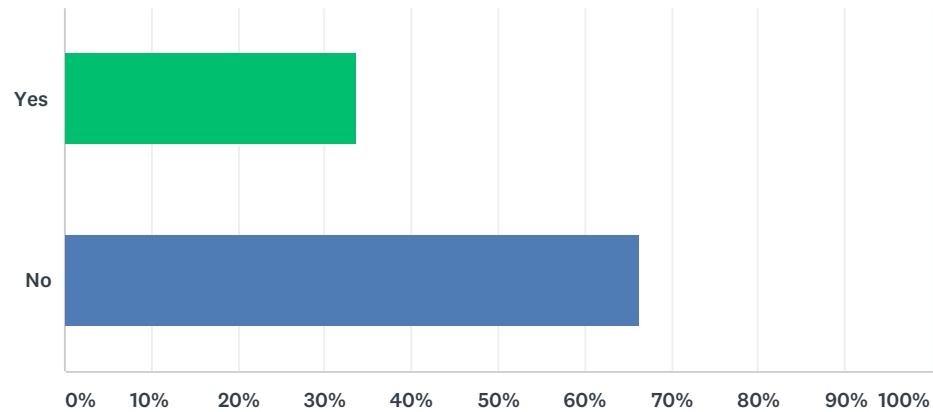
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Daily	0.99%	1
At least once a week	14.85%	15
At least once a month	31.68%	32
Less than once a month	27.72%	28
Never	24.75%	25
TOTAL		101

Q8 Some shared services offer carpooling options where multiple riders are picked up and dropped off along shared routes. Have you ever used UberPool or Lyft Line or another similar service?

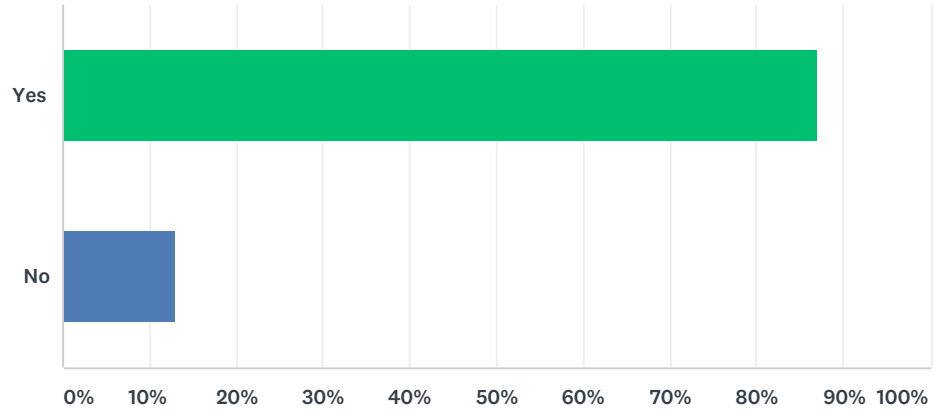
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	33.66% 34
No	66.34% 67
TOTAL	101

Q9 Had you ever heard of autonomous self-driving vehicles before participating in this survey?

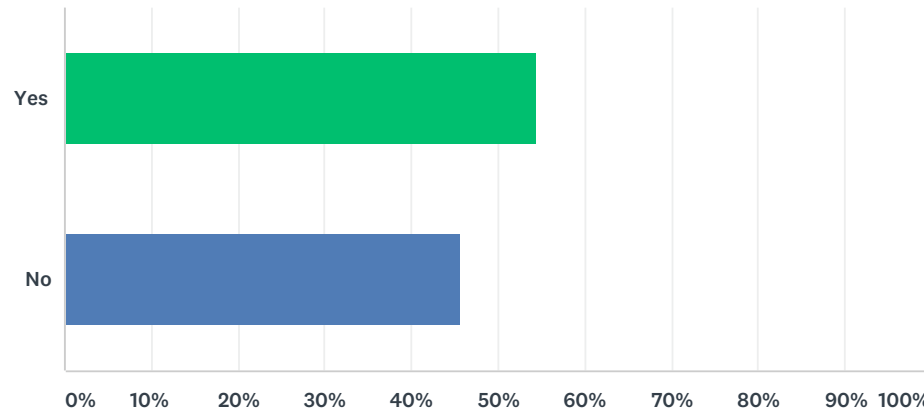
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	87.13%	88
No	12.87%	13
TOTAL		101

Q10 Had you ever heard of self-driving shuttles (mini-buses) before participating in this survey?

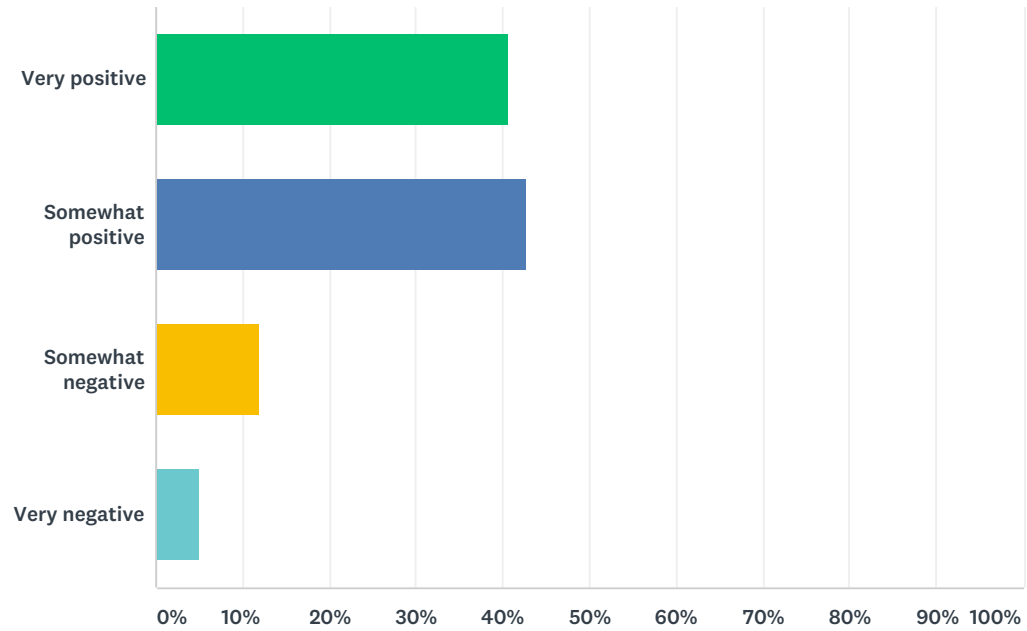
Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	54.46%	55
No	45.54%	46
TOTAL		101

Q11 What is your general opinion of self-driving shuttles?

Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very positive	40.59%	41
Somewhat positive	42.57%	43
Somewhat negative	11.88%	12
Very negative	4.95%	5
TOTAL		101

Q12 What do you think the benefits will be from self-driving shuttles and buses?

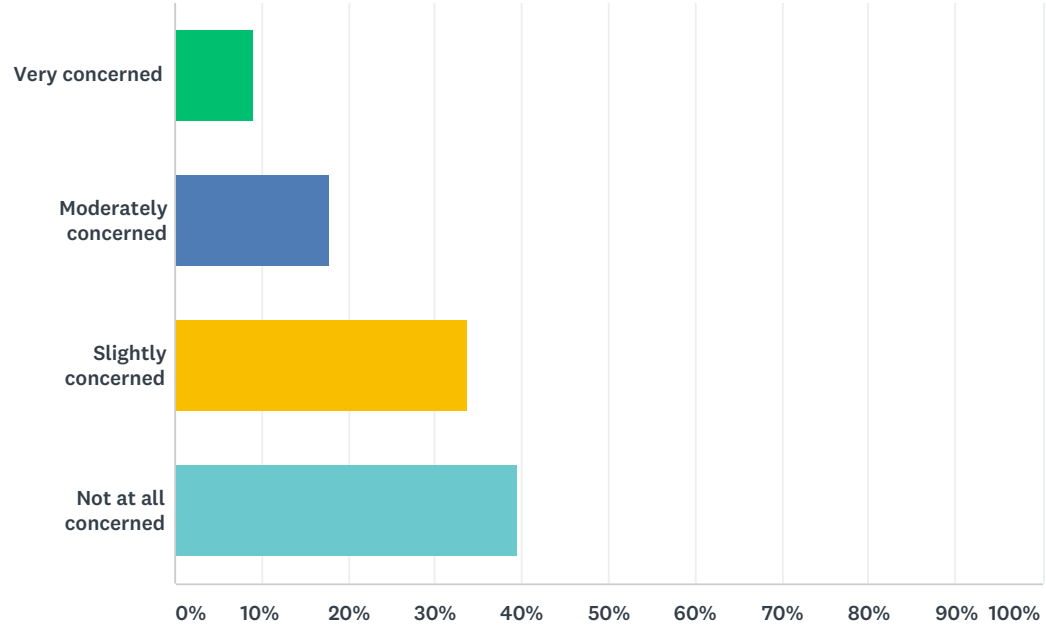
Answered: 101 Skipped: 0



	VERY LIKELY	SOMEWHAT LIKELY	SOMEWHAT UNLIKELY	VERY UNLIKELY	TOTAL
Fewer crashes	35.64% 36	44.55% 45	15.84% 16	3.96% 4	101
Reduced severity of crashes	38.61% 39	39.60% 40	17.82% 18	3.96% 4	101
Less traffic congestion	29.70% 30	42.57% 43	16.83% 17	10.89% 11	101
Shorter travel time than traditional (human operated) buses and shuttles	24.75% 25	35.64% 36	30.69% 31	8.91% 9	101
Lower vehicle emissions	50.50% 51	38.61% 39	5.94% 6	4.95% 5	101

Q13 How concerned are you about riding in a self-driving shuttle?

Answered: 101 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very concerned	8.91%	9
Moderately concerned	17.82%	18
Slightly concerned	33.66%	34
Not at all concerned	39.60%	40
TOTAL		101

Q14 If you are concerned about riding in a self-driving shuttle, can you please explain what concerns you? (fill in the blank)

Answered: 101 Skipped: 0

#	RESPONSES	DATE
1	Non self driving vehicles and drivers	12/25/2017 7:41 PM
2	Mistakes	12/7/2017 3:43 PM
3	Unknown	12/7/2017 1:00 PM
4	Still waiting to see how autonomous vehicles integrate into a mostly self-driving community	12/4/2017 3:23 PM
5	Na	12/1/2017 5:34 PM
6	Not concerned	12/1/2017 11:18 AM
7	The danger of something unexpected happening that shuttle has not been programmed for, therefore, causing a major accident.	12/1/2017 6:53 AM
8	safety	11/30/2017 8:24 PM
9	Making sure I can get on/off with my stuff OK. Like how will it know when everyone who needs to get on/off has done so?	11/30/2017 5:56 PM
10	not concerned at all	11/30/2017 3:31 PM
11	Other riders	11/30/2017 2:56 PM
12	no concern	11/30/2017 1:51 PM
13	n/a	11/30/2017 1:07 PM
14	na	11/30/2017 12:59 PM
15	Others	11/30/2017 12:34 PM
16	I would rather trust a human to respond to immediate events.	11/30/2017 12:18 PM
17	I think it's such a new technology, I would rather wait until it's been around longer before I would consider using one - especially in Atlanta where other drivers can be crazy.	11/30/2017 10:17 AM
18	I don't trust computers to run my life, generally speaking, so I would not trust a computer with my life in a traffic situation.	11/30/2017 10:00 AM
19	Who "deals with it" when there's a problem...the people on the shuttle.	11/30/2017 9:31 AM
20	Early safety record	11/30/2017 9:27 AM