



Transit Concepts Report

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For Chatham Area Transit

JARRETT WALKER + ASSOCIATES

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1 Introduction and Summary

This is the second report published as part of the CAT System Redesign. For information about the existing network, its performance and the key choices that will be made as part of the Redesign, consider reading the Transit Choices Report, available on the project website.

Purpose of this Report

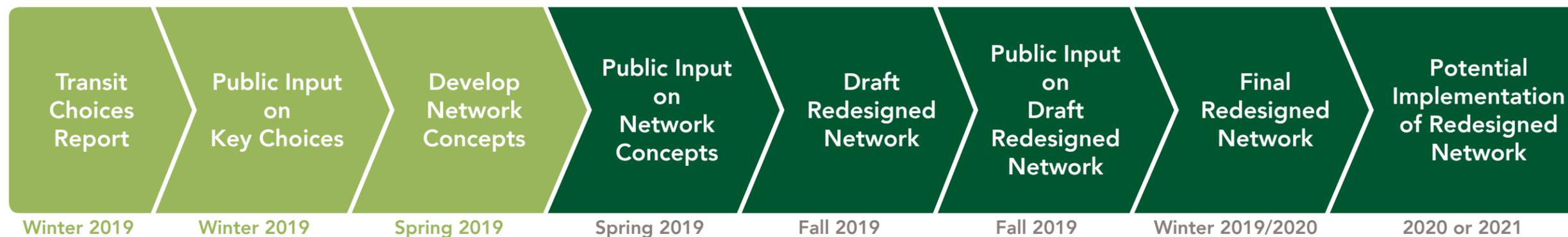
The purpose of this report is to illustrate for the public and decision-makers the trade-off that Chatham Area Transit (CAT) faces in how it designs its network.

This report contains two Concepts for the future, which are intentionally very different from one another:

- The High Coverage Concept preserves all of the existing coverage of the CAT network. The places that are served today would be served in the High Coverage Concept, though most of them are served with low frequencies and short spans.
 - ▶ In the High Coverage Concept, 50% of the service budget is spent on high-ridership service used by many people, and 50% is spent covering places where ridership is low but people have severe needs for transit.
- The High Frequency, High Ridership Concept concentrates service into fewer routes, where the largest numbers of people and jobs are, so that those routes can run more frequently, later at night and on the weekends.
 - ▶ In the High Frequency, High Ridership Concept, 90% of the budget is spent on high-ridership service that would be used by many people. Only 10% is left to cover places where people have severe needs for transit.

Neither of these Concepts is a *proposal*. Rather, each is an illustration of one end of the spectrum between competing goals for transit.

Anticipated Timeline for the Let's Go! System Redesign



Timeline and Community Engagement

The anticipated timeline for the rest of this project is:

- Spring 2019: Community engagement on the transit network Concepts.
- Winter 2019/2020: Community engagement on a draft System Redesign for CAT.
- 2020 or 2021: Potential implementation of the new System Redesign.

At each phase of this process CAT staff and the consulting team will engage the public, current transit riders and community stakeholders in multiple ways:

- In-person outreach at transit stops and community events.
- Online and paper surveys.
- Consultation with a committee of major stakeholders.
- Public open-house meetings.

General information and details on the latest events is posted at [LetsGo.CatchaCAT.org](https://lets-go.org).

How to Use This Report

We suggest that you take the following steps in reading this report:

- Look at the detailed **network maps** starting on page 11. Find the places you care about, and notice which routes go by there. Note the colors of the routes, which represent their frequencies and their spans of service each day and each week. Note where else those routes go.
- There are detailed **maps of weeknight service** starting on page 13, and **maps of Sunday service** starting on page 15. Locate the places you care about on these maps, too.
- The **frequencies and spans of every route** in each Concept are shown in the tables starting on page 18. This is where you can see if the route(s) you would care about run at the times of day, and on the days of the week, when you would want them too, and at what frequencies.
- A map of the **existing network** is shown on page 10, and frequencies and spans of existing routes are shown on page 17, so that you can compare the Concepts to today's service if you don't know it well.
- If you care about **big-picture outcomes**, look at the graphics and charts in Chapter 3 (starting on page 22), which show how county residents' access to jobs would change under each Concept.

Transit's Many Purposes

Transit can serve many different goals. But different people and communities value these goals differently. It is not usually possible to excel towards all of these goals at the same time.

Understanding which goals matter most in the Savannah area is a key step in the CAT System Redesign.

Possible outcomes of transit include:

- **Economic:** transit can give businesses access to more workers, and workers access to more jobs, and give students more access to education and training.
- **Environmental:** increased transit use can reduce air pollution and greenhouse gas emissions. Transit also can support more compact development and help conserve land.
- **Social:** transit can help meet the needs of people who are in various situations of disadvantage, providing lifeline access to services and jobs.
- **Health:** transit can be a tool to support physical activity by walking. This is partly because most riders walk to their bus stop, but also because riders will tend to walk more in between their transit trips.
- **Personal Liberty:** By providing people the ability to reach more places than they otherwise would, a transit system can be a tool for personal liberty, empowering people to make choices and fulfill their individual goals.

Transit's Conflicting Goals

Some of transit's outcomes are achieved when more people ride, for more of their trips. For example, the environmental benefits of transit only arise from many people riding the bus rather than driving. Subsidy per rider is lower when ridership is maximized. Access to jobs for large numbers of people, in support of economic prosperity, depends on high ridership.

These outcomes arise from what we call a "ridership goal" because they are achieved through high ridership. For example, transit that attracts only low ridership does not reduce emissions or congestion.

Other outcomes are achieved simply by getting service close to people, whether or not they ride. A bus route through a neighborhood provides residents insurance against isolation, even if the route is infrequent, indirect or only runs on certain days. People with severe needs for transportation live everywhere, and a route nearby helps them meet their needs.

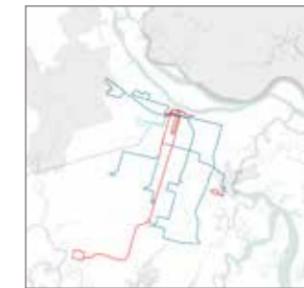
Coverage may also fulfill political or social obligations, for example by getting service into every political district.

These outcomes arise from what we call "coverage goals" because they are achieved by covering areas with service, regardless of ridership.

The **High Frequency, High Ridership Concept** in this report illustrates what the CAT network would be like if CAT spent 90% of its fixed-route budget trying to move the largest number of riders possible. Only 10% would be left to cover places where there are small numbers of people, but severe needs for transit.

The **High Coverage Concept** would maintain CAT's current policy of spending about 50% of the budget getting infrequent service close to a large number of people, despite low ridership, and 50% on services ridden by large numbers of people.

High Frequency, High Ridership Concept 90%–10%



90% spent on high-ridership service, 10% on coverage

High Coverage Concept 50%–50%



50% spent on high-ridership service, 50% on coverage

Where should CAT be, on this spectrum?

Summary of Outcomes

In plain language, the Concepts would likely have these effects on transit outcomes:

- **Ridership potential** would increase slightly in the High Coverage Concept, and would increase a great deal in the High Frequency, High Ridership Concept.
 - ▶ *In the High Ridership Concept, more people could reach more opportunities in a given amount of time.*
 - ▶ Other factors would affect whether or not people choose to ride, such as fares, parking pricing, gas prices, employment levels, etc. Holding all of these other factors constant, however, when more people can make more of their trips faster, by transit, more people will choose to ride.
 - ▶ *The increase in job access in the High Ridership Concept would be as high for low-income County residents as for the general population, and it would be even higher for minority residents.*
- **Larger parts of the region are unserved in the High Ridership Concept than in the High Coverage Concept**, and this is very obvious when you compare the network maps.
 - ▶ However, because the uncovered areas are mostly low-density areas, the number of residents and jobs who lose coverage is lower than you might expect from the visual impression given by the maps.
- **The High Coverage Concept would increase slightly the number of residents near any all-day service, but would not increase the number who are near frequent service.**
- **In contrast, the number of people living near the frequent network would triple in the High Ridership Concept.** Frequency correlates strongly with high ridership.
- **The High Coverage Concept is somewhat simpler than the existing network. The High Ridership Concept is radically simpler.** Spans of service throughout the days of the week also get simpler. Simplicity is important to attract spontaneous and new riders. Fewer lines mean a network is easier to remember, and more frequent lines with more consistent spans make trip-planning easier.

Change in Average Transit Access to Jobs within 45 minutes by Chatham County Residents		
	High Coverage Concept	High Frequency, High Ridership Concept
All residents	+2%	+47%
Residents living on low-incomes	1%	+46%
Minority residents	+2%	+52%

Figure 1: The number of jobs the average County resident could reach within 45 minutes would increase by 47% in the High Frequency, High Ridership Concept. The growth in job access would be similar for the average low-income resident, and higher for the average minority resident.

- **The number of places where Savannah and Chatham County could justify encouraging transit-oriented development, including affordable housing, is greater in the High Ridership Concept.** Dense developments, affordable housing developments and urban neighborhoods around them benefit from frequent transit service, and some cities have policies allowing more density, less parking, and greater affordability around frequent bus lines like the Route A - Abercorn in the High Ridership Concept.

2 The Concepts

What are the Concepts?

This chapter introduces two Concepts illustrating very different ways that the CAT network could be designed in the future. Both Concepts assume no growth in the budget for operating transit service, so they show different ways of allocating CAT's existing budget.

The two Concepts differ in the degree to which they emphasize Ridership goals as opposed to Coverage goals.

The High Frequency Concept also is described as the High Ridership Concept, depending on the context. High frequencies and long spans of service through the day and the week make transit useful and usable for a larger number of people, and in that way tend to increase the number of people riding. Many members of the public will react to a question about frequencies (which matter in their individual lives) more strongly than they react to a policy-level question about ridership. The two outcomes relate very strongly, and are both demonstrated in this High Frequency, High Ridership Concept.

Concepts, Not Proposals

A proposal is something that the proposer recommends. At this stage, neither CAT nor the consulting team is proposing or recommending anything.

The purpose of the Concepts is to illustrate the ends of the spectrum of choices that CAT can make, about how to balance frequency and coverage within its budget. The public conversation about these Concepts will guide the development of an actual proposed Redesigned Network, which will be presented to the community in the fall of 2019.

No New Money

Both Concepts are designed for the year 2021, but with the assumption that CAT has its existing fixed-route operating budget and its existing service area. While it is possible that CAT will be offering service county-wide by then, such county-wide service will be funded using additional tax dollars from that additional service area.

The existing CAT operating budget is fairly small given both the service area population and the very large geographic area that is CAT's existing service area. In addition, land use and development patterns in much of the region are hostile to transit and to walking, which means that getting useful transit service close to people is more expensive for CAT than it is for other transit agencies of similar size.¹

¹ For a longer explanation of how geography, land use and development in the CAT service area affect the usefulness of transit, see the [Transit Choices Report, linked from the project webpage](#).

There is no "low-hanging fruit" in the existing CAT network, no waste or inefficiency, that a blank-slate redesign (such as this process) could fix. Within the existing budget, nearly every improvement in service requires a difficult trade-off.

No Preferred Concept

Neither the consultant nor CAT staff has any preference among these Concepts, nor any desire to steer the conversation to one end of the spectrum or the other.

The most important word in this report is *if*. The High Coverage Concept shows what could happen *if* CAT chose to retain its current balance of ridership and coverage goals, while updating the network to better match today's travel demands.

At the other extreme, the High Ridership Concept shows what could happen *if* CAT chose to focus service into higher-frequency, longer-span routes, in order to attract and serve more riders.

The High Ridership Concept is the most different from the existing system. For this reason, this report puts greater focus on explaining it, including both its upsides and downsides. This can create the illusion that this Concept is being promoted. This is not the intent.

The High Coverage Concept will naturally be more familiar and more easily understood by readers of this report, especially if they use the existing CAT network.

DOT Shuttles

DOT shuttles are funded by the City of Savannah, and are designed by the City and CAT together. The goals for these services are set by the City.

Both Concepts include a change to the route of the DOT Downtown loop. In the future, this DOT shuttle is unlikely to run as a one-way loop. It currently attracts about 17 boardings per hour, which is much less than the highly-productive DOT Forsyth route. It is also less productive than most CAT routes, even though it offers very high frequencies and long spans in the busiest part of the city.

The City is interested in changing the DOT Downtown route to make it more useful to a larger number of people. The design shown in these Concepts is one potential routing. The DOT Downtown route would start

at the transit center, follow Boundary and Liberty Streets, and then run through downtown on Congress/Bryan, and end at the Eastern Wharf. This two-way route would be longer than the existing loop and therefore represents an increased operating investment by the City.

Comments on this new DOT route are welcome in this process, even though the route is the same in the two Concepts.

Focus on the Big Picture

These Concepts have not been refined to the point that they could be implemented, because their purpose is to illustrate choices at a high altitude. A later stage of planning will produce a Draft Redesigned Network, based on public feedback and policy direction from the CAT Board. At that point many more details will be filled in.

These Concepts do not show any information about:

- Local routing details such as turnarounds.
- Bus stop locations.
- Precise schedules such as exact start and end times.
- The timing of connections between pairs of bus routes.
- Peak frequencies. On a few routes, to avoid crowding, CAT may increase frequencies slightly at peak times. These brief peaks in frequencies are not represented in this report.

All of this detail will be added later in a final plan, but doing so would be premature at this stage.

Map: Weekdays in the Existing Network

The existing CAT network is shown at right, for reference as you examine the Concepts in this chapter.

Routes are drawn in lighter colors if their buses come less frequently. This is essential information for readers, because not all bus routes are equally useful to potential riders. The biggest predictor of how many people will find a route useful is its frequency. The number of hours per day and days per week that it runs (its span) is also a major factor in whether it is useful to large numbers of people.

More information about the frequencies and spans of the existing CAT routes shown on this map is in the colorful table on page 17.

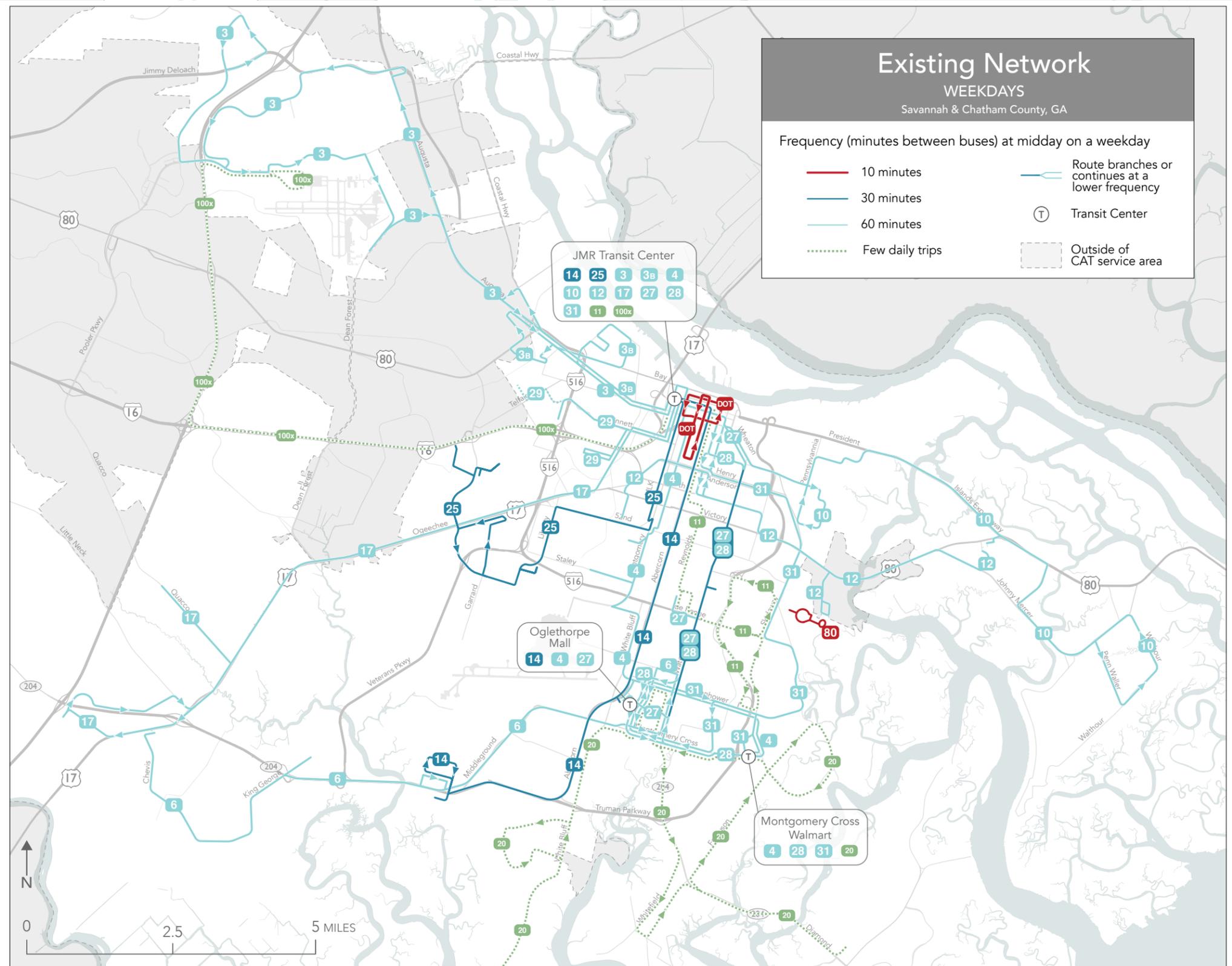


Figure 2: This map shows the entire CAT network, with routes color-coded by their midday weekday frequency.

Map: Weekdays in the High Coverage Concept

The High Coverage Concept is similar to the existing network in that most areas with a route nearby today would have a route nearby in this Concept. It would increase the number of jobs the average Chatham County resident could reach by transit within 45 minutes by about two percent.

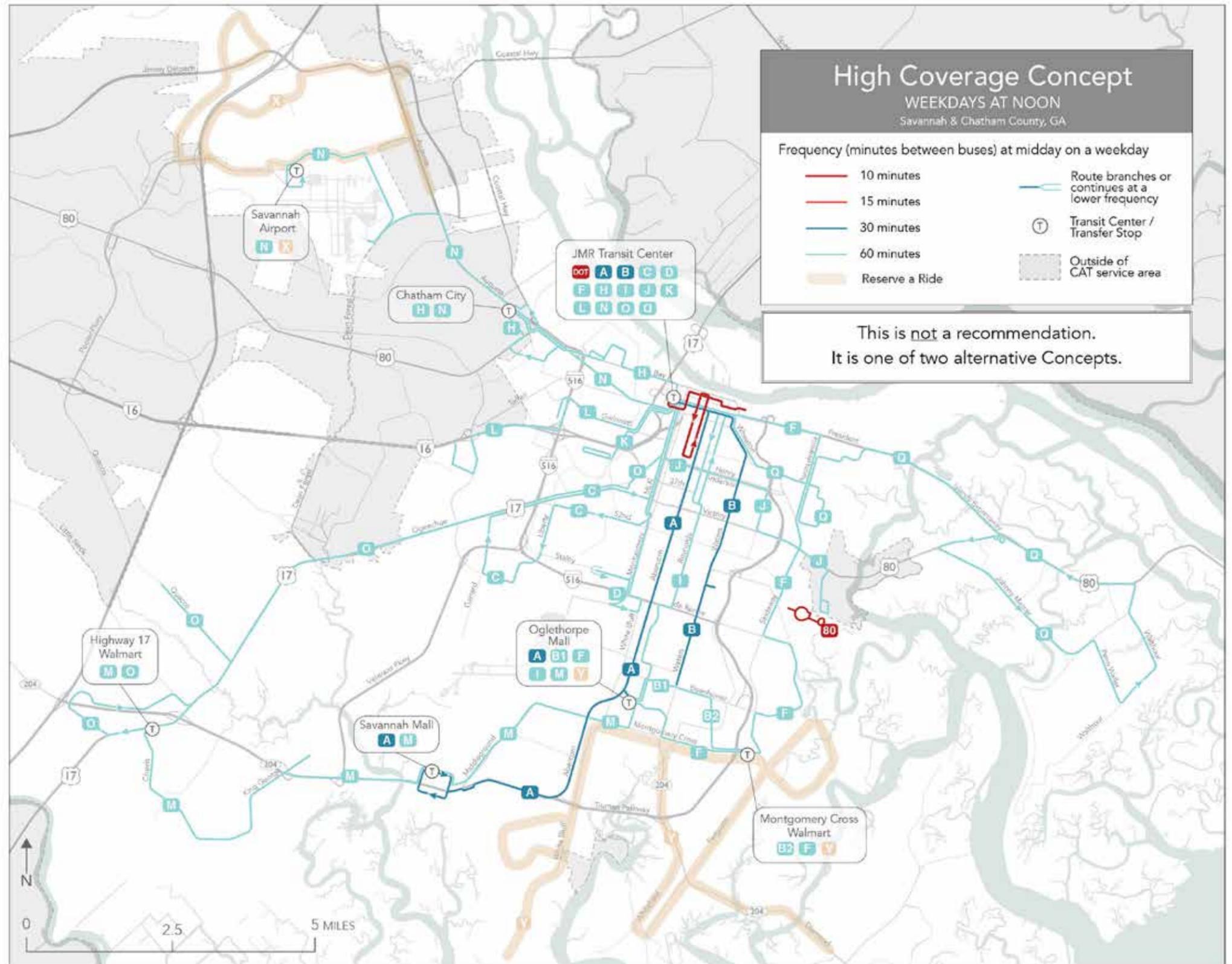
To explore this network and its relevance to your life, or the lives of people you care about, you can:

1. Find a place you care about on the map, using the labeled streets.
2. Note which routes are nearby, by letter and by color.
3. Look at the legend at upper right, to see what frequency those routes would have on weekdays.
4. Look at the other places those routes go, besides the places of interest to you. They may be different from the existing routes you know.
5. Refer to the table on page 18 to learn how the frequencies of these routes would change throughout a weekday, how many days of the week they operate, and what hours of service they offer.

Because this Concept is designed to cover all of the neighborhoods where service exists today, it is not possible to increase frequencies on any routes. It is also not possible to increase spans of service (e.g. at night or on weekends) by more than a little bit on a few routes.

Other information about this Concept that you may want to review:

- A map showing weeknight service is on page 13 and a map of Sunday service is on page 15.
- The number of residents and jobs this Concept would get close to with any service (and frequent service) is reported on page 24.
- A table reporting how access to jobs would change under this Concept is on page 32.
- Maps illustrating how peoples' travel time would be affected from sample locations are shown starting on page 26.



Map: Weekdays in the High Frequency, High Ridership Concept

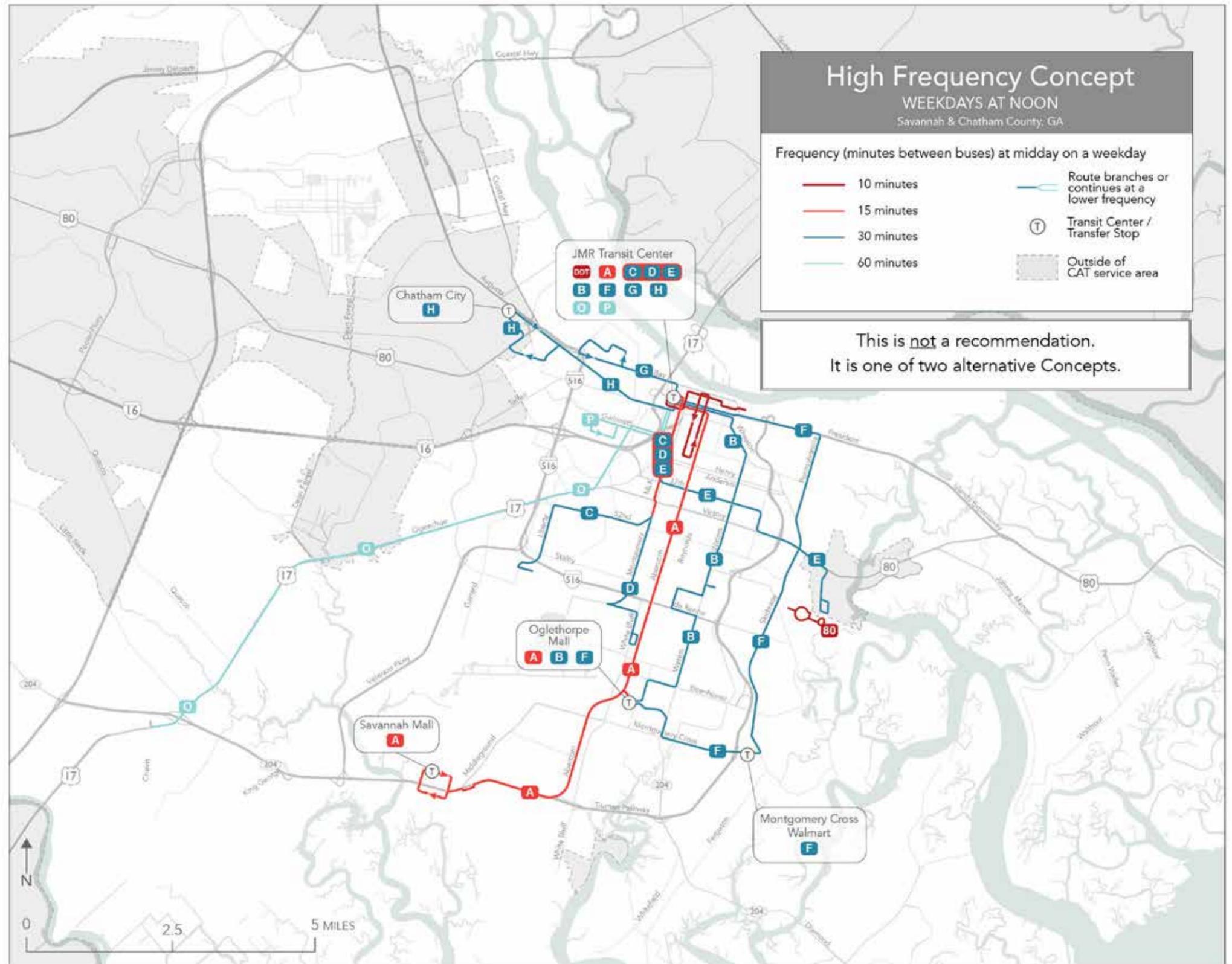
The High Frequency, High Ridership Concept would increase the number of jobs the average Chatham County resident could reach by transit within 45 minutes by about 47%.

This Concept is very different from the existing network:

- Service is concentrated into fewer routes in the areas where the most people live, work, and study so that more people ride.
 - ▶ These fewer routes can be more frequent so that a bus is more likely to be coming when someone needs it.
 - ▶ Routes also run later into the evenings and at higher frequencies on weekends than in the existing network or in the High Coverage Concept. This also makes it more likely that anyone will find transit useful for the times they need to travel.
- Concentrating service into fewer routes means less is available to spread widely. In this Concept, some areas that are covered today would be a longer walk from service or too far from service to walk at all.
- In many cases, a place that is very close to a low-frequency route today would be walking distance from a more frequent route in this Concept. This almost always gives people a faster travel time, despite the longer walk.

Other information about this Concept you may want to review:

- A map showing weeknight service is on page 14 and a map of Sunday service is on page 16.
- The number of residents and jobs this Concept would get close to with any service (and frequent service) is reported on page 24.
- A table reporting how access to jobs would change under this Concept is on page 32.
- Maps illustrating how peoples' travel time would be affected from sample locations are shown starting on page 26.



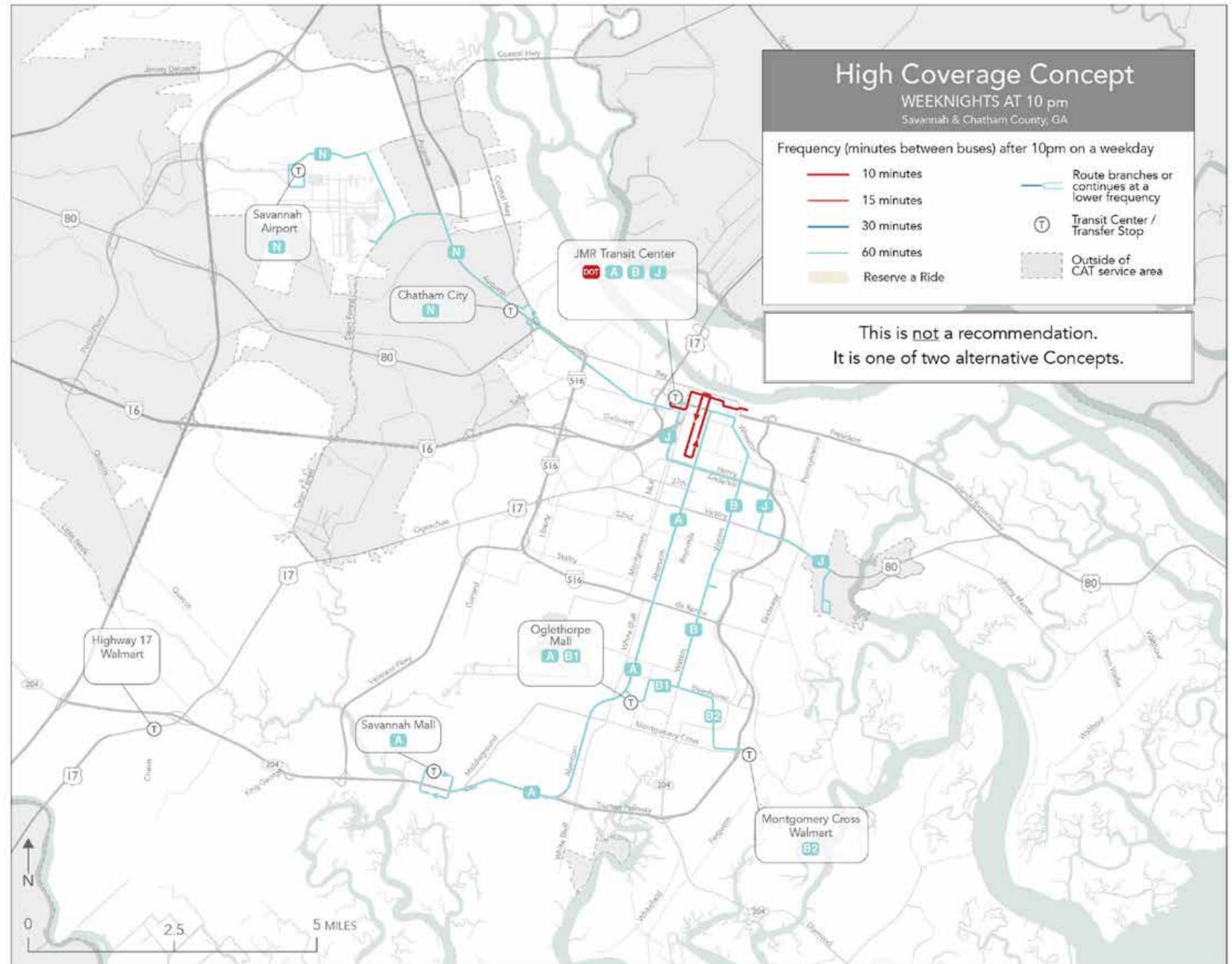
Map: Weeknights in the High Coverage Concept

The map at right shows which routes would be operating, and at what frequencies, at 10 p.m. on a weeknight in the High Coverage Concept.

Very little of the CAT transit network would operate this late. Some people working service jobs would have trouble using transit for their commutes, because it wouldn't run as late as the end of their dinner or bar shifts.

As noted earlier, some of the routes in the High Coverage Concept would stop running earlier in the evening than they do in the existing network. This is the case because some operating budget has been invested in more reliable connections, rather than night service.

Information about how late each route would run is shown in the colorful table on page 18.



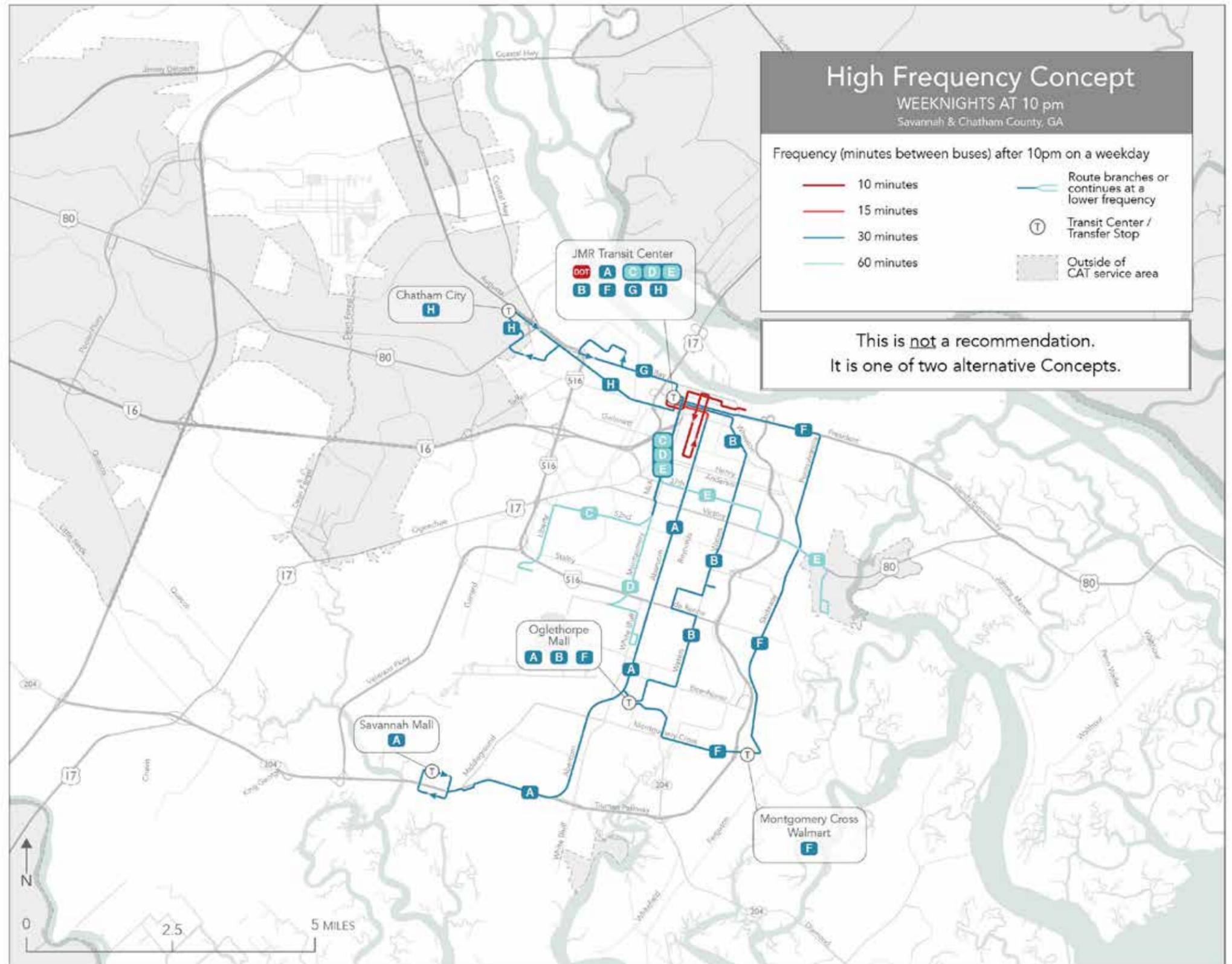
Map: Weeknights in the High Frequency, High Ridership Concept

The map at right shows which routes would be operating, and at what frequencies, at 10 p.m. on a weeknight in the High Frequency, High Ridership Concept.

This Concept would keep more routes running, and some of them at higher frequencies, later at night than the High Coverage Concept. Even though public input in Phase 1 of this project indicated less support for night service than other types of improvements, night service is part of a long-term high ridership strategy.

High transit ridership arises from large numbers of people choosing to depend on transit for most of their trips. For most people to do so, transit needs to be running whenever they travel, and most people travel in the evenings. Lower-income people are more likely to travel in the evenings because they are more likely to work in the service industry. Lower-income people have a great incentive to choose transit because they are living on a tighter budget. For these reasons, making a large number of low-wage commutes possible is part of a high-ridership strategy for Savannah.

For information about how late each route would run, on each day of the week, and at what frequencies, see the colorful table on page 19.



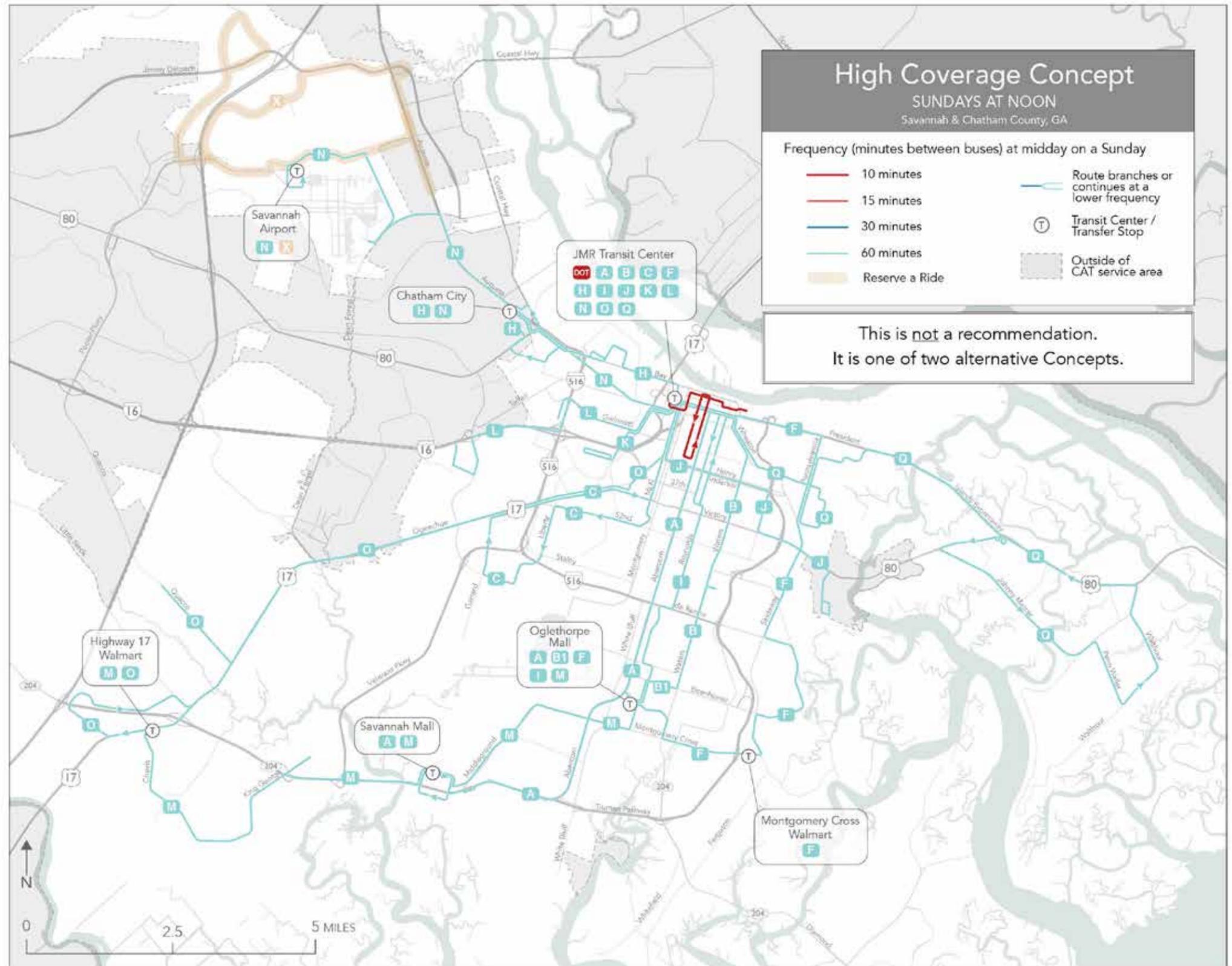
Map: Sundays in the High Coverage Concept

The map at right shows the High Coverage Concept on Sundays during the daytime.

Daytime Saturday service would be very similar to the Sunday service shown at right, except on Saturdays Routes A-Abercorn and B-Waters would come every 30 minutes.

Sunday and Saturday spans would be shorter than weekday spans, with most routes starting service later and ending service earlier. No weekday only routes (such as Routes 11-Candler and 20-Skidaway Island/Coffee Bluff in the existing network) would gain Sunday service in the High Coverage Concept. However, some routes with inconsistent Sunday frequencies (worse than every 60 minutes) would gain a consistent 60 minute frequency in this Concept.

For a better understanding of weekend service on these routes, see the frequency and span table on page 18.



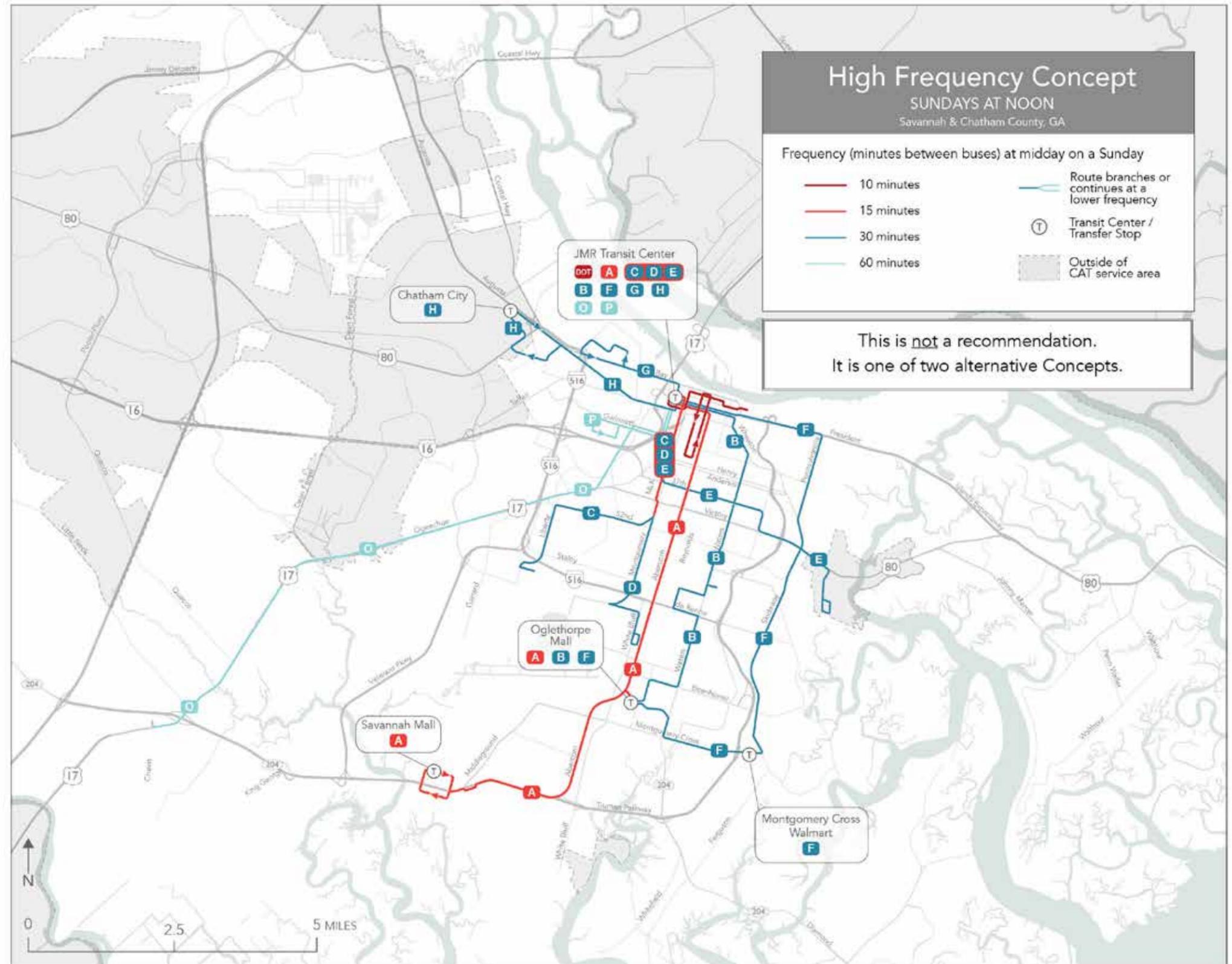
Map: Sundays in the High Frequency, High Ridership Concept

The map at right shows daytime Sunday service in the High Frequency, High Ridership Concept.

Daytime Saturday service would be the same as the daytime Sunday service shown at right - the same routes would run at the same frequencies on both weekend days. The only difference between Saturdays and Sundays in this Concept would be shorter spans on Sundays.

More frequent weekend service would make it possible for a larger number of people to commute to work, run errands and socialize on transit on Saturdays and Sundays. For anyone whose time is scarce (and this is the case for low-income people and high-income people alike), less time would be spent waiting because the bus would probably be coming when someone wanted to ride it.

For a better understanding of weekend service on these routes, see the frequency and span table on page 19.



Frequencies and Spans in the Existing Network

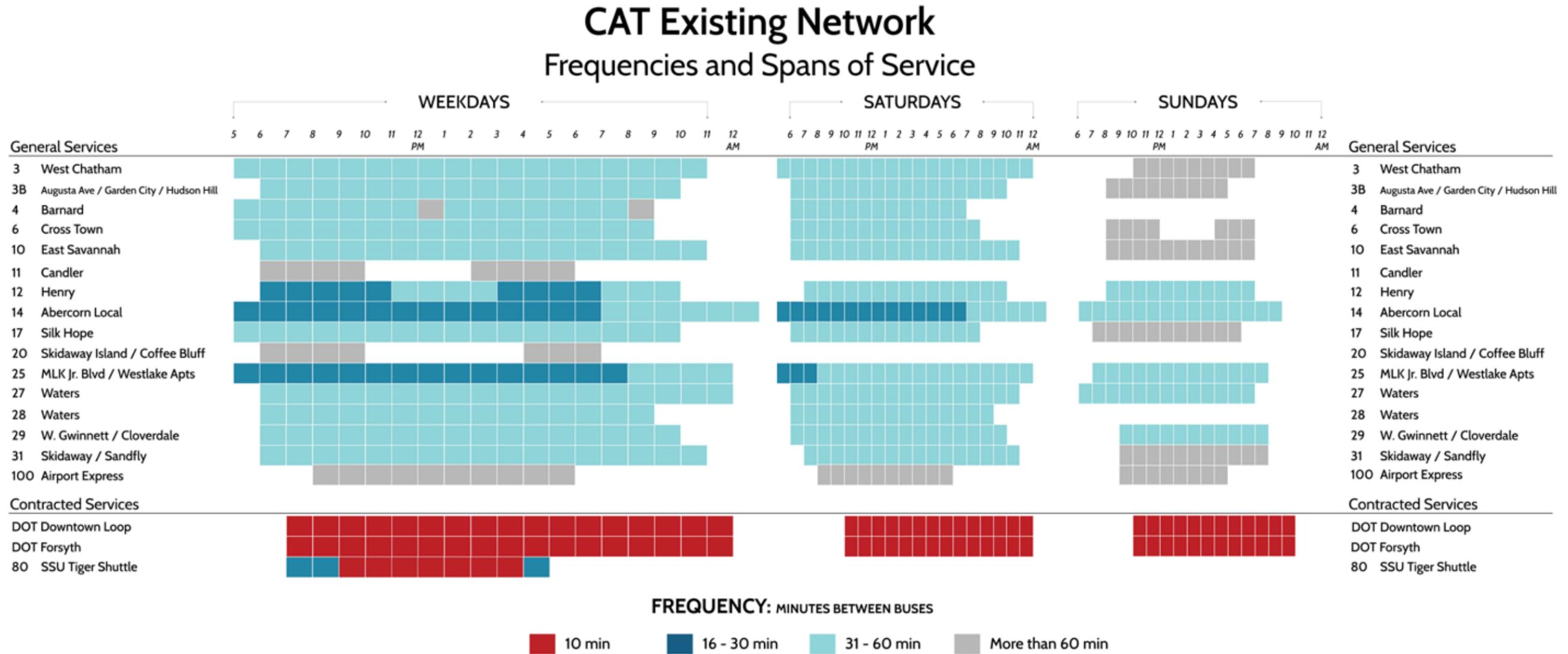


Figure 3: This table shows the frequency of every route in the existing network for each hour of the day, on weekdays, Saturdays and Sundays. Most routes offer low frequencies of 60 minutes or worse. While CAT offers fairly late night service on a handful of routes (the 25, 27 and 14), most routes go out of service early in the evening, and offer particularly short spans on Sundays.

Frequencies and Spans in the High Coverage Concept

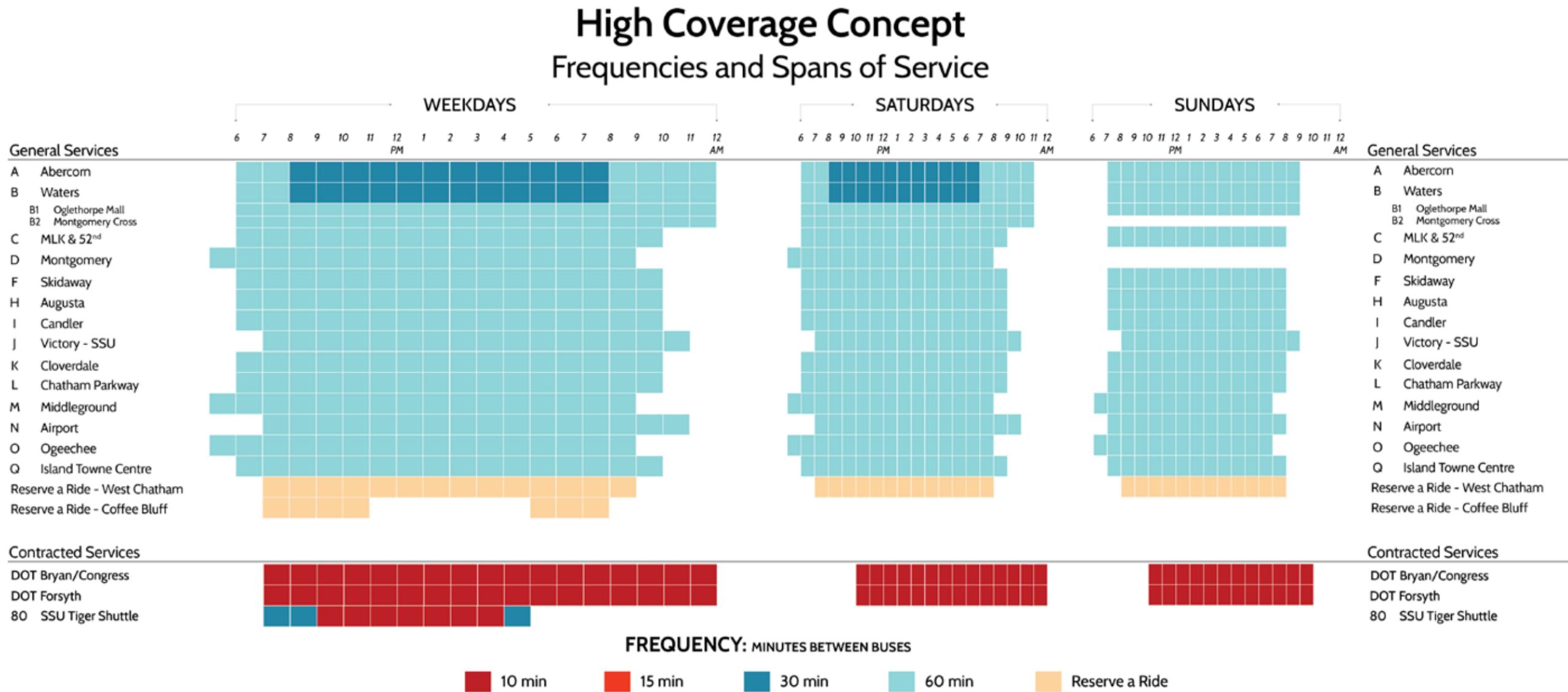


Figure 4: This table shows the frequency of every route in the High Coverage Concept for each hour of the day, on weekdays, Saturdays and Sundays. The High Coverage Concept would offer slightly more service on Sundays than the existing network. Frequencies would still be low on nearly all routes, especially on Sundays. Spans of daily service would be similar to what they are today or slightly worse in a few cases.

Frequencies and Spans in the High Frequency, High Ridership Concept

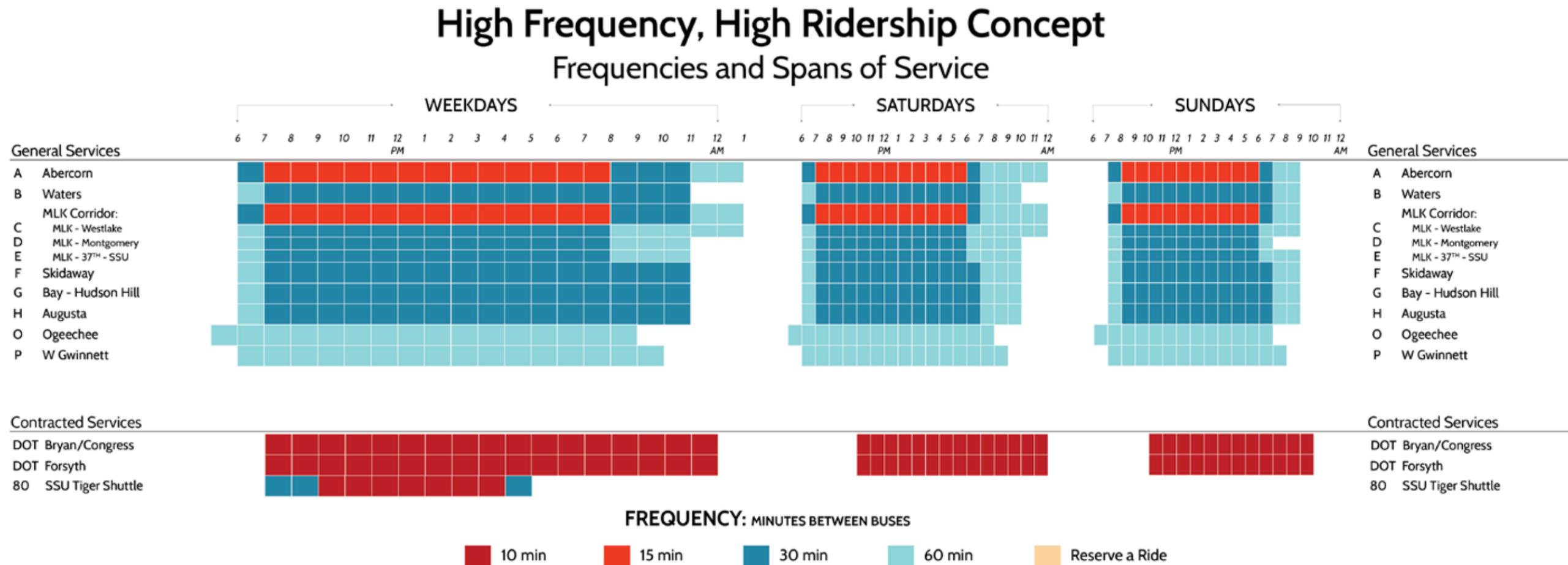


Figure 5: This table shows the frequency of every route in the High Frequency, High Ridership Concept, for each hour of the day, on weekdays, Saturdays and Sundays. The High Frequency Concept would offer longer spans of service on weekdays on most routes. It would also offer more Saturday and Sunday service in the form of higher frequencies (every 30 minutes or better on most routes) and longer spans on some routes. This Concept includes fewer routes than either the existing network or the High Coverage Concept. The same quantity of service is concentrated into these fewer routes, so that each route can be more frequent and operate longer each day and on more days of the week, and so it can thereby be useful to more people.

More About the High Coverage Concept

Many routes in the High Coverage Concept would be similar to existing routes, though a few are different. Like in the existing network, CAT would spend about 50% of its budget running service in places where ridership is high. The other 50% would be spent running service in places where few people live and ridership is low, but people have severe needs for transit.

There are two major differences between this Concept and the existing network. One is visible on the map; the other is invisible on the map.

Demand-response Services – “Reserve-a-Ride”

The first difference is that two of the lowest-ridership, least-productive routes would be replaced by an on-demand shuttle serving the same bus stops. We have described this service as “Reserve-a-Ride.”

The western end of Route 3 West Chatham goes to the airport and Highlands. This segment covers huge distances, at great operating expense, and picks up very few people. Route 20 Skidaway Island / Coffee Bluff is similar. Both areas would be covered, in this Concept, by a shuttle that requires advanced reservations, will pick someone up at any bus stop, and will take them to a nearby transfer point where service to the rest of the network is available. In the west, this point would be the airport. In the south, it would be Oglethorpe Mall or the Montgomery Cross Walmart.

Such “on-demand” and “microtransit” service has lately been promoted by Silicon Valley as a revolutionary form of transit. It is in fact an old technology, which we used to call “dial-a-ride,” but now we can offer better real-time information and dispatching (thanks to smartphones). The fundamentals of its performance – how many people it can move for a given cost – are no different from traditional dial-a-ride. These on-demand services are not providing a private ride but are rather a shared-ride public transportation service (which is why they are publicly subsidized and charge lower fares than hired cars do). This means that demand-response riders have to ride along to other peoples’ pick-ups and destinations.

No demand-response service in low-density areas like these, even with the latest technologies, has managed to move more than six people per hour. For geometric reasons this probably represents the limit of what is physically possible with a demand-response service.

Route 20 Skidaway Island / Coffee Bluff is currently handling about four boardings per hour, which is extremely low productivity by

fixed-route standards but is near the upper limit of what is possible with a demand-response service. If CAT were to switch from fixed-route to demand-response in this area, it might be possible to continue serving four boardings per hour. The subsidy per rider would still be high, but it might not be any higher than it is today, and a rider’s experience might be better.¹

We know less about the productivity of the western end of Route 3 West Chatham, because it is currently a segment of a route and its boardings data is combined with boardings on the very busy eastern end of Route 3. Based on the very small number of boardings observed at each stop, and the very long distances CAT needs to drive between those stops, it seems possible that the western segment of Route 3 attracts fewer than six boardings per hour. If this is the case, then a demand-response service to those stops could theoretically handle existing demand. However, people using these stops would no longer have a direct ride into Savannah - they would have to make a connection at the airport.

The spans of both of these demand-response services are shown in the frequency table on page 18.

The fares for both of these services would be equal to the fare for a fixed-route. Advanced reservations would be required. Same-day trip requests might be accommodated with a higher fare.

Reliability

There are two types of improvement in reliability in this Concept.

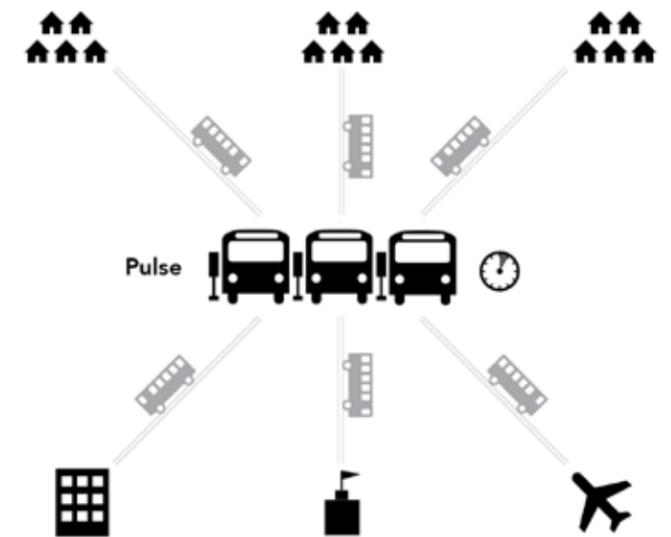
One is simply the benefit of re-writing bus schedules from a “blank slate.” Many of CAT’s bus schedules have not kept up with the times, and reflect driving times that were right 15 years ago but are no longer accurate today. Some routes have gotten slower to drive, and some have gotten faster. Starting fresh means using an estimate of driving times that is more accurate, and applying that estimate to the new planned routes.

“Blank slate” schedules that better-match reality would be present in both Concepts. There is a small cost to doing so; some bus routes need a little more time to drive and therefore consume a little more budget than in the past. Yet, updating them in this way will mean that buses are more likely to arrive and depart on time.

¹ This theory is still being tested and may not pan out. In 2017, AC Transit replaced a very low-ridership fixed-route with a demand-response service. The productivity of the demand-response service was lower than they expected. Surprisingly, the majority of boardings did not take place at the times and places of riders’ choosing but rather at the stop where the service made its only dependable, scheduled departure, once per hour!

The other improvement in reliability is the restoration of a *timed connection* or *pulse*. Today, only a few routes are designed so buses meet at the JMR Transit Center at the same times. This allows people to quickly connect between them, in both directions. In these Concepts, all of the low-frequency routes would offer such a timed connection.

The pulse is essential to the function of the High Coverage Concept because nearly every route is infrequent all day. In the High Frequency



Concept, routes’ frequencies are higher during the day, but at night when frequencies fall, some pulsed connections would be offered.

In the High Coverage Concept, there would be two pulses: a major pulse of many routes at the JMR Transit Center and a pulse of fewer routes at the Oglethorpe Mall. Not every route would pulse with every other route, but routes from very different parts of town would be intentionally pulsed with one another, to make cross-town trips more reliable. Some trips that today require a very long wait at a transit center would in this Concept require only a 5 or 10 minute wait.

Restoring the pulse costs money. For a pulse to work, routes must be designed so their trips to and from the center take just the right amount of time. When they meet up with other arriving buses, they must sit and dwell together for a few minutes so passengers can transfer among them – they can’t simply stop and go. This additional time in their schedules costs operating budget; budget that today is spent on slightly longer spans of service on some routes, especially at night. Whether or not CAT should restore the pulse is a complex question, and is described at

greater length on page 36.

As noted earlier, public input in Phase 1 of this project reveals a large number of people place a high priority on reliable service. On average, people place a greater priority on reliability than on night or weekend service.

This is a value judgment the public can and should revisit, now that it is demonstrated in this Concept. It is certainly possible the network ultimately recommended in this System Redesign could maintain existing spans of service exactly, and maintain all existing coverage...but it would not then be possible to restore the pulse and the reliable connections it supports. CAT's operations are stretched so tightly today that, within a fixed budget, any improvement in one area requires a sacrifice in another.

More About the High Frequency, High Ridership Concept

The High Frequency, High Ridership Concept is very different from the existing network. Instead of spending 50% of the budget covering places where there are small numbers of people, ridership is low, but people have severe needs for transit, in this Concept CAT would spend just 10% of its budget in such low-ridership places. This would free up a great deal of funding to increase the frequencies and spans of CAT's higher-ridership routes, making service more useful where there are large numbers of people.

In this Concept, every route but two would offer service every 30-minutes or better, during daytimes, every day of the week. Yet some places that have service today would have none, or would be a longer walk from service, in this Concept.

Two of CAT's general public routes would offer frequent service every day of the week.² Route A on Abercorn all the way from downtown to Savannah Mall would come every 15 minutes, every day. Routes C, D and E would combine to offer service every 15 minutes between 52nd Street and downtown on MLK Blvd. (Those three routes would also branch off beyond 52nd Street.)

This Concept was designed with great attention to:

- Places with the largest numbers of residents.

- Places with the largest numbers of jobs and services.
- Places where great numbers of students are traveling.
- Places where large numbers of low-income people live, work and travel.
- The distances necessary to reach those places since longer distances consume more of the limited budget for service.

These factors make Abercorn Street a great source of high ridership potential. Large numbers of residents are within walking distance of Abercorn, as are large numbers of jobs and services. Abercorn is continuously dense, with only a few low-density areas. As a result, CAT needs to cover only modest distances to get service close to large numbers of people. The mix of housing, education and retail along Abercorn means that transit can attract riders all day in both directions and that it is particularly useful for service industry workers, lower-income residents and students.

Why would this Concept attract a large number of riders?

The consulting team is certain, were this Concept to be implemented, it would get higher ridership than either the High Coverage Concept or the existing network. Why are we so certain?

- Repeated, wide-scale research has shown that higher frequencies and longer spans of service are a major factor in predicting ridership. This is true in many different kinds of urban areas, including places like Savannah.
- This network would get many more jobs within a reasonable travel time for the average resident than do the existing network or the High Coverage Concept. People choose transit if it is workable given their destination and their time constraints. Making more destinations accessible within less time for a large number of people is a straightforward way to attract more riders.
- In places where concentrated service offers higher frequencies and longer spans *today*, ridership is much higher. In similar parts of Savannah where frequencies are lower and spans are shorter, even if there are large numbers of people nearby and similar demographics, ridership is lower. This is not just true in Savannah, but all over the world.

The High Frequency, High Ridership Concept would massively grow the number of people in Chatham County who could use transit to reach jobs within a reasonable amount of time. More information about this

growth in access is on page 32.

No profit motive

CAT is a public agency that provides transit in order to service community goals, not in pursuit of "profits." No public transportation system is profitable. While private for-profit companies can be involved in delivering transit service by providing buses, drivers or other contracted services to public agencies, public transit agencies themselves are not pursuing or making a profit.

Fares paid by riders can help offset some of the costs of transit, but in a place like Chatham County fares rarely cover even 25% of that cost. Even in the biggest cities, only about 1/3 of the cost of operating transit is collected from riders through fares. The rest of the cost is covered by taxpayers, just as the costs of schools, parks and roads are covered by taxpayers.

The High Frequency, High Ridership Concept is designed to attract numerous riders in order to distribute the benefits of transit to large numbers of people. As a side effect, the amount of revenue collected through fares would likely increase. This increase would be too small to "restore" any of the coverage that is provided in the existing network.

Fare revenues do contribute to financial sustainability over time, but they make up a small part of the CAT budget. Some federal grants are calculated based on ridership, however, and the total number of people riding CAT buses can therefore affect how much federal funding CAT receives.

² The contracted DOT and SSU shuttles would offer high frequency service in both Concepts. The frequency of service on those routes is largely up to their funders, who are the City and SSU, respectively.

3 Comparing Outcomes

This chapter reports on three different ways of measuring the potential outcomes of the Concepts.

These measurements are not forecasts. They do not make assumptions about how culture, technology, prices or other factors will change in the next few years. These are simple arithmetic measures that combine existing distance, time and population information to show the potential of each Concept and how they each differ from the existing network.

Proximity

The first measure reported, on the next page, is very simple: *How many residents and jobs are near transit?*

Proximity does not tell us how useful people will find transit service, only that it is nearby to them. We also report on proximity to frequent transit service, to provide a little more information about how many people are near service that they are more likely to use.

Isochrones

To understand the benefits of a network change, consider this simple question: *Where could I get to, in a given amount of time, from where I am?*

This question refers to the physical dimension of liberty and opportunity. To the extent that you want to do things outside of your neighborhood, your life will be more free, and you will have more opportunities, if you can get to more places in a given amount of time.

Isochrones provide a visual explanation of how a transit network changes peoples' freedom to travel, on foot and by transit, to or from a place of interest. A few examples are included in this report.

Access to Jobs

Isochrones display the change in access that a person would experience to or from a particular place. By summing up the isochrones for every single part of Chatham County, we can describe how average access to jobs would change for all County residents.

This is a good proxy for a ridership forecast, because it describes the part of ridership forecasting that is basic math and highly predictable: *Could more people access more jobs (and other opportunities) by transit, in less time?* If the answer is "Yes," that implies higher ridership potential.

Summary of Outcomes

This section is repeated from the Introduction and Summary chapter above.

In plain language, the Concepts would likely have these effects on transit outcomes:

- **Ridership potential** would increase slightly in the High Coverage Concept, and would increase a great deal in the High Frequency, High Ridership Concept.
 - ▶ *In the High Ridership Concept, more people could reach more opportunities in a given amount of time.*
 - ▶ Other factors would affect whether or not people choose to ride, such as fares, parking pricing, gas prices, employment levels, etc. Holding all of these other factors constant, however, when more people can make more of their trips faster, by transit, more people will choose to ride.
 - ▶ *The increase in job access in the High Ridership Concept would be as high for low-income County residents as for the general population, and it would be even higher for minority residents.*
- **Larger parts of the region are unserved in the High Ridership Concept than in the High Coverage Concept**, and this is very obvious when you compare the network maps.
 - ▶ However, because the uncovered areas are mostly low-density areas, the number of residents and jobs who lose coverage is lower than you might expect from the visual impression given by the maps.
- **The High Coverage Concept would increase slightly the number of residents near any all-day service, but would not increase the number who are near frequent service.**
- **In contrast, the number of people living on the frequent network would triple in the High Ridership Concept.** Frequency correlates strongly with high ridership.
- **The High Coverage Concept is somewhat simpler than the existing network. The High Ridership Concept is radically simpler.** Spans of service throughout the days of the week also get simpler. Simplicity is important to attract spontaneous and new riders. Fewer lines mean a network is easier to remember, and more frequent lines with more consistent spans make trip-planning easier.
- **The number of places where Savannah and Chatham County could justify encouraging transit-oriented development, including**

affordable housing, is greater in the High Ridership Concept.

Dense developments, affordable housing developments and urban neighborhoods around them benefit from frequent transit service, and some cities have policies allowing more density, less parking, and greater affordability around frequent bus lines like the Route A - Abercorn in the High Ridership Concept.

Proximity to Transit Service

The number of people within a certain distance of transit is the simplest measure of transit outcomes. In this report we call this measure *proximity* or *coverage*.

The two bar charts at right show how many residents (at top) and jobs (at bottom) would be within 1/4 mile¹ of any all-day service, or frequent service.

- The High Coverage Concept would maintain all existing coverage and even increase it very slightly (with 46% of residents close to any service, compared to 44% in the existing network).
 - ▶ It would not increase the 4% of service-area residents who would be close to frequent service.
- The High Ridership Concept would massively increase the number of service-area residents near frequent service (from 4% to 12%), but this would be paid for through reductions in coverage.
 - ▶ As a result, 32% of residents would be near any service, rather than the 44% who are close to any service in the existing network.
- The High Coverage Concept would slightly increase the number of service-area jobs that are close to any service, but would not increase the number of jobs that are close to frequent service.
- The High Ridership Concept would greatly increase the number of jobs that are close to frequent service, to 37%, mostly due to the high frequency provided on Abercorn from downtown to Savannah Mall.
 - ▶ To accomplish this, coverage of jobs by any service would have to decrease slightly.

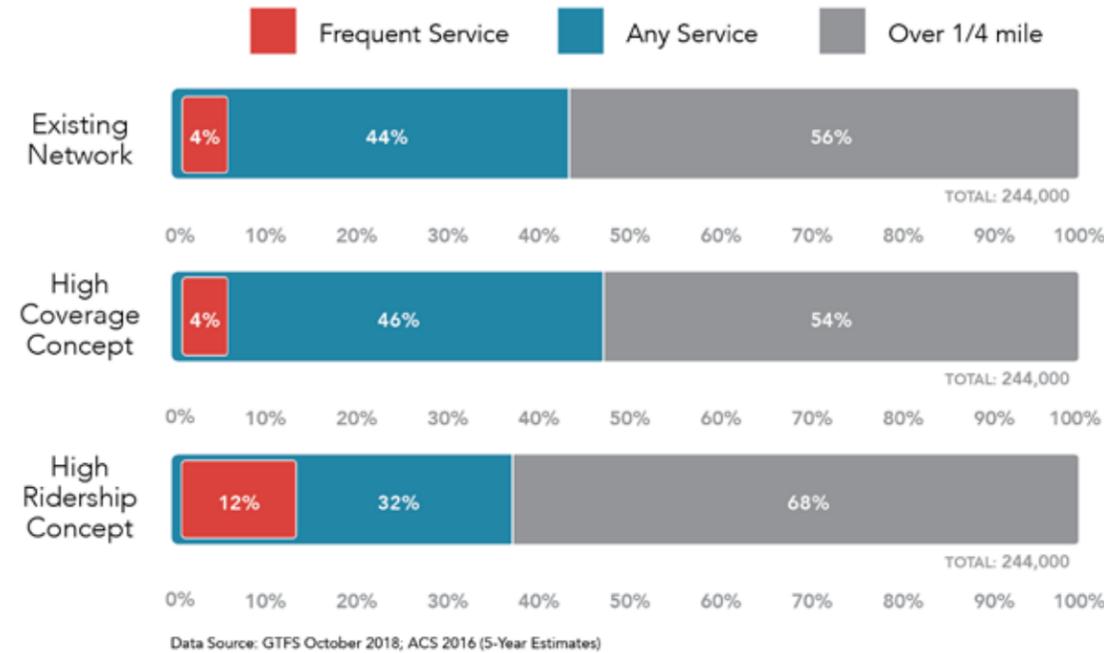
Proximity to service of any type is a good measure of an agency's success towards a coverage goal (though more specific investigations are essential to determine whether vulnerable people and important destinations are covered). Proximity does not tell us how useful the service is to people, only that it is nearby.

In pursuit of a coverage goal an agency will spread service thinly, to cover as many people as possible. Spreading transit thinly means routes have low frequencies, short spans, and circuitous routing. A route that is not very useful, but is proximate to many people, is helping an agency meet a coverage goal.

¹ Different people are willing and able to walk a different distance to transit. Different street environments make such a walk easier or harder. People will walk longer distances to services that offer shorter waits or faster speeds. Notwithstanding this variety in tolerable walking distances, we have assumed that someone is "proximate" to transit service if they are within 1/4 mile of a bus stop, as-the-crow-flies. Walking 1/4 mile over flat ground takes the average person about 5 minutes.

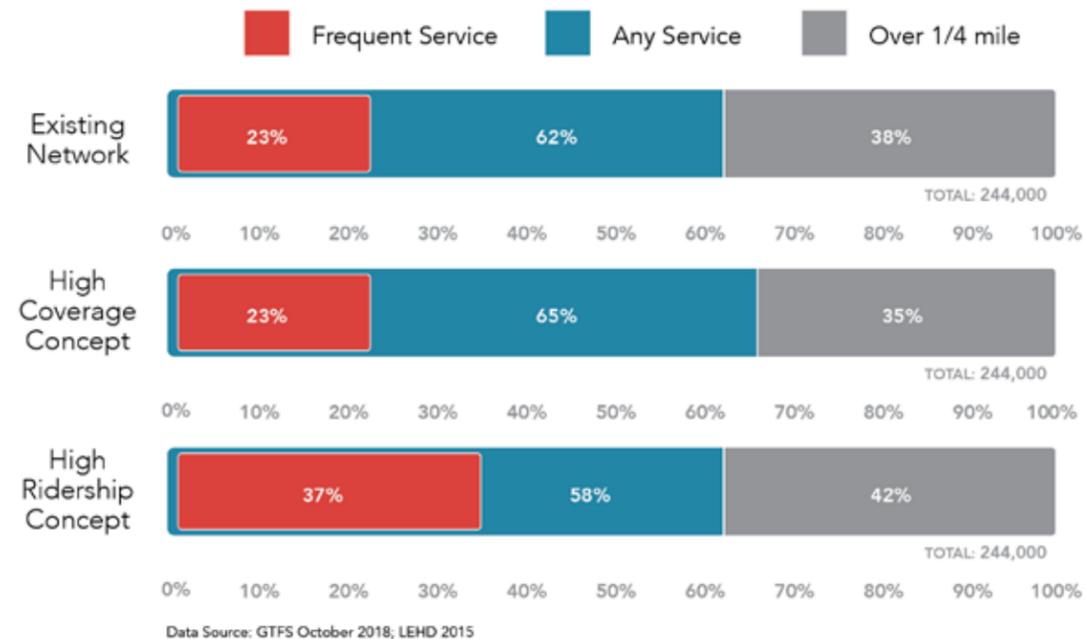
Residents Near Transit

at midday on weekday (within 1/4 mile)



Jobs Near Transit

at midday on weekday (within 1/4 mile)



Proximity to *frequent* service speaks more to success at a ridership goal. Frequent service is more expensive relative to the area it covers, but it is more useful and therefore tends to attract higher ridership.

The gain in proximity to frequent service, and the loss in proximity to non-frequent services, in the High Ridership Concept is an illustration of the trade-off between ridership and coverage goals. Within a fixed budget, CAT cannot *both* increase frequencies in places where large numbers of people live, *and* spread service out to cover a large area.

Transit is often tasked with providing affordable transportation for low-income residents, which is why agencies provide service to some people and areas, regardless of ridership potential. Federal laws also protect those with low incomes from disparate transportation impacts, which is why agencies sometimes provide transit service in places where poverty is high, even if this does not maximize ridership.

The two bar charts at right show how many low-income residents (at top) and minority residents (at bottom) would be within 1/4 mile of any all-day service,² or frequent service.

In the existing network, CAT provides service within 1/4 mile of a higher share of residents in poverty (61%) than of the general population (44%, as shown in the graph at top on the previous page).³

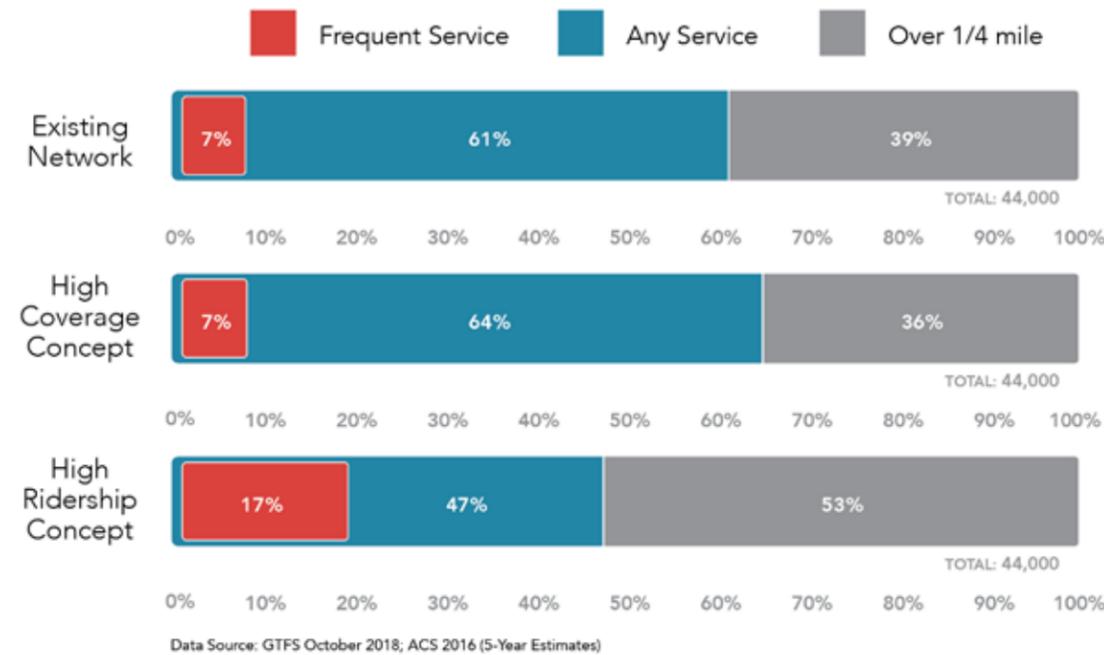
- The graph at top shows that the High Coverage Concept would slightly increase the number of low-income service-area residents near any service, from 61% to 64%.
- Also in the top graph, the High Ridership Concept would more than double the number of low-income service-area residents near frequent service, from 7% to 17%
 - ▶ However, the number of low-income residents near *any* service would decrease.
- Comparing the bars in the graph at bottom, the High Ridership Concept would dramatically increase the number of minority residents near frequent service from 4% to 12%.
 - ▶ Just like for the total population, getting more minority residents near *frequent* service would require reducing the number of minority residents near *any* service.

² Peak-only services (Routes 11 and 20) are not counted in this analysis.

³ Low-income residents are also more likely to be close to frequent service in the existing network (7% of them are) than the general population (of whom only 4%) are. This may be attributable to the large number of students living near the frequent DOT shuttles downtown.

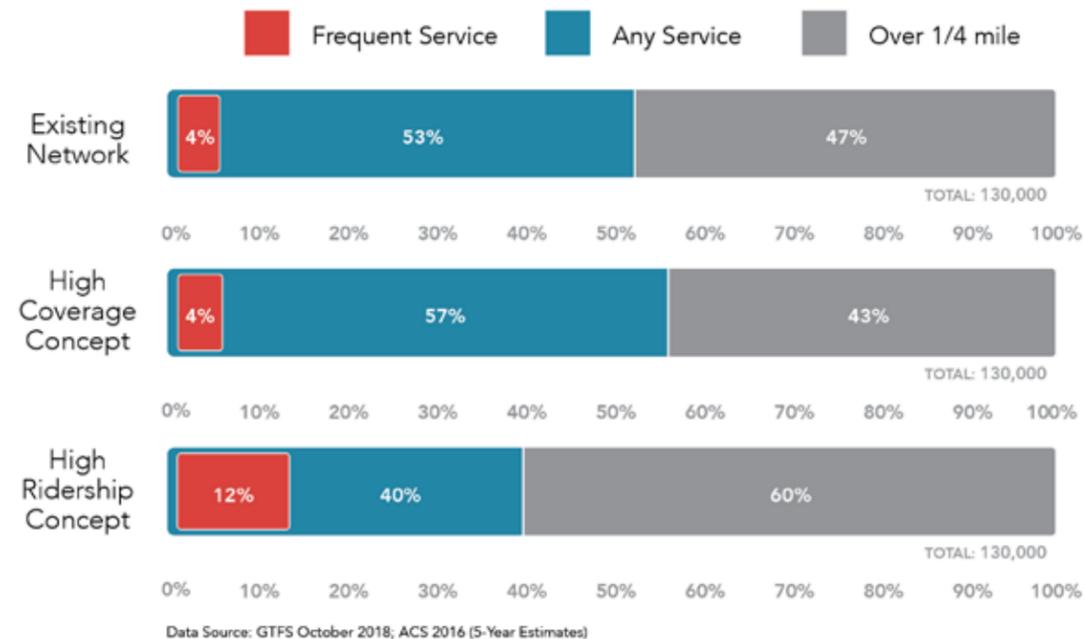
Low Income Residents Near Transit

at midday on weekday (within 1/4 mile)



Minority Residents Near Transit

at midday on weekday (within 1/4 mile)



Isochrones: Maps of Liberty and Opportunity

Putting transit, even high-frequency transit, near people is not enough to attract large numbers of people to actually ride. Transit needs to go *where* they want to go, and also *when* they want to go.

A proximity analysis only tells us how many people are near transit, not where and when transit meets their needs. We need a way to describe the kind of access that becomes possible on a complete and connected transit network.

We can do that by asking a question like, “Where can I get in 45 minutes on this network?” To answer that question, we analyze every trip that can be made by walking and transit. The geographic border around the trips you can take in a set amount of time is called an “isochrone.”

We refer to these as *maps of liberty and opportunity* because they show how free someone is to access the opportunities around them, using transit.

Large isochrones, centered on places where large numbers of people live, mean not only that ridership will be high, but also that a great number of people will be free to pursue the opportunities offered across the urban area.

Everyone’s Time is Valuable

All kinds of people find that their time is valuable, especially low-income and working people. Because their time is valuable, they will find another option if riding transit takes too long.¹ For low-income people, the other option might be to buy a car (and forgo other opportunities, to cover the cost); to use a taxi, Uber or Lyft; to get a ride from someone; or, worst of all, to simply not make the trip.

Ridership is not the only payoff of large isochrones. Liberty and opportunity have their own value to the community, aside from how they affect transit ridership. For lower income people, transportation is the biggest barrier to employment, and can also limit access to education. When low-income people are able to get to more places in less time, it means they have more choices in their lives, and in that sense, more freedom.

¹ Travel time is not the only reason to choose transit, but it is a major factor in nearly every potential rider’s decision. Subjective features such as comfort, amenity, and perceptions of safety also influence the choice. Those other factors matter less until the service is basically *useful* – it takes people where they want to go in an amount of time they find reasonable.

How to Read Isochrones

In the sample isochrones in this chapter, you will see a dot at the starting location. Around this starting point are blobs of color, which show where a person could be, in the noted amount of time, by some combination of walking and riding transit.²

These isochrones compare each Concept to the existing network.

The three colors on the map mean:

- Blue: Areas that would become accessible in the Concept but are not accessible in the existing network.
- Red: Areas that are accessible in the existing network but would no longer be accessible in the Concept.
- Purple: Areas that are accessible in the existing network and would remain accessible in the Concept.

The sample isochrones in this chapter show how far someone could get within 60 minutes of travel. These locations were chosen to illustrate the differences between the two Concepts because they are major destinations, or home to large numbers of people. When looking at these isochrones, keep in mind that:

- Waiting time counts!³
- A long walk to a high-frequency route can get people farther, faster, than a short walk to an infrequent route.
- Some of the access shown in these isochrones isn’t reached via a single route, but rather two routes. Especially with the high-frequency routes in the High Ridership Concept, some places are reachable quickly even when the trip involves a transfer.
- You can use this tool to think about access in the reverse. For a worksite or store at the center of the isochrone, it shows who could readily get there: the employees it could attract or the customers who could shop there.

² The isochrones assume that people must walk along the street network, and can only cross major streets and highways at a signal. The isochrones account for situations in which there are few through-streets and walking is harder. However, they do not account for opportunities to walk across parking lots, lawns and parks.

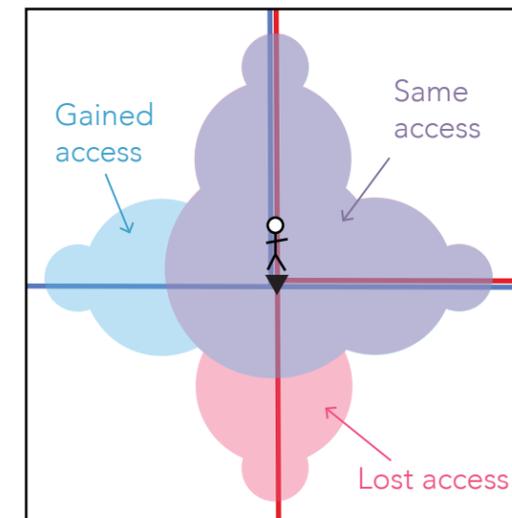
³ Even if you don’t wait at the bus stop, a lower-frequency route often makes you wait at your destination because it forces you to arrive very early (rather than be late). Very few people have the liberty of arriving whenever they please for all of their trips, and no one can make it so that they are released from events like doctor’s appointments or movies at exactly the right time to catch the bus home. Riding transit means waiting *somewhere*. The more frequent the transit, the shorter the wait.

Not Just the Area – Also What is Inside the Area

The real measure of usefulness is not just how much geographic area we can reach, but *how many useful destinations are in that area*.

This is why each map on the next four pages reports the change in the numbers of jobs and residents within each isochrone, relative to the existing network. This is also why the access analysis shown on page 32 takes into account not just the areas that are reachable within a certain amount of time, but also the number of people living or working in those areas.

It has long been known that ridership arises from service being useful, for more people, to get to more busy places. That’s why predictive models that forecast ridership do this very same this analysis, behind-the-scenes.⁴



⁴ Such predictive ridership models require assumptions about culture, sociology and economics, which always turn out to be wrong in some way and increase the uncertainty in the predictions.

Sample Locations

The isochrones on the next few pages compare the High Coverage and High Frequency Concepts to the existing network for four locations around Chatham County. These locations were chosen to evaluate closely because they are home to large numbers of people, or destinations for large numbers of people.

Downtown Savannah

Bull Street & E Broughton Street

Downtown Savannah is the center of the city's tourism industry, and the greatest concentration of jobs and housing in the County.

Both Concepts would expand access to jobs from downtown Savannah, and access by residents to downtown Savannah. The only place in either Concept where some people would lose access to downtown within 60 minutes of travel is in the High Coverage Concept, along the existing Route 25. The frequency of Route 25 in the High Coverage Concept would be reduced from every 30 minutes to every hour. Access to downtown would be expanded in the High Ridership Concept, especially along Abercorn, Waters, Skidaway, Montgomery and Augusta.

A 60-minute transit commute may seem like a lot, but remember that it doesn't mean someone has spent 60 minutes on the bus. Imagine someone is going to a movie that starts at 7:00 p.m.. Their bus route gets them there a little early, at 6:45 p.m.. That 15 minutes waiting at their destination is the average wait they experience whenever they ride this half-hourly bus anyway.

Here is what their trip is like:

- Walk 10 minutes to bus stop.
- Get to bus stop 5 minutes before bus is scheduled to depart, to be safe. Catch the bus.
- Ride bus for 30 minutes.
- Arrive at theater at 6:45 p.m.. Wait 15 minutes until 7:00 p.m. movie starts.
- Total time riding: 30 minutes.
- Travel time budget used: 60 minutes.

Once you count all of this, many people actually have a "60 minute" transit commute to and from downtown Savannah, but they might not think of it as taking quite so long if they only count the bus-riding time.

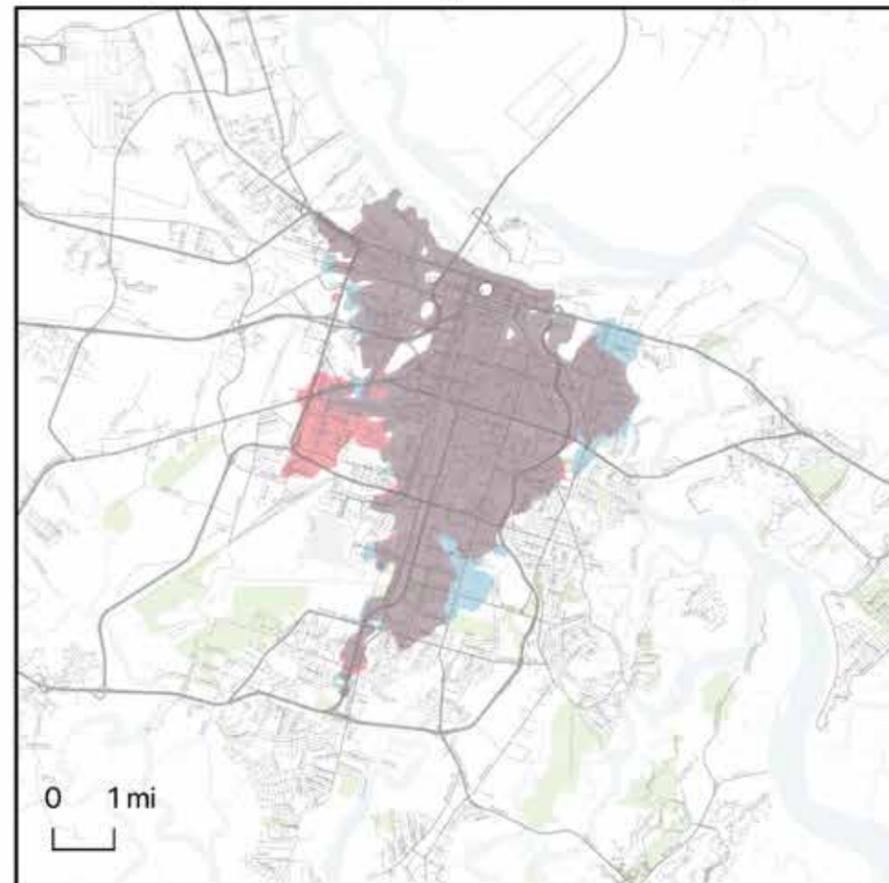


How far can I travel in 60 minutes from Savannah Downtown at noon on a weekday?



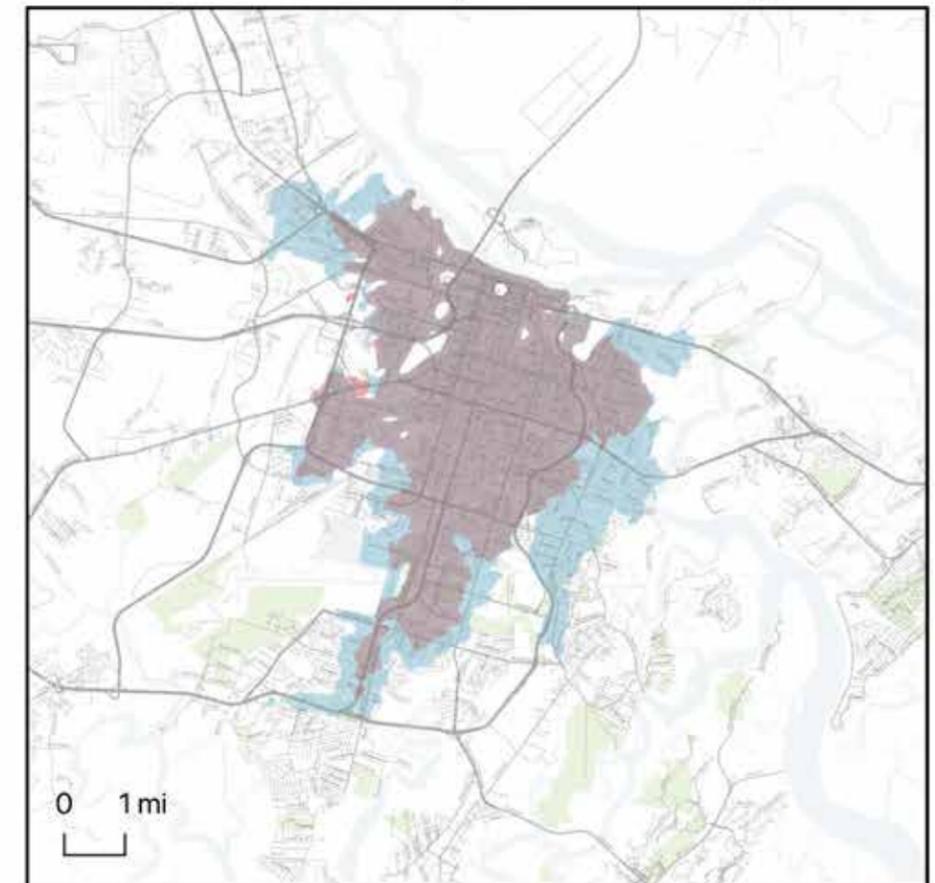
High Coverage Concept

1% more residents and 4% more jobs accessible than existing network



High Ridership Concept

35% more residents and 17% more jobs accessible than existing network



Georgia Southern University – Armstrong Campus

Abercorn Street & Middleground Road

GSU Armstrong is an important destination for Countywide residents by itself, but it is also near retail outlets, workplaces, St. Joseph’s Hospital and apartment buildings on either side of Abercorn Street.

The High Coverage Concept would increase by 69% the number of County residents who could reach GSU within an hour on transit. This is largely because:

- Route A - Abercorn is assumed to pull off of Abercorn Street and onto Burnett Blvd., just on campus, so that students can more easily access service in both directions (without having to cross Abercorn and walk 1/4 mile). This is part of a high ridership strategy because:
 - ▶ Large numbers of people are traveling to and from GSU Armstrong.
 - ▶ The deviation into GSU can be done very easily and quickly, without adding much travel time for through-riders.
- Route A - Abercorn would no longer make the time-consuming deviation into St. Joseph’s Hospital, where only small numbers of people board Route 14 today.
 - ▶ Without this deviation, the much greater number of people boarding the bus north or south of the hospital have a faster and more direct trip.

The High Ridership Concept would increase by 144% the number of County residents who could access GSU within an hour. This is largely because:

- The changes described above for the Coverage Concept would also exist in the Ridership Concept.
- Route A - Abercorn would come every 15 minutes (instead of the existing 30-minute frequency), which would allow people to travel farther within the same travel time budget.
- The higher frequencies on Route A - Abercorn and Route F on Montgomery Cross and Skidaway Roads mean that someone could start their trip on Montgomery Cross Road east of Oglethorpe Mall and, with a transfer to the Route A - Abercorn, make it to GSU much quicker than in the existing network.

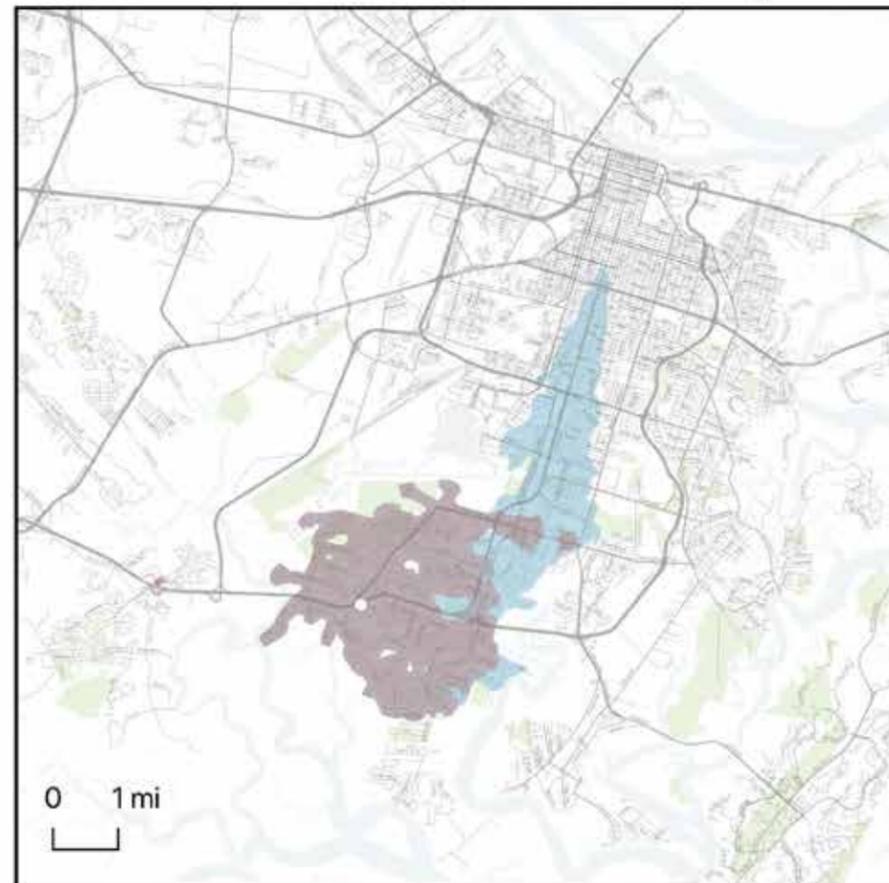


How far can I travel in 60 minutes from Georgia Southern University at noon on a weekday?



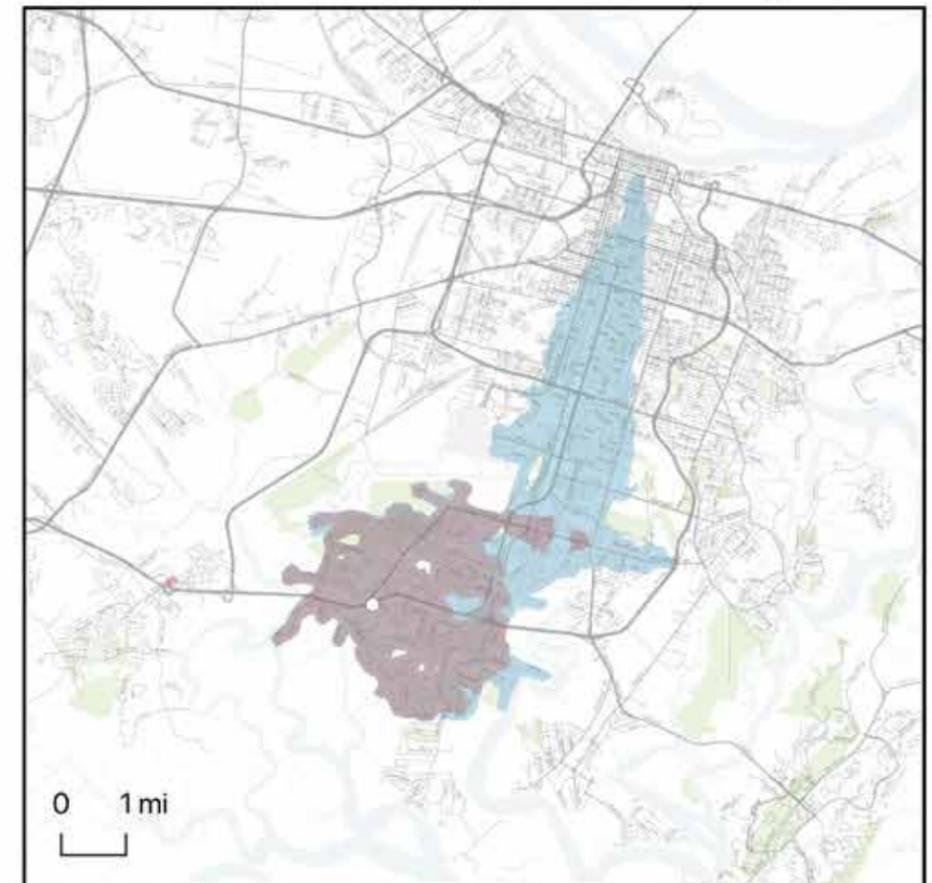
High Coverage Concept

69% more residents and 198% more jobs accessible than existing network



High Ridership Concept

144% more residents and 309% more jobs accessible than existing network



Chatham City

Minus Avenue & Augusta Road

The number of people who could access jobs in Chatham City (or the number of Chatham City residents who could access jobs elsewhere) would grow slightly in the High Coverage Concept and enormously in the High Ridership Concept.

The High Coverage Concept would increase slightly the number of residents (by 4%) and the number of jobs (by 8%) that are reachable within 60 minutes from Chatham City. This is mostly caused by slightly more direct routing of Routes H and N (compared to the existing Routes 3B and 3), and to better access into the tourism district via the more linear DOT Downtown Shuttle.¹

In the High Ridership Concept, 122% more residents could access jobs in Chatham City, and 171% more jobs are accessible from Chatham City. This is mostly caused by the higher frequencies of all routes entering downtown, which make it possible for someone to transfer to another route and reach more of the city beyond downtown, as far south as Victory Blvd. While the area on the map that appears blue in the isochrone is not as large as in some other isochrones, it is so dense with residents, jobs, services and opportunities that it has a big impact on the number of people who gain access in that Concept.

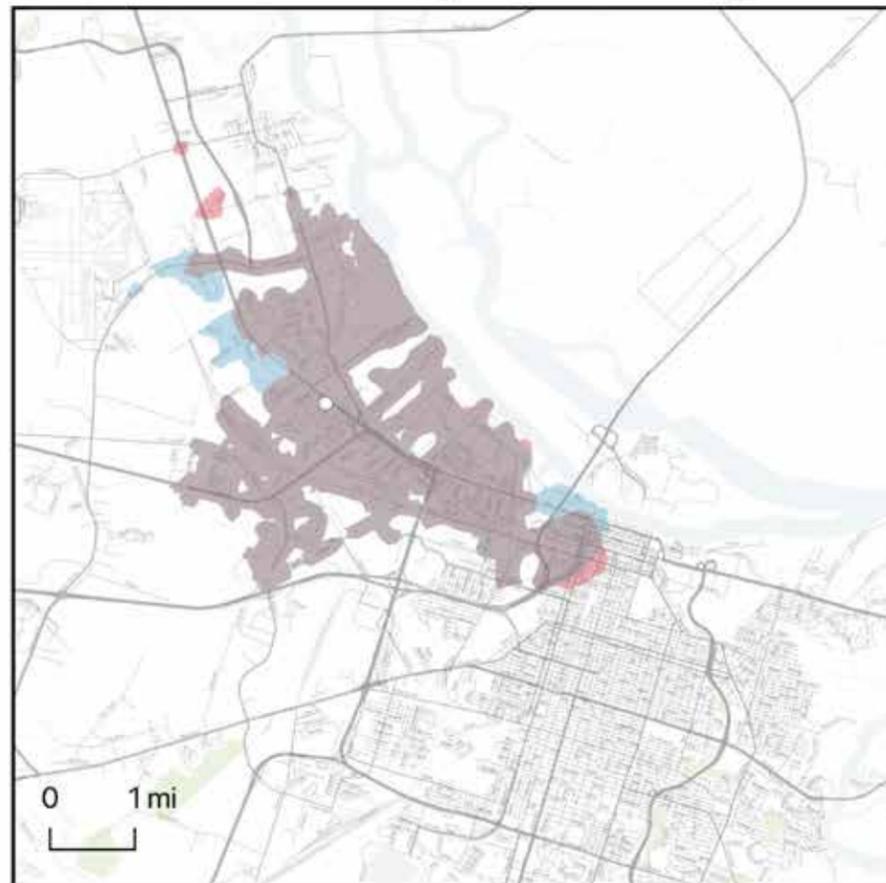


How far can I travel in 60 minutes from Chatham City at noon on a weekday?



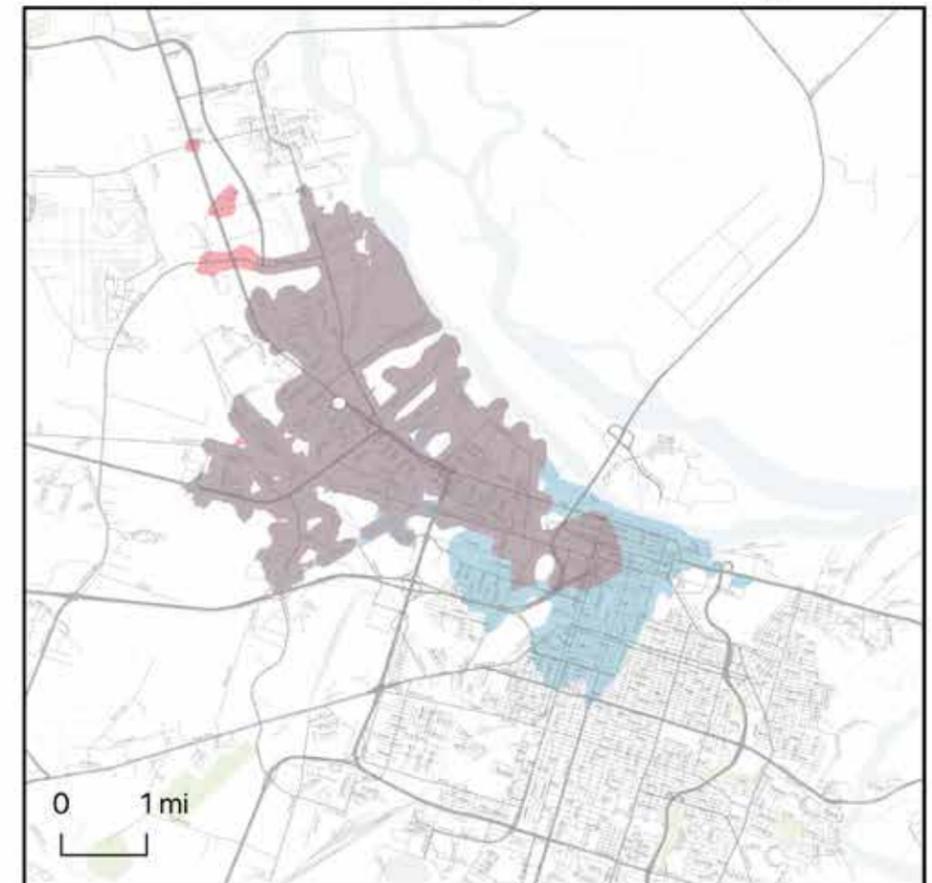
High Coverage Concept

4% more residents and 8% more jobs accessible than existing network



High Ridership Concept

122% more residents and 171% more jobs accessible than existing network



¹ In the High Coverage Concept isochrone at right, a small amount of lost access, shown in pink, appears along Augusta Road, north of Chatham City. This area would in fact be served by Route N. This apparent loss of access is an artifact of Route 3's existing one-way loop on that segment of Augusta Road. It is only possible to calculate these isochrones for an outbound or an inbound trip, but not both, and with such a big one-way loop as Route 3 the inbound and outbound trips are radically different. A one-way loop therefore makes it look as though access were lost on one side of the loop, when it is not. In the High Ridership Concept isochrone, however, those pink splotches represent real lost access, for outbound trips only, because the Ridership Concept does not continue Route N west of Chatham City.

Avondale

Alabama Avenue & Ohio Avenue

Access to and from the Avondale neighborhood would improve slightly in the High Coverage Concept and greatly in the High Ridership Concept.

In the High Coverage Concept, 12% more residents could reach a destination in Avondale (perhaps a friend's house or a place of worship) within an hour on transit. This is because in the High Coverage Concept the Route F on Skidaway would continue straight down Pennsylvania to President Street instead of following Skidaway to Wheaton Street. This provides more direct service between Avondale and eastside neighborhoods south of Victory Drive.

In the High Ridership Concept, 54% more residents and 30% more jobs would be within an hour of Avondale. This is largely because:

- Route F - Skidaway would come every 30 minutes, rather than every hour as it does in the existing network.
- Route F - Skidaway would run closer to Avondale, as described above.
- With that higher frequency service, people in Avondale could reach downtown more quickly. Once downtown, they could transfer to other routes that are also more frequent, and reach more of the city more quickly. Waiting less for their first bus gives them more time to transfer, and more time to ride farther beyond downtown.

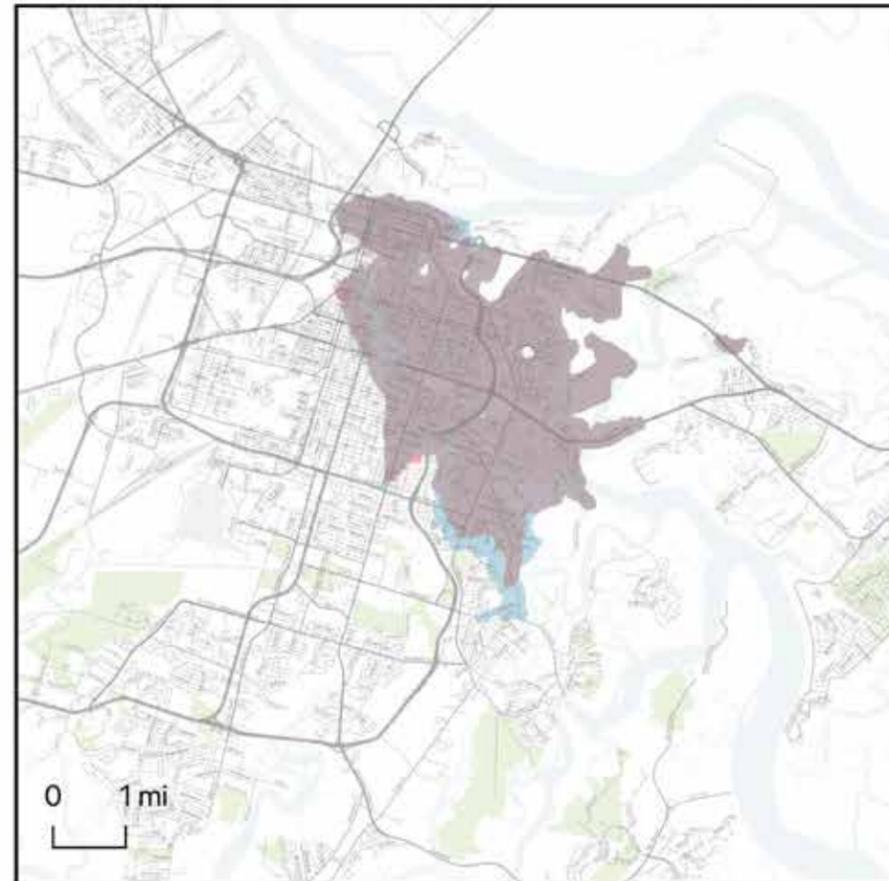


How far can I travel in 60 minutes from Avondale at noon on a weekday?



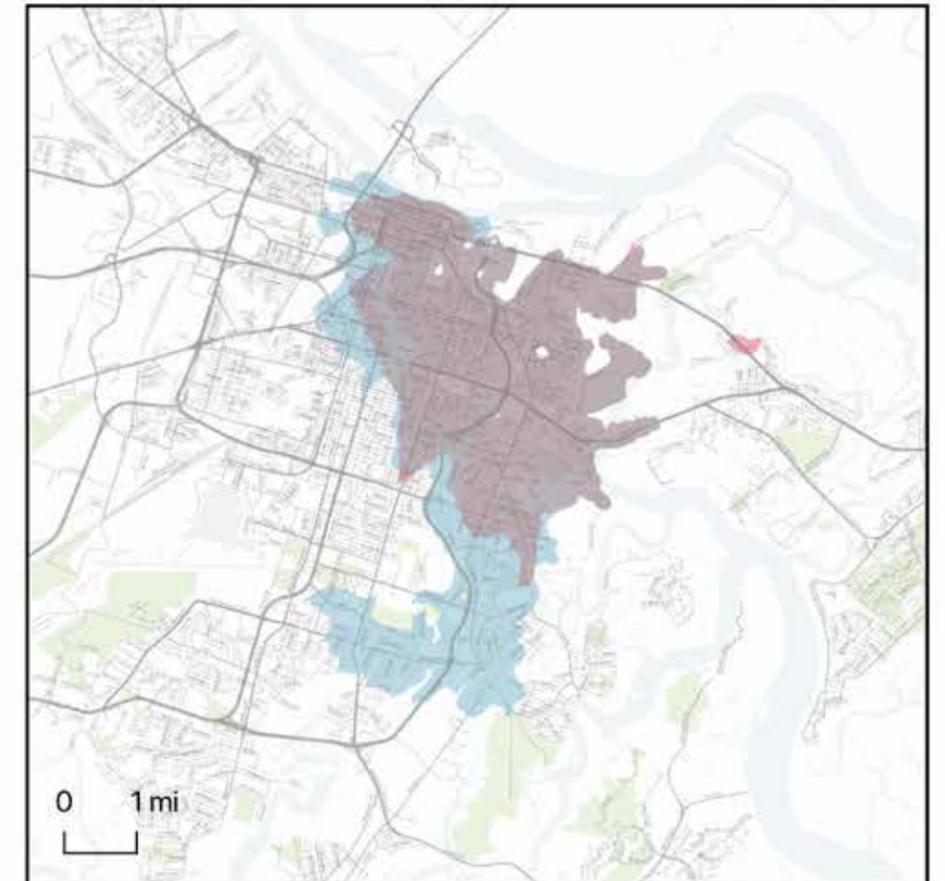
High Coverage Concept

12% more residents and 0% fewer jobs accessible than existing network



High Ridership Concept

54% more residents and 30% more jobs accessible than existing network

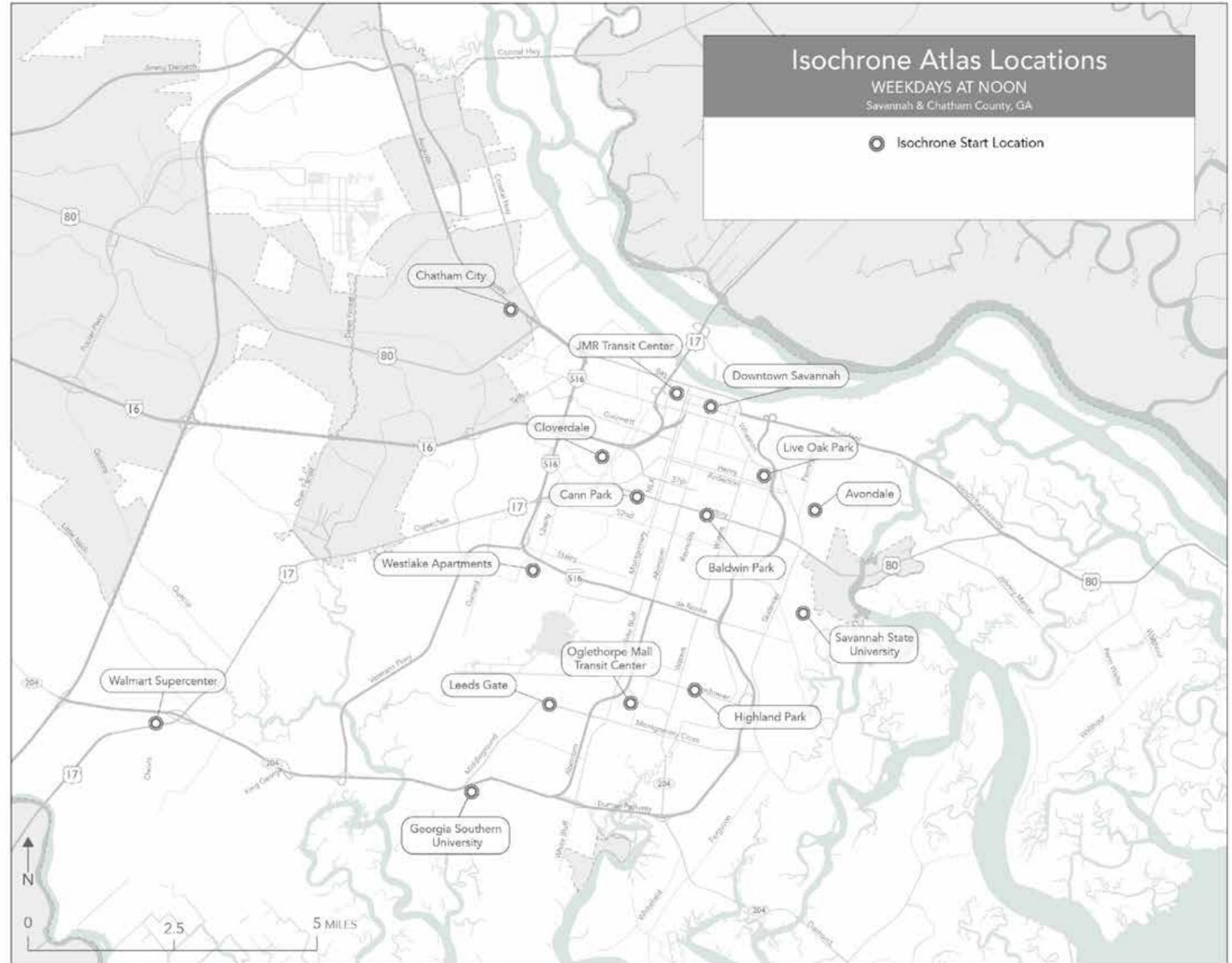


More Locations

Isochrones describing transit access within 45 or 60 minutes of travel, for both Concepts, are available for more locations than the samples shown on the previous page.

PDFs showing isochrones for each location on the map at right are available for download:

- [Avondale](#)
- [Baldwin Park](#)
- [Cann Park](#)
- [Chatham City](#)
- [Cloverdale](#)
- [Downtown Savannah](#)
- [Georgia Southern University – Armstrong Campus](#)
- [Highland Park](#)
- [JMR Transit Center](#)
- [Leeds Gate](#)
- [Live Oak](#)
- [Ogeechee Walmart Supercenter](#)
- [Oglethorpe Mall](#)
- [Savannah State University](#)
- [Westlake Apartments](#)



County Residents' Access to Jobs

The table at right describes how the number of jobs the average Chatham County resident could reach within certain amounts of time, by transit, would change under either Concept. Like the isochrones, this measure is taken using frequencies of service at noon on a weekday, so it well-represents the time when service workers in particular are commuting.

High Coverage Concept: Similar Access to Jobs

Average job access within 30, 45 or 60 minutes by transit would barely change for Chatham County residents in the High Coverage Concept.

The High Coverage Concept is very similar to the existing network, with only small changes to improve reliable connections, to make some routes more direct, and with shorter spans to make up the operating cost of reliability improvements.

The High Coverage Concept is not designed to make transit more time-competitive for anyone, and certainly not for large numbers of people. Little change in average job access is therefore exactly the type of result we would expect for this Concept.

High Frequency, High Ridership Concept: Greater Access to Jobs

The High Ridership Concept would greatly increase the number of jobs the average County resident could reach within 30, 45 or 60 minutes of travel time.

Small numbers of people in low-density and outlying areas would lose access to the minimal service they have today, but much larger numbers of people in other places would gain access to so many jobs that the overall measure for the entire County comes out very positive. The High Ridership Concept was designed to do exactly that: to increase transit access in the places where large numbers of people live.

This measure demonstrates why the High Ridership Concept would attract more transit ridership than the existing network or the High Coverage Concept. Much larger numbers of people would find their commutes (and their errands, and their social trips) easier to do by transit, and over time many more of them would choose to rely on transit. However, small numbers of people living in low-density and outlying areas would lose transit coverage entirely.

Average Transit Access to Jobs by Chatham County Residents					
Travel Time Budget	Existing Network	High Coverage Concept		High Frequency, High Ridership Concept	
		Total	Change from Existing	Total	Change from Existing
30 minutes	2,003	1,985	-1%	2,869	+43%
45 minutes	6,818	6,961	+2%	10,024	+47%
60 minutes	14,306	14,557	+2%	20,015	+40%

Minority and Low-Income Residents' Access to Jobs

Access to jobs would improve for minority- and low-income County residents to similar degrees as for all residents, in both Concepts.

The table at right reports the access changes for people living on low-incomes and for minority residents, separately from the total population. (This table was also shown in the Introduction and Summary chapter.)

In the High Coverage Concept, access to jobs would increase by 2% for the average County resident. Access to jobs would increase by 1% for the average low-income County residents, and by 2% for the average non-white resident of the County.

In the High Frequency, High Ridership Concept, access to jobs would increase for the average low-income resident in the County by 46%, a similar degree of change as for the general population. For the average minority resident, access to jobs would increase by 52%, a greater increase than would be experienced by the general population.

Change in Average Transit Access to Jobs within 45 minutes by Chatham County Residents		
	High Coverage Concept	High Frequency, High Ridership Concept
All residents	+2%	+47%
Low-income residents	+1%	+46%
Minority residents	+2%	+52%

Map: Access to Jobs in the High Coverage Concept

The map at right shows the places where residents would have more or less access to jobs within 45 minutes under the High Coverage Concept.

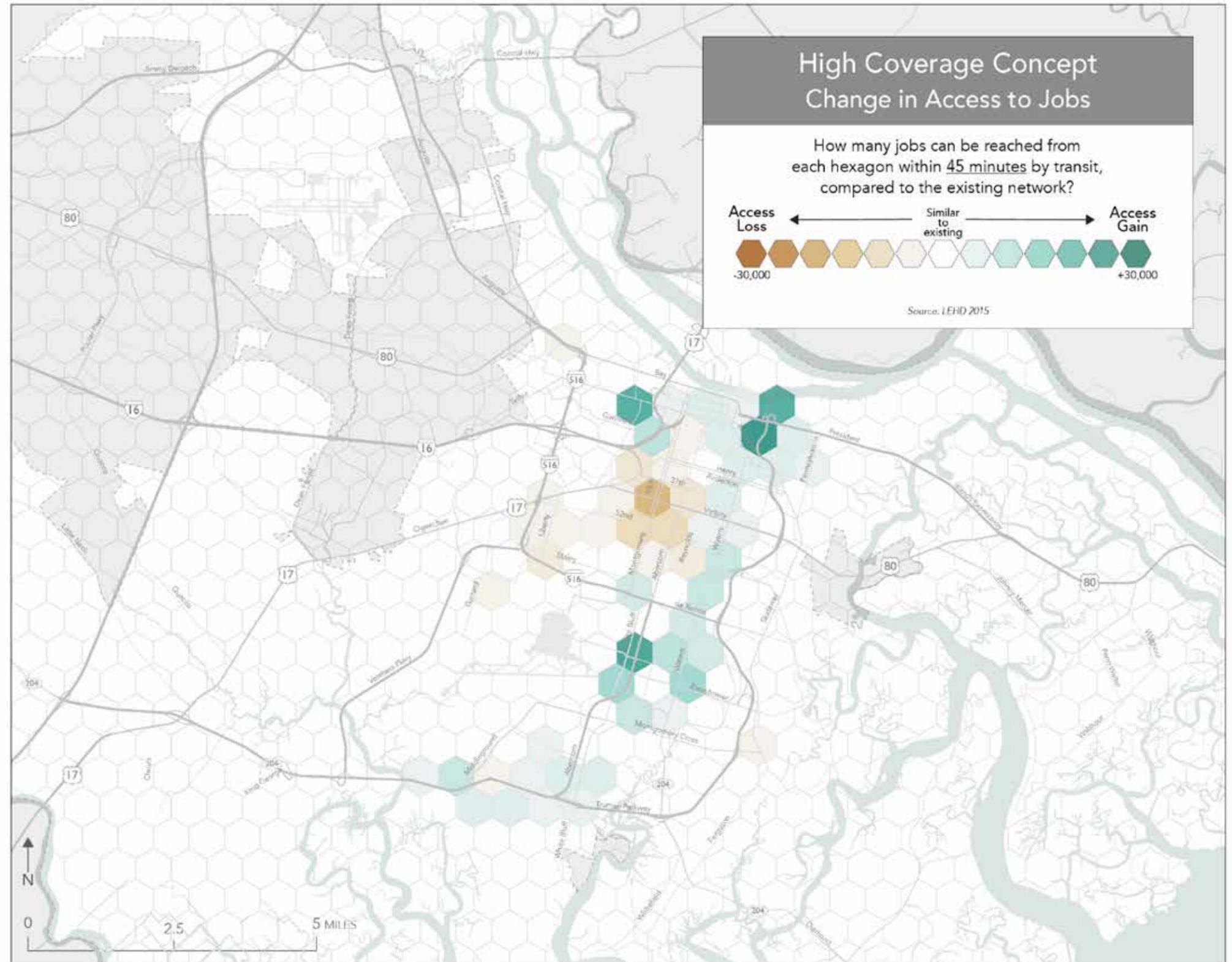
Note that the shaded colors on this map do not take into account the number of residents in each place. Some places from which more jobs would become access are home to many residents, while others are home to very few.

The High Coverage Concept would increase access to jobs from areas around downtown, Waters Ave. and midtown, while decreasing it somewhat for areas around Montgomery and Victory. Access to jobs would increase slightly around southern Abercorn Street.

In the High Coverage Concept, a loss in the number of jobs reachable from a place would not mean a loss of any access to service in that place. All places with service today would have some service nearby in this Concept, including the tan-colored areas shown at right. But some transit trips would get longer.

Recall that the major goal of this Concept is to get service close to people rather than to make service time-competitive for people. A modest loss of job access in some places is not actually in conflict with that goal. Everyone would still have some service nearby, but most of them wouldn't find it very useful for getting them to jobs, or to the other places they go.

Measuring access to jobs involves measuring transit's time-competitiveness, but time-competitiveness can't be treated as a high priority when an agency is trying to provide coverage everywhere.



Map: Access to Jobs in the High Ridership Concept

The map at right shows the places where residents would have more or less access to jobs within 45 minutes in the High Ridership Concept.

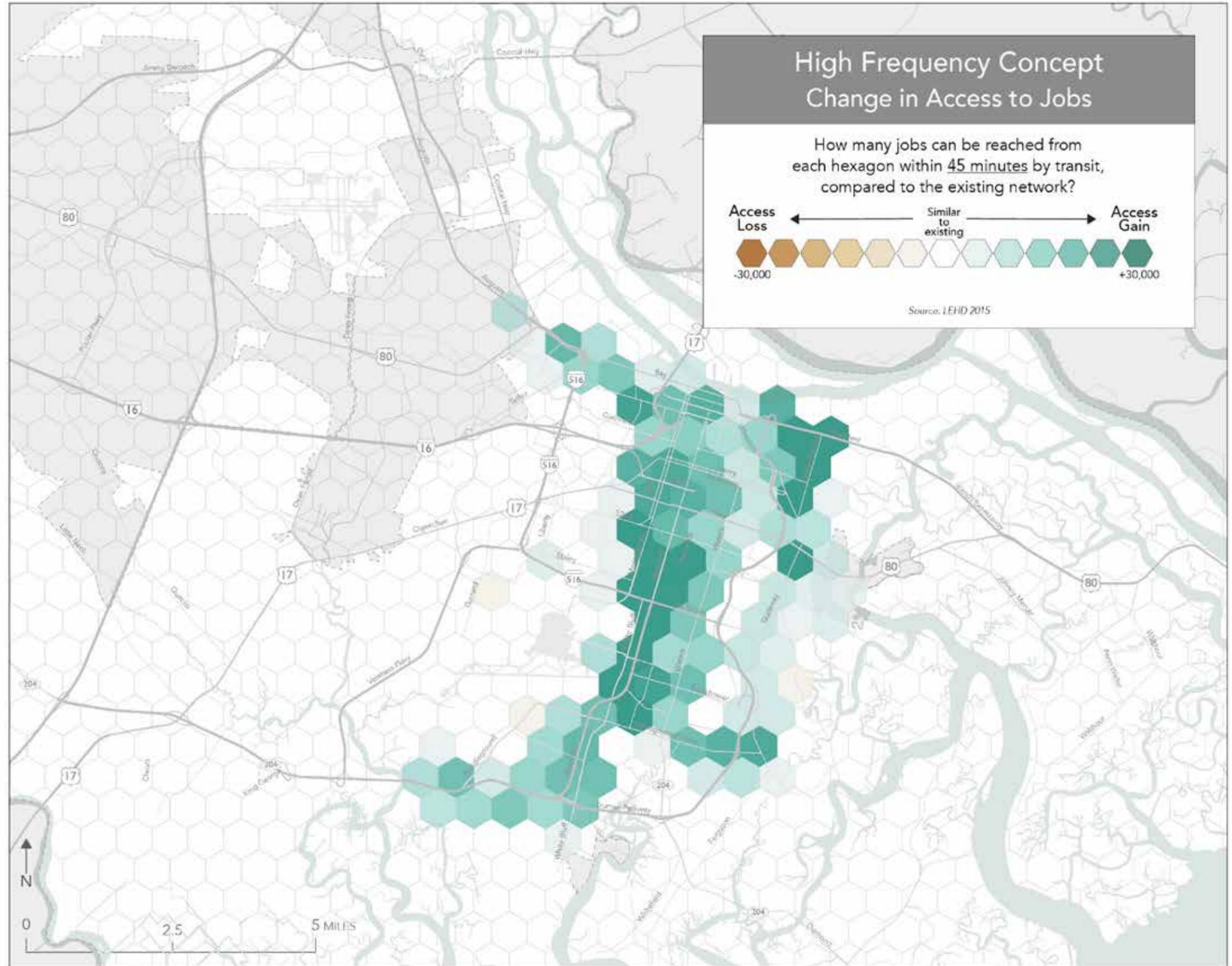
This Concept would massively expand the number of jobs reachable from nearly every neighborhood it serves. Increases in job access would be felt by residents:

- Along all of Abercorn Street, as far as Savannah Mall;
- Along Waters, Pennsylvania and Skidaway on the east side of Savannah;
- Along Montgomery Cross Road east of Oglethorpe Mall; and
- In Chatham City.

The High Ridership Concept leaves parts of the existing CAT service area completely unserved, yet these areas show up barely or not at all as having lost job access in this map. This is because so few jobs are reachable by transit within 45 minutes from those areas in the existing network.¹

Recall that the shading on this map does not take into account the number of residents within each area, only the number of jobs reachable from that area. However, this Concept was intentionally designed to make transit time-competitive in places where there are, indeed, large numbers of residents. For this reason, most of the areas with big access gains (shown in green) do indeed contain large numbers of residents.

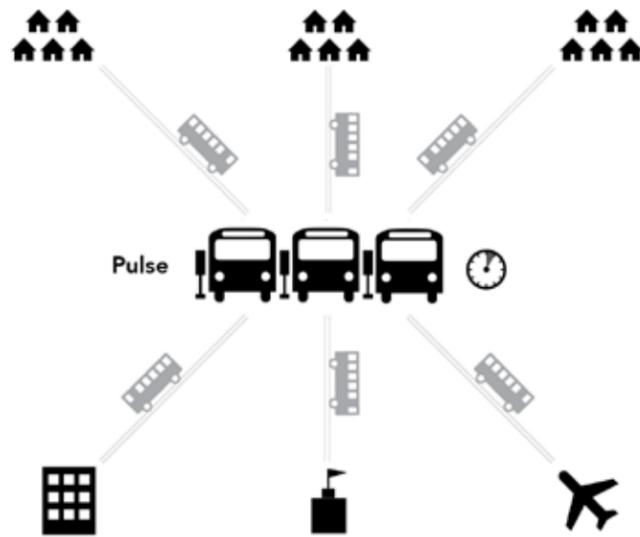
The County-wide access changes reported in the table on page 32 do take into account the number of residents living in areas where job access increases or decreases.



¹ If we were to measure the change in job access within 75 or 90 minutes of travel time, then some job access losses from outlying areas would become visible.

Reliable Connections

As described earlier in this report, there is a major difference between the Concepts and the existing network that is invisible on the map, and that is the timing of connection between infrequent routes at transit centers.



This is particularly important in the High Coverage Concept, because nearly all of the routes are very infrequent, even on weekdays. The only way that these routes can operate as a *network*, allowing people to go beyond the territory covered by a single route, is if they make timed connections with another in certain places.

Such timed connections, also called pulses, cost extra operating dollars to provide. They require very reliable operations, so every route needs extra time in the schedule to protect it against running late. They require that routes be drawn at a certain length, so that all buses can report back to the transit center in a regular, recurring pattern, to meet the other buses. And they require buses to sit and dwell together for a few minutes at the transit centers, so that people can make transfers in all directions among them. All of these constraints cost CAT extra operating dollars.

CAT's budget has remained relatively flat over the past decades while community demands for transit have grown, and as a result the pulse has been slowly squeezed away. Now a few pairs of routes make timed connections in certain places, but often only for travel in one direction. Travel in the other direction requires a very long wait. And transfers between most pairs of route are untimed, which means a long wait in both directions.

CAT will have an opportunity to restore the pulse with this System Redesign. However, it is not a given that CAT *should* restore the pulse, for three reasons:

- Establishing and maintaining a pulse cost operating dollars. In order to do this, within its fixed budget, CAT would have to either sacrifice coverage of some currently-served areas, or reduce spans of service on a few routes.
- Maintaining a pulse requires ongoing effort and discipline from the whole transit agency: administrators, planners, supervisors and operators. It also requires the installation and active use of new GPS technology, which CAT will soon have but which comes with its own costs and learning curve. Once a pulse is established CAT cannot say "yes" to most of the route-modification requests that typically come before it: to extend a route a little bit, to go down this driveway, to go around that block, etc. Small erosions in a bus's drive time can cause it to miss the pulse, which means that its riders are waiting 55 minutes for their connection instead of 5 minutes. The consequences of a missed pulse can be hugely negative for riders, which means that the pulse demands constant attention, investment and active management.

With all of those caveats aside, the images on the following pages illustrate what becomes possible with a reliable pulse. People can travel much farther across the County than they could if they were transferring between routes in an un-timed way.

Ordinarily, making a trip using two routes that each come every 60 minutes would involve so much waiting time, that you couldn't get very far with a 75-minute travel budget.

Imagine someone wants to reach a doctor's appointment at 10:00 am. The bus that goes to the clinic passes by at 9:30 am, so they will have to arrive half an hour early, and there is nothing they can do about that. (To use an hourly route, waiting half an hour at the start or the end of your trip is the average experience.)

If the way they get to their doctor's appointment is through a connection between two hourly routes, they spend a lot of time waiting!

- Get to bus stop 5 minutes before bus is scheduled to depart. Catch first bus.
- Ride first bus for 5 minutes.
- Alight, walk to connecting bus stop, wait for second bus for 30 minutes. (One of the 60-minute frequency.)

- Ride second bus for 5 minutes.
- Arrive at clinic at 9:30 am.
- Wait 30 minutes until 10:00 a.m. doctor's appointment.
- Total time riding buses: 10 minutes.
- Travel time budget used: 75 minutes.

Without a pulse, if someone can only bear to spend 75 minutes getting themselves to their doctor's appointment before they hire a car, buy a car, ask a friend or family for a ride, or just don't go to the doctor, then that only leaves them *10 minutes of time moving down the road* to get anywhere. They spend so much time waiting, they barely get beyond their own neighborhood.

If, instead, they are using a pair of bus routes that make a timed connection at a pulse, they can get much farther:

- Get to bus stop 5 minutes before bus is scheduled to depart. Catch first bus.
- Ride first bus for 25 minutes to transit center.
- Alight, walk to connecting bus stop, where the second bus is probably already parked. Board and wait 5 minutes while the pulse takes place.
- Ride second bus for 25 minutes.
- Arrive at clinic at 9:30 am.
- Wait 30 minutes until 10:00 a.m. doctor's appointment.
- Total time riding buses: 50 minutes.
- Travel time budget used: 75 minutes.

Even though they still have to arrive at the clinic half an hour before they would like to, their connection requires a great deal less waiting. As a result, they can spend more of their personal travel time budget riding farther. This might mean that they have more choice in where to see a doctor, as well as where to do their grocery shopping, to worship, to study, or to work.

The purpose of a high coverage network is to give a large number of people the option to use transit, even if few of them take it. It is possible to make infrequent transit trips reliable, and for infrequent routes to operate as a *network*, giving people access places beyond their neighborhood or their route. The pulse helps deliver those outcomes.

Three Examples

The maps on the following pages show three example locations, and how the pulse would expand access to and from these locations within 75 minutes of travel time.

These are just examples – the pulse would also help people travel to and from many other places on infrequent routes, in similar ways.

Cloverdale

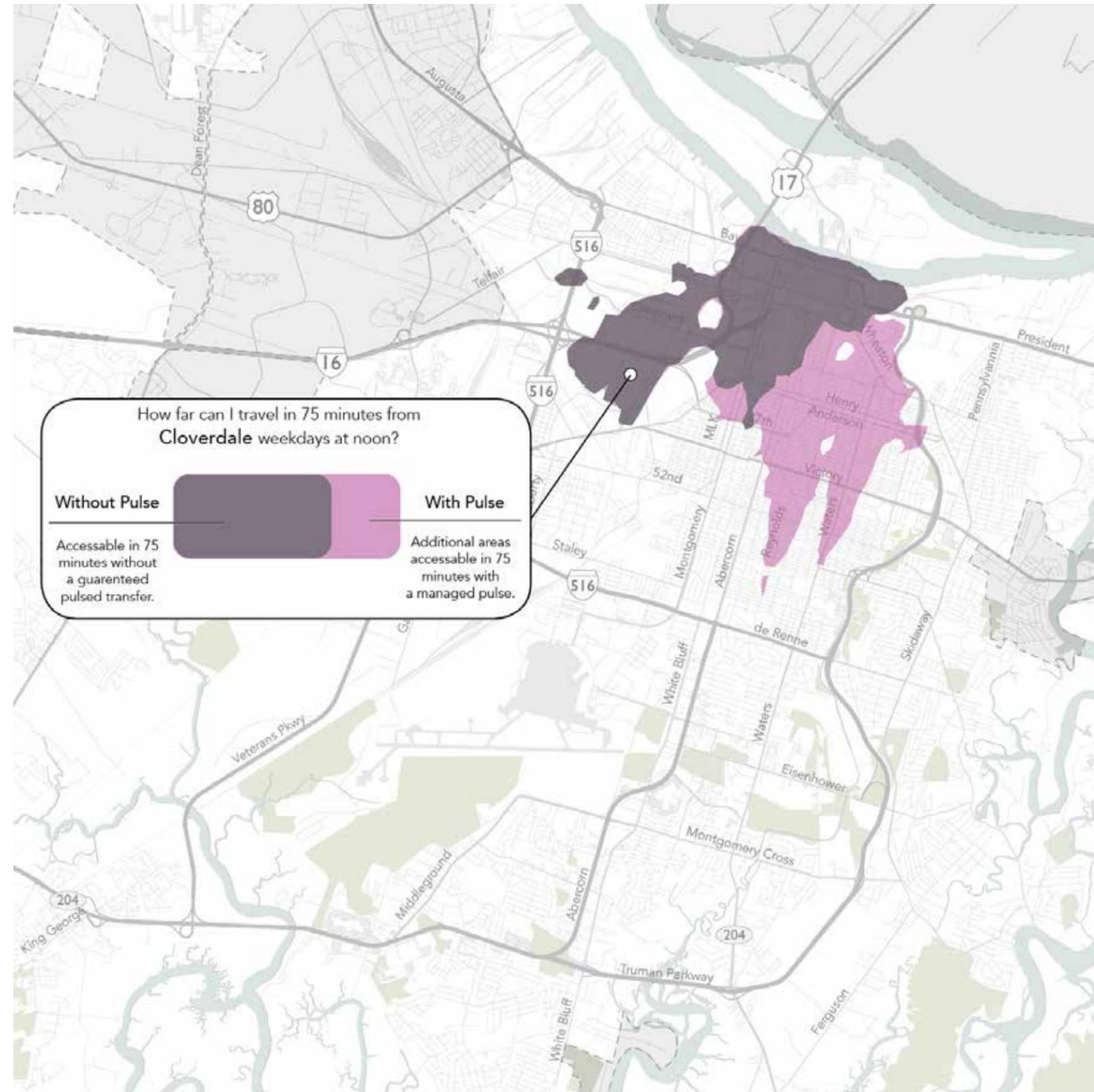
Cloverdale Drive & Cynthia Street

The graphic at right shows how far someone could travel within 75 minutes (counting all waiting time, walking time, and time arriving earlier than they wanted at their destination) from Cloverdale, in the High Coverage Concept.

Shown in purple are the areas they can get to by riding a single route. Shown in pink are the areas they can reach within 75 minutes because of the pulse.

People living in and near Cloverdale could ride Route K (shown on the map on page 11) to the JMR Transit Center and transfer to other infrequent routes that meet at that pulse.

Access to these areas from Cloverdale would not be better, in the High Coverage Concept, than in the High Ridership Concept. But it would be better than one might think when simply looking at the High Coverage Concept and adding up all the time spent waiting for infrequent buses! This image demonstrates what can't be seen in the isochrones for the High Coverage Concept (shown starting on page 26) and what can't be imagined and based on maps frequency tables alone.



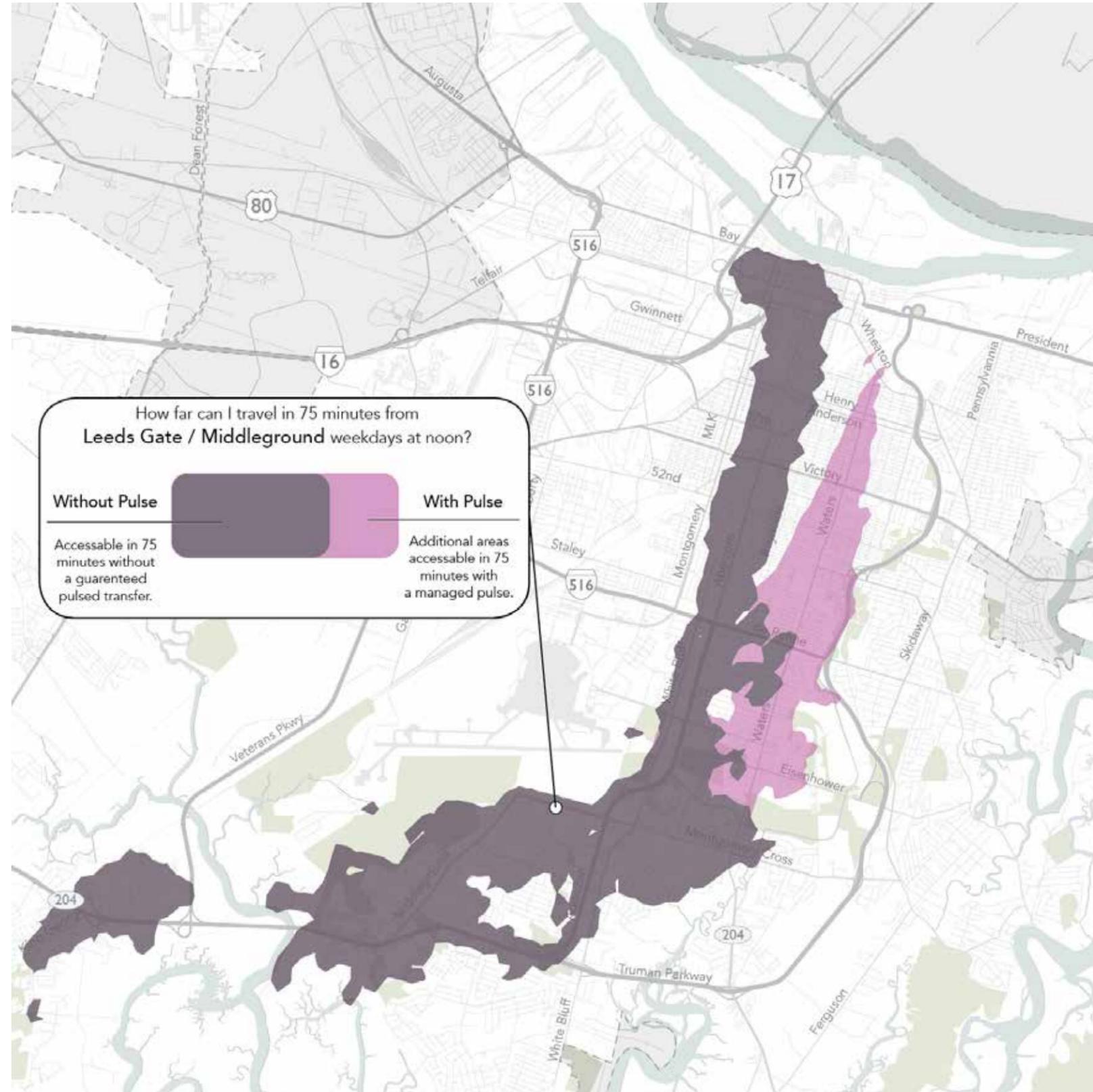
Leeds Gate

West Montgomery Cross & Pine Knoll Court

The graphic at right shows how far someone could travel within 75 minutes to or from Leeds Gate, in the High Coverage Concept.

Shown in purple are the areas they can get to by riding a single route or transferring between routes in timed ways. Shown in pink are the areas they can reach because of the pulse.

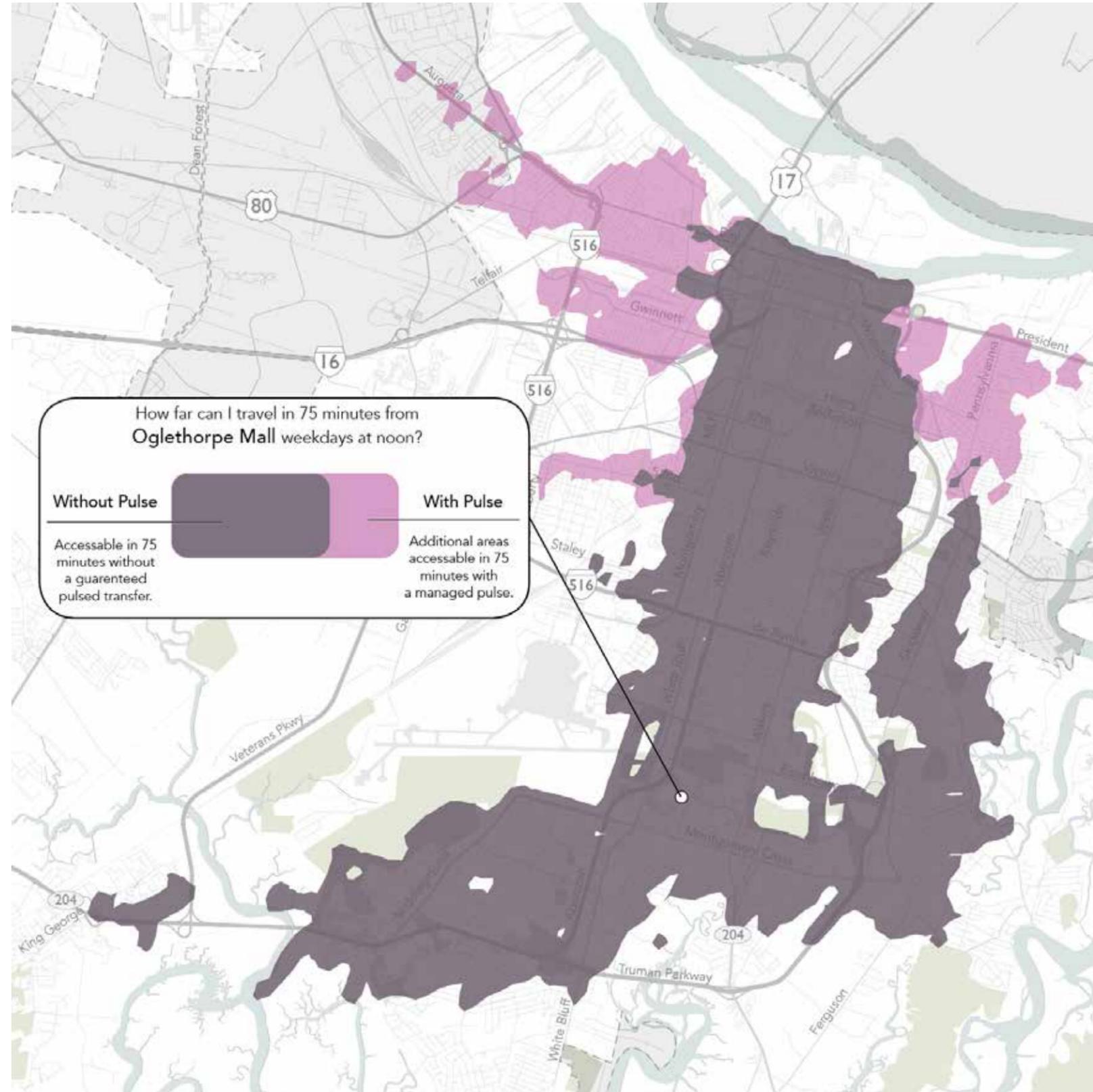
This image demonstrates the small pulse designed into this Concept at the Oglethorpe Mall Transit Center, between Routes B1 (Waters) and M (Middleground). Many destinations along Waters Avenue would come within 75 minutes travel time budget of people living along Middleground, thanks to that pulse.



Oglethorpe Mall

The graphic at right shows where people could come from to reach Oglethorpe Mall within 75 minutes, in the High Coverage Concept.

Areas along West Augusta Road become reachable, as do 52nd Street west of MLK Blvd. and Pennsylvania Ave. north of Victory. These are all places that someone could live and have a reliable connection to a job at the Mall, thanks to a pulse.



Get involved!

If you're interested enough to read this far, we'd love to have you more involved in this project!

This report is part of Phase 2 of the *Let's Go!* CAT System Redesign. It kicks off a second round of public involvement in CAT's decision of whether to continue providing high coverage, or to spend more of its budget attracting high ridership.

In the fall of 2019, this process will produce a Network Plan, incorporating input from the public and guidance from the CAT board. If CAT decides to move ahead with any of the recommendations of that Network Plan, then there will be additional community notification before any actual service changes are made.

We hope you will encourage other people you know to learn about this effort and get involved by:

- Visiting letsgo.catchacat.org
- Joining the email list by contacting us at letsgo@catchacat.org.
- Providing input via an online survey, which will be available soon at the project website.
- Meeting the project team at a public event—places and times are listed on the project website and will be announced to the project email list as well.
- Requesting a presentation at a meeting or public event, which you can do through letsgo@catchacat.org.

Appendix A: Detailed Route-by-Route Descriptions

High Frequency, High Ridership Concept

This table details routing, frequencies and hours of service.

Route	Route Name	Routing	Weekdays	Saturdays	Sundays and Holidays
A	Abercorn	Similar to existing Route 14, between JMR Transit Center and Savannah Mall, via Oglethorpe and Abercorn. Southbound travels Abercorn, Gaston, Drayton, to Oglethorpe. Route stops at Oglethorpe Mall Transfer Center.	30-minute frequency from 6 am to 7 am, then 15-minute frequency until about 8 pm. 30-minute frequency from 8 pm to 11 pm, then 60-minute frequency until about 1 am.	30-minute frequency from 6 am to 7 am, then 15-minute frequency until about 6 pm. 30-minute frequency from 6 pm to 7 pm, then 60-minute frequency until about midnight.	30-minute frequency from 7 am to 8 am, then 15-minute frequency until about 6 pm. 30-minute frequency from 6 pm to 7 pm, then 60-minute frequency until about 9 pm.
B	Waters	Similar to existing Routes 27 and 28, between JMR Transit Center, Memorial Medical Center, Candler Hospital, and Oglethorpe Mall via Oglethorpe, Wheaton, Waters, E 65th, Reynolds, E de Renne, Waters, Eisenhower, and Hodgson Memorial.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 11 pm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 10 pm.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 9 pm.
MLK Corridor	Shared Trunk	The frequent MLK Corridor, similar to existing Route 25 to West 37th Street, shared by Routes C, D, and E, travel between the JMR Transit Center and W 37th, via MLK Jr Boulevard.	30-minute frequency from 6 am to 7 am, then 15-minute frequency until about 8 pm. 30-minute frequency from 8 pm to 11 pm, then 60-minute frequency until about 1 am.	30-minute frequency from 6 am to 7 am, then 15-minute frequency until about 6 pm. 30-minute frequency from 6 pm to 7 pm, then 60-minute frequency until about midnight.	30-minute frequency from 7 am to 8 am, then 15-minute frequency until about 6 pm. 30-minute frequency from 6 pm to 7 pm, then 60-minute frequency until about 9 pm.
C	MLK - Westlake	Similar to existing Route 25 south to Westlake. Follows the MLK Corridor, then continues to Westlake Apartments via MLK, Montgomery, Exchange, W 52nd, Mills B Lane, Liberty Pkwy, and Westlake Ave.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 8 pm. 60-minute frequency from 8 pm to about 1 am.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 6 pm. 60-minute frequency from 6 pm to about midnight.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 6 pm. 60-minute frequency from 6 pm to about 9 pm.
D	MLK - Montgomery	Similar to existing Route 4, follows the MLK Corridor, then continues to Abercorn and Lee, via MLK, Montgomery, Hampstead, White Bluff, and Jackson.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 8 pm. 60-minute frequency from 8 pm to about 11 pm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 6 pm. 60-minute frequency from 6 pm to about 10 pm.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 6 pm. 60-minute frequency from 6 pm to about 7 pm.
E	MLK - 37th - SSU	Similar to portions of existing Route 12. Follows the MLK Corridor, then continues to Savannah State University, via W 37th, Bee, Victory, Whatley, Falligant, College, and Owens.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 8 pm. 60-minute frequency from 8 pm to about 11 pm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 6 pm. 60-minute frequency from 6 pm to about 10 pm.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 6 pm. 60-minute frequency from 6 pm to about 9 pm.
F	Skidaway	Similar to existing Route 31, between JMR Transit Center, Montgomery Cross Walmart, and Oglethorpe Mall, via Oglethorpe, Broad, President, Pennsylvania, Skidaway, Montgomery Cross, Waters, and Mall Blvd.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 11 pm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 10 pm.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 9 pm.
G	Bay - Hudson Hill	Between JMR Transit Center and W Lathrop Ave. Westbound via Ann, Bay, Carolan, Clearview, Cleland and Krenson. Westbound via Lathrop, Bay, and Fahm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 11 pm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 10 pm.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 9 pm.

This table details the High Frequency Concept’s routing, frequencies and hours of service.

Route	Route Name	Routing	Weekdays	Saturdays	Sundays and Holidays
H	Augusta	Similar to existing Route 3B, between JMR Transit Center and Minis Ave. Eastbound via Oglethorpe, Boundary, Louisville, Lathrop, Augusta, Collins, Bay, Fair, Alfred, Hwy 80, and 3rd. Westbound via Augusta, Bypass, Main, Bay, Augusta, Lathrop, Louisville, Boundary, and Oglethorpe.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 11 pm.	60-minute frequency from 6 am to 7 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 10 pm.	60-minute frequency from 7 am to 8 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 7 pm to about 9 pm.
O	Ogeechee	Similar to existing Route 17, between JMR Transit Center and Hwy 17 Super Walmart, via Oglethorpe, Boundary, W Gwinnett, Stiles, Ogeechee, and Atlantic Coastline Highway.	60-minute frequency from 5 am to about 9 pm.	60-minute frequency from 5 am to about 8 pm.	60-minute frequency from 6 am to about 7 pm.
P	W Gwinnett	Similar to portions of existing Route 29, between JMR Transit Center and Carroll St, via Oglethorpe, Boundary, W Gwinnett, Bowden, and Winburn St.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency from 6 am to about 9 pm.	60-minute frequency from 6 am to about 8 pm.
DOT	Bryan/Congress	Between JMR Transit Center and the Commerce Street Parking Garage. Eastbound via Boundary, Liberty, Montgomery, Congress, Broad, Broughton, Randolph, and Congress. Westbound via Congress, Randolph, Broad, Bryan, Montgomery, Liberty, and Boundary.	10-minute frequency from 7 am to midnight.	10-minute frequency from 10 am to midnight.	10-minute frequency from 10 am to 10 pm.
DOT	Forsyth	This route remains the same as today.	10-minute frequency from 7 am to midnight.	10-minute frequency from 10 am to midnight.	10-minute frequency from 10 am to 10 pm.
80	SSU Tiger Shuttle	This route remains the same as today.	30-minute frequency from 7 am to about 9 am. 10-minute frequency 9 am to about 4 pm, then 30-minute frequency from 4 pm to about 5 pm.	No service.	No service.

High Coverage Concept

This table details routing, frequencies and hours of service.

Route	Route Name	Routing	Weekdays	Saturdays	Sundays and Holidays
A	Abercorn	Similar to existing Route 14, between JMR Transit Center and Savannah Mall, via Oglethorpe and Abercorn. Southbound travels Abercorn, Gaston, Drayton, to Oglethorpe. Route stops at Oglethorpe Mall Transfer Center.	60-minute frequency from 6 am to 8 am, then 30-minute frequency until about 8 pm. 60-minute frequency from 8 pm to midnight.	60-minute frequency from 6 am to 8 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 8 pm to about 11 pm.	60-minute frequency from 7 am to about 9 pm.
B	Waters	Similar to existing Route 28, between JMR Transit Center, Memorial Medical Center, and Eisenhower Dr via Oglethorpe, Wheeton, and Waters. Route B1 continues to Oglethorpe Mall, via Eisenhower and Hodgson Memorial. Route B2 continues to Montgomery Cross Walmart, via Eisenhower, Sallie Mood, and Montgomery Cross.	60-minute frequency from 6 am to 8 am, then 30-minute frequency until about 8 pm. 60-minute frequency from 8 pm to midnight. Routes B1 and B2 run at 60-minute frequency from 6 am to midnight.	60-minute frequency from 6 am to 8 am, then 30-minute frequency until about 7 pm. 60-minute frequency from 8 pm to 11 pm. Routes B1 and B2 run at 60-minute frequency from 6 am to 11 pm.	60-minute frequency from 7 am to about 9 pm. Route B2 has no service.
C	MLK & 52nd	Similar to existing Route 25, between JMR Transit Center and Louis Mills Blvd. Outbound via Oglethorpe, MLK, Exchange, W 52nd, Mills B Lane, Liberty Pkwy, and Acl Blvd. Inbound via Ogeechee, Victory, MLK, and Oglethorpe.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.
D	Montgomery	Similar to existing Route 4 south to Savannah Technical College. Between JMR Transit Center and White Bluff Rd. Northbound via Oglethorpe, MLK, Exchange, Montgomery, and De Renne. Inbound via Hampstead, Montgomery, Staley, O'Byrne, Tatem, Dillon, Staley, Montgomery, Exchange, MLK, and Oglethorpe.	60-minute frequency from 5 am to about 9 pm.	60-minute frequency between 5 am and about 8 pm.	No service.
F	Skidaway	Similar to existing Route 31, between JMR Transit Center, Montgomery Cross Walmart, and Oglethorpe Mall, via Oglethorpe, Broad, President, Pennsylvania, Skidaway, de Renne, La Roche, Nottingham, Beaumont, Skidaway, Montgomery Cross, Waters, and Mall Blvd.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.
H	Augusta	Similar to existing Route 3B, between JMR Transit Center and Minis Ave. Eastbound via Ann, Bay, Carolan, Clearview, Cleland, Bay, Fair, Alfred, Hwy 80, and 3rd. Westbound via Augusta, Bypass, Main, Bay, Graham, Hudson, Cleland, Clearview, Carolan, Bay, and Fahm.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.
I	Candler	Similar to existing Route 11 to Candler Hospital. Between JMR Transit Center, Candler Hospital, and Oglethorpe Mall. Northbound via Oglethorpe, Price, 40th, Reynolds, de Renne, Habersham, Stephenson, and Hodgson Memorial. Southbound via Hodgson Memorial, Stephenson, Habersham, de Renne, Reynolds, 40th, Broad, and Oglethorpe.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.

This table details the High Coverage Concept’s routing, frequencies and hours of service.

Route	Route Name	Routing	Weekdays	Saturdays	Sundays and Holidays
J	Victory - SSU	Between JMR Transit Center and Savannah State University, via MLK, Anderson (Westbound) / Henry (Eastbound), Bee, Victory, Whatley, Falligant, College, and Owens St.	60-minute frequency from 7 am to about 11 pm.	60-minute frequency between 7 am and about 10 pm.	60-minute frequency between 8 am and about 9 pm.
K	Cloverdale	Similar to a portion of existing Route 12 to Cloverdale, between JMR Transit Center and Cloverdale Dr, via Oglethorpe, Boundary, W Gwinnett, Stiles, Cloverdale, Eleanor, and Audubon Dr.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.
L	Chatham Parkway	Between JMR Transit Center and Chatham County Detention Center, via Oglethorpe, Boundary, W Gwinnett, Lynes Ave, Lynes Pkwy, I-16, Chatham Pkwy, and Carl Griffin Dr.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.
M	Middleground	Similar to existing Route 6, between Oglethorpe Mall, Savannah Mall and Hwy 17 Super Walmart, via Hodgson Memorial, Montgomery Cross, Middleground, Mohawk, Apache, Shawnee, Rio, Abercorn, King George east to Westminster, King George southwest to Wild Heron, Chevis, and Ogeechee Rd.	60-minute frequency from 5 am to about 9 pm.	60-minute frequency between 5 am and about 8 pm.	60-minute frequency between 6 am and about 7 pm.
N	Airport	Similar to existing Route 3, between JMR Transit Center and Savannah Airport. Westbound via Oglethorpe, Boundary, Louisville, Lathrop, Augusta, Main, Minus, Bell, Augusta, Dean Forest, Davidson, Dean Forest, Robert B Miller, Gulfstream, Patrick S Graham, and Airways Ave. Inbound via Airways, Gulfstream, Robert B Miller, Dean Forest, Davidson, Dean Forest, Augusta, Bypass, Bay, Augusta, Lathrop, Louisville, Boundary, and Oglethorpe.	60-minute frequency from 7 am to about 11 pm.	60-minute frequency between 7 am and about 10 pm.	60-minute frequency between 7 am and about 8 pm.
O	Ogeechee	Similar to existing Route 17, between JMR Transit Center and Hwy 17 Super Walmart, via MLK, Anderson, Ogeechee, Sadler (outbound) / Hopkins, 40th (inbound), Victory, Ogeechee, Atlantic Coastal Highway, Quacco to Pink Dogwood, Quaco, Atlantic Coastal Highway, Canebrake, Al Henderson, Little Neck, and Atlantic Coastal Hwy to Hwy 17 Super Walmart.	60-minute frequency from 5 am to about 9 pm.	60-minute frequency between 5 am and about 8 pm.	60-minute frequency between 6 am and about 7 pm.
Q	Island Towne Center	Similar to existing Route 10, between JMR Transit Center and Island Towne Center, via Oglethorpe, Broad, Wheaton, E Gwinnett, Treat, Mississippi, Georgia, Bonaventure, Skidaway, Pennsylvania, Capitol, Gregory, Riverview, Island Express, Hwy 80, Johnny Mercer, Penn Waller, Walthour, Johnny Mercer, and Island Express.	60-minute frequency from 6 am to about 10 pm.	60-minute frequency between 6 am and about 9 pm.	60-minute frequency between 7 am and about 8 pm.

This table details the High Coverage Concept’s routing, frequencies and hours of service.

Route	Route Name	Routing	Weekdays	Saturdays	Sundays and Holidays
Reserve-a-ride	West Chatham	Reserve-a-ride service covering the existing Route 3 service north of the Richmond Airport.	In service between 7 am and 10 pm.	In service between 7 am and 8 pm.	In service between 8 am and 8 pm.
Reserve-a-ride	Coffee Bluff	Reserve-a-ride service covering the existing Route 20 service area.	In service between 7 am and 11 am, then between 5 pm and 9 pm.	No service.	No service.
DOT	Bryan/Congress	Between JMR Transit Center and the Commerce Street Parking Garage. Eastbound via Boundary, Liberty, Montgomery, Congress, Broad, Broughton, Randolph, Congress. Westbound via Congress, Randolph, Broad, Bryan, Montgomery, Liberty, Boundary.	10-minute frequency from 7 am to midnight.	10-minute frequency from 10 am to midnight.	10-minute frequency from 10 am to 10 pm.
DOT	Forsyth	This route remains the same as today.	10-minute frequency from 7 am to midnight.	10-minute frequency from 10 am to midnight.	10-minute frequency from 10 am to 10 pm.
80	SSU Tiger Shuttle	This route remains the same as today.	30-minute frequency from 7 am to about 9 am. 10-minute frequency 9 am to about 4 pm, then 30-minute frequency from 4 pm to about 5 pm.	No service.	No service.

Appendix B: Methods

How is the proximity analysis performed?

The proximity analysis estimates the number of residents (or jobs) within a given distance of any transit stop. More specific analysis gives the results for low-income residents and minority residents.

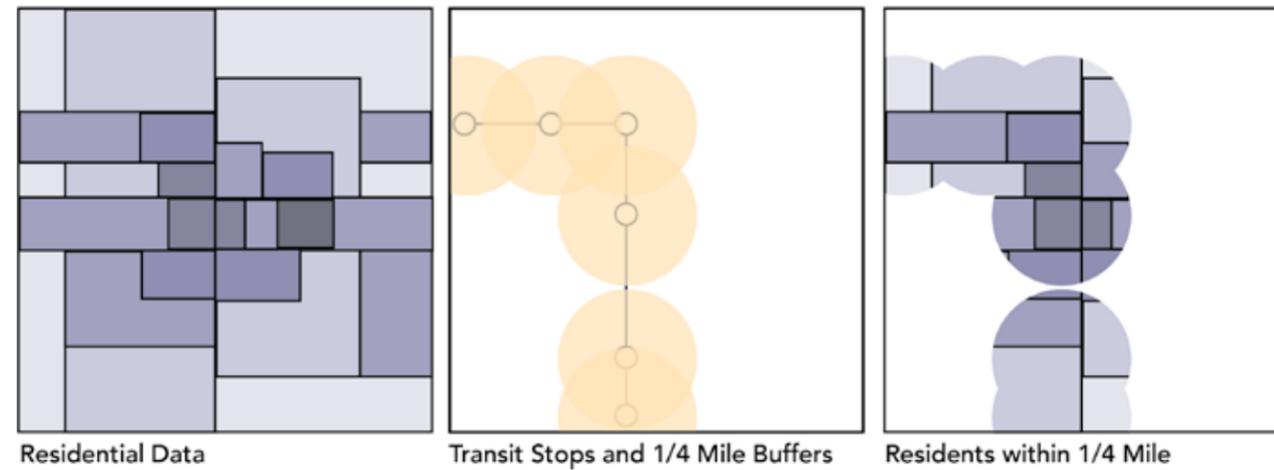
The demographic data necessary for this analysis, and for the access analysis, comes from the U.S. Census. The most recent source was used, the 2012-2016 American Community Survey (ACS) 5-Year Summary.

The data source for job locations and wage levels is the U.S. Census Longitudinal Employer-Household Dynamics (LEHD) Program, 2015.

The diagram at right illustrates how the proximity analysis is performed:

- Demographic data is mapped, in the smallest geographic units available (for residential data, these were Block Groups).
- For this analysis, we must assume that residents are evenly-distributed within each unit, though we know this is not always the case, especially not for apartment buildings in suburban settings.
- Bus stop locations were estimated for all new routes in the Concepts, and a 1/4 mile buffer was drawn around them.¹
- The estimated number of residents within the buffer was summed for that route.
- The same procedure was followed for minority residents, low income residents and jobs; and using only frequent bus services, as distinct from any all-day service.

The sums that result from these steps were then compared to the total population and jobs in the service area, to give results in terms of percentages.



Residential Data

Transit Stops and 1/4 Mile Buffers

Residents within 1/4 Mile

¹ As noted earlier in this report, 1/4 mile is an overestimate of an acceptable walk for some people and some situations, and an underestimate for other people and other situations. 1/4 mile is a standard assumption in transit planning, though 1/2 mile is often used as an assumed tolerable walking distance for frequent, rapid and express services.

How are isochrones made?

To create the isochrones, we used a trip planning tool called Open Trip Planner (OTP). Each of the networks was created in or imported into OTP, along with all route frequencies, spans, and vehicle speeds. The frequencies, spans, and speeds are used to generate a schedule for stops along each route. These schedules were imported into OTP, which allows the software to plan trips and determine travel times along the transit and street networks in each Concepts.

Each transit trip involves some combination of walking, waiting and riding. For waiting time, we assumed riders wait on average half the time until the next bus. For a route that operates every 30 minutes that would mean an average wait of 15 minutes. This applies to the wait for the first ride and any transfer throughout the trip.

This waiting time exists in real life, even when real-time information allows people to have shorter waits at the bus stop. If someone has to be at work, or a doctor's appointment, or some other commitment at 9 am, they have to catch a bus early enough to get them there on or before 9 am. If the bus comes every 15 minutes, they will have to arrive, at worst, 14 minutes early. If the bus comes every 60 minutes, they will have to arrive, at worst, 59 minutes early.

On average, their waiting time – whether at the bus stop or at their destination – will be 1/2 of the frequency of the bus route. This can be thought of as the mismatch between the route's frequency and their life. The lower the frequency, the bigger the average mismatch.

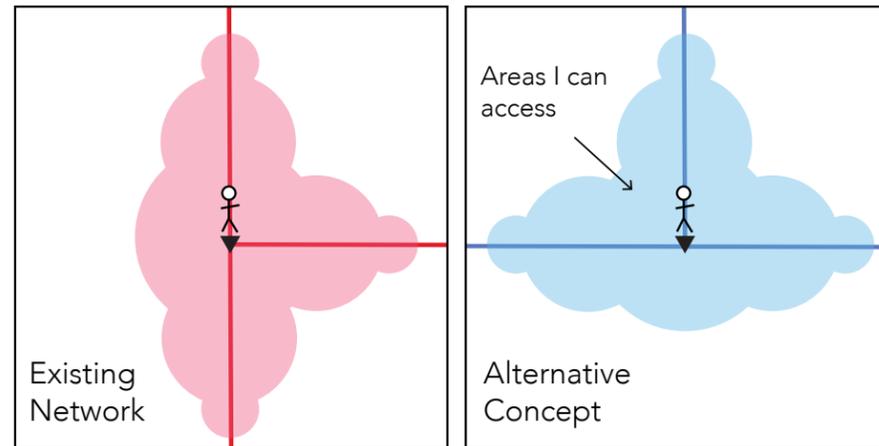
The assumed walking speed in the isochrones is 3 miles per hour. There is an assumed maximum walking time as part of any transit trip, of about 45 minutes. Some people cannot or will not walk that far, and other people will walk all the way to their destination if walking is the fastest option.

Each isochrone map shows two overlapping isochrones. Isochrones for the Concepts are shown in blue, while the existing network isochrones are shown in red, as illustrated in the diagram at right.

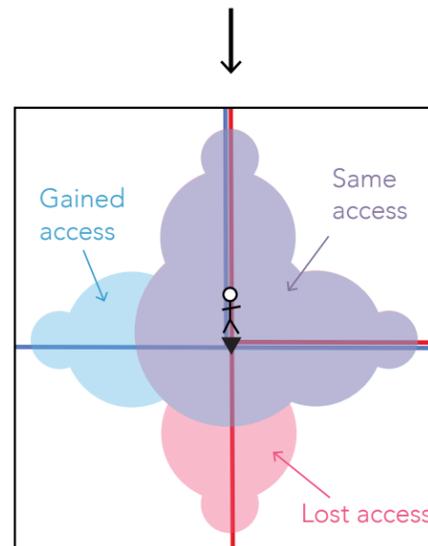
Purple areas show where two isochrones overlap, meaning access would be preserved under the Concept. Red areas show where access would be lost under the Concept. Blue areas show where the Concept would provide new access.

Each isochrone page includes an estimate of the percentage increase or decrease in residents and jobs that could be reached from the center point.

By walking and transit, where can I get to in 30 minutes?



How is my access different between these two networks?



Overlapping isochrones can show the areas that are lost or gained between two transit networks.

Residential population and job data for this analysis come from the same U.S. Census data sources as were used in the proximity analysis (and the demographic maps included in the Transit Choices Report, available [online](#)).

How is the access analysis performed?

The access analysis builds on the isochrone methods.

To measure access for all residents, we created a hexagonal grid of sections, evenly-spaced across Chatham County (illustrated at right). We calculated the population in each section, in terms of residents, jobs, minority residents and low-income residents. (As in the proximity analysis, this requires an assumption that residents are evenly-distributed within each Block Group.)

We then created isochrones for each of these sections, for the given amount of travel time, and summed all of the jobs within each isochrone area.

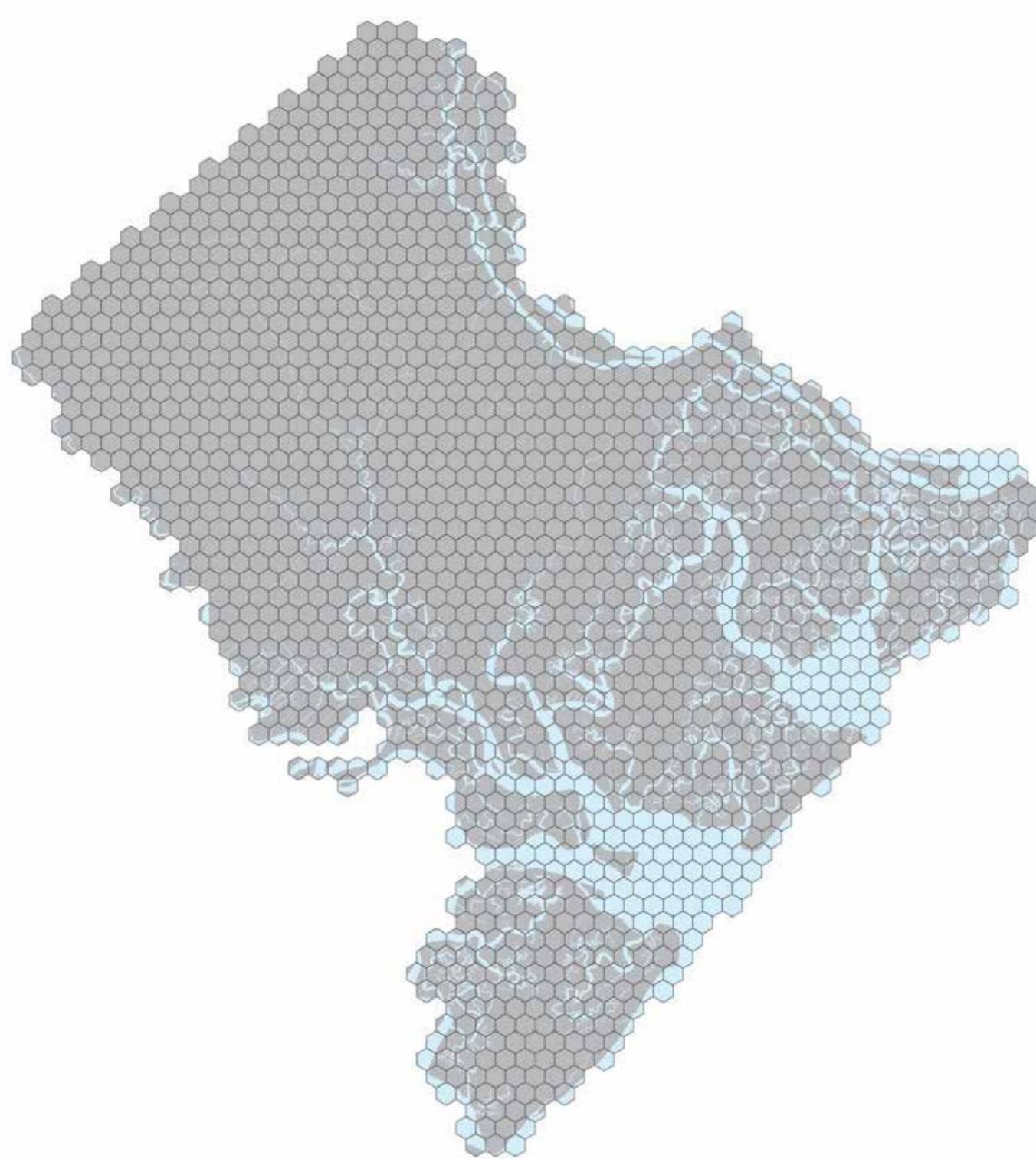
While some grid sections contain thousands of residents, others contain only a few. The jobs accessible from each grid section were multiplied by the number of residents estimated (from Census Block Group data) to live in that grid section. The product of this multiplication was summed for all grid sections in the County, and then divided by the total number of residents in the County. This gave the change in the number of jobs accessible, within a given amount of time, for the average resident of the County.

The access maps shown in this report can answer two basic questions about each hexagon:

1. For the residents in this hexagon, how many jobs elsewhere could they reach within a given amount of time on transit?
2. For the businesses, social services and other destinations in this hexagon, how many residents elsewhere could reach them within a given amount of time on transit?

The maps shown on pages 34 and 35 illustrate the answers to the first question, for each hexagon.

The answers to these two questions are slightly different for some hexagons, because of the different balance of residences and jobs in each hexagon across the county. The maps on the following two pages illustrate the answers to the second question.

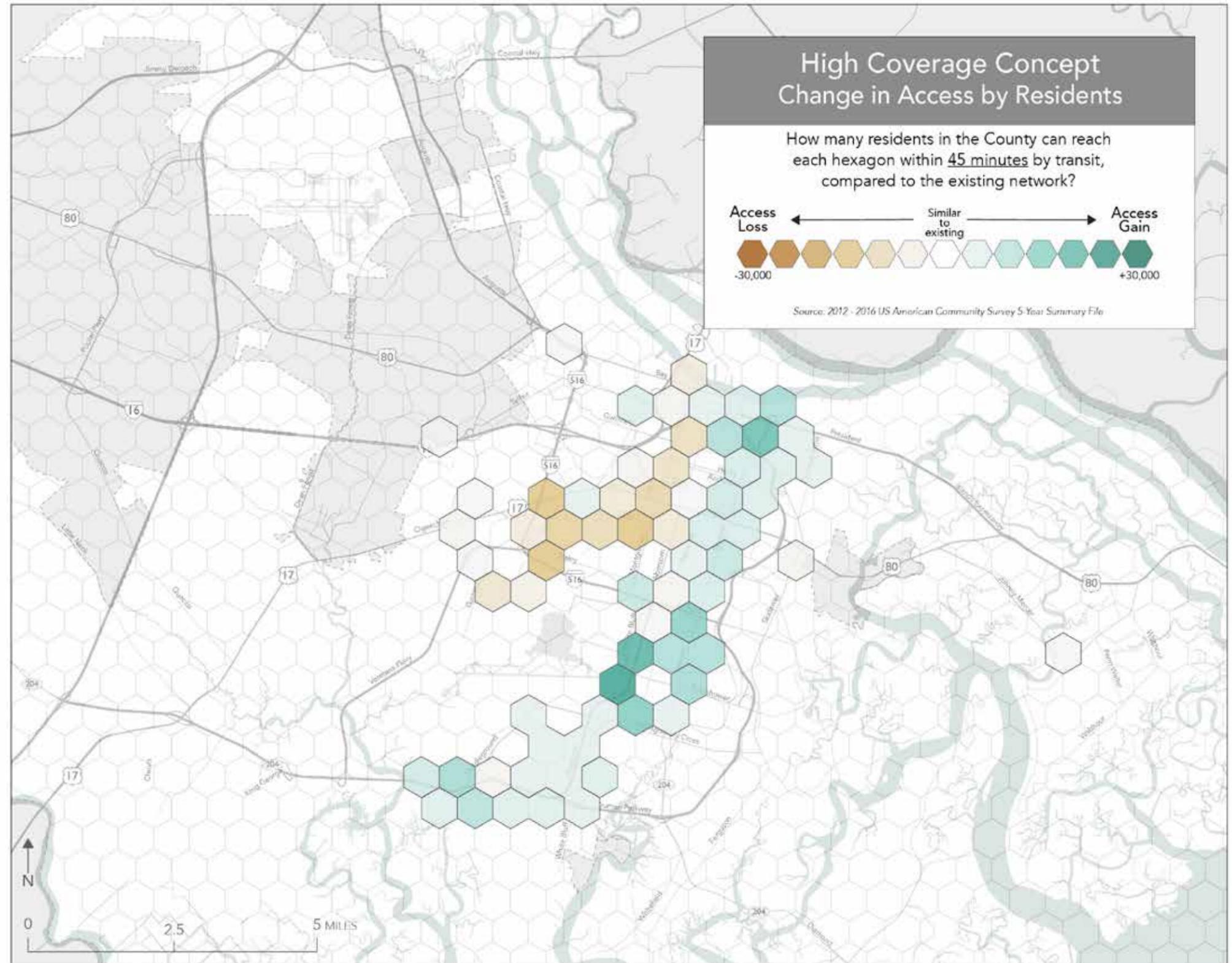


Map: County Businesses' and Institutions' Access to Residents in the High Coverage Concept

The map at right shows how access by County residents would change to each hexagon in the County, under the High Coverage Concept. Some areas would have a modest gain in the number of residents who could reach them within 45 minutes, and some would have a modest decline. Most areas would not experience a change.

This is the type of information that matters to schools and colleges, to social service organizations and to businesses, because they want large numbers of people to be able to reach them within a reasonable amount of time.

If a person manages such a business or organization in a particular hexagon in the map at right, they will care about whether a Concept increases the number of residents who can reach that hexagon (shown in shades of teal) or decreases that number (shown in shades of brown). Being reachable by more residents is good for attracting workers, customers, clients and community members.

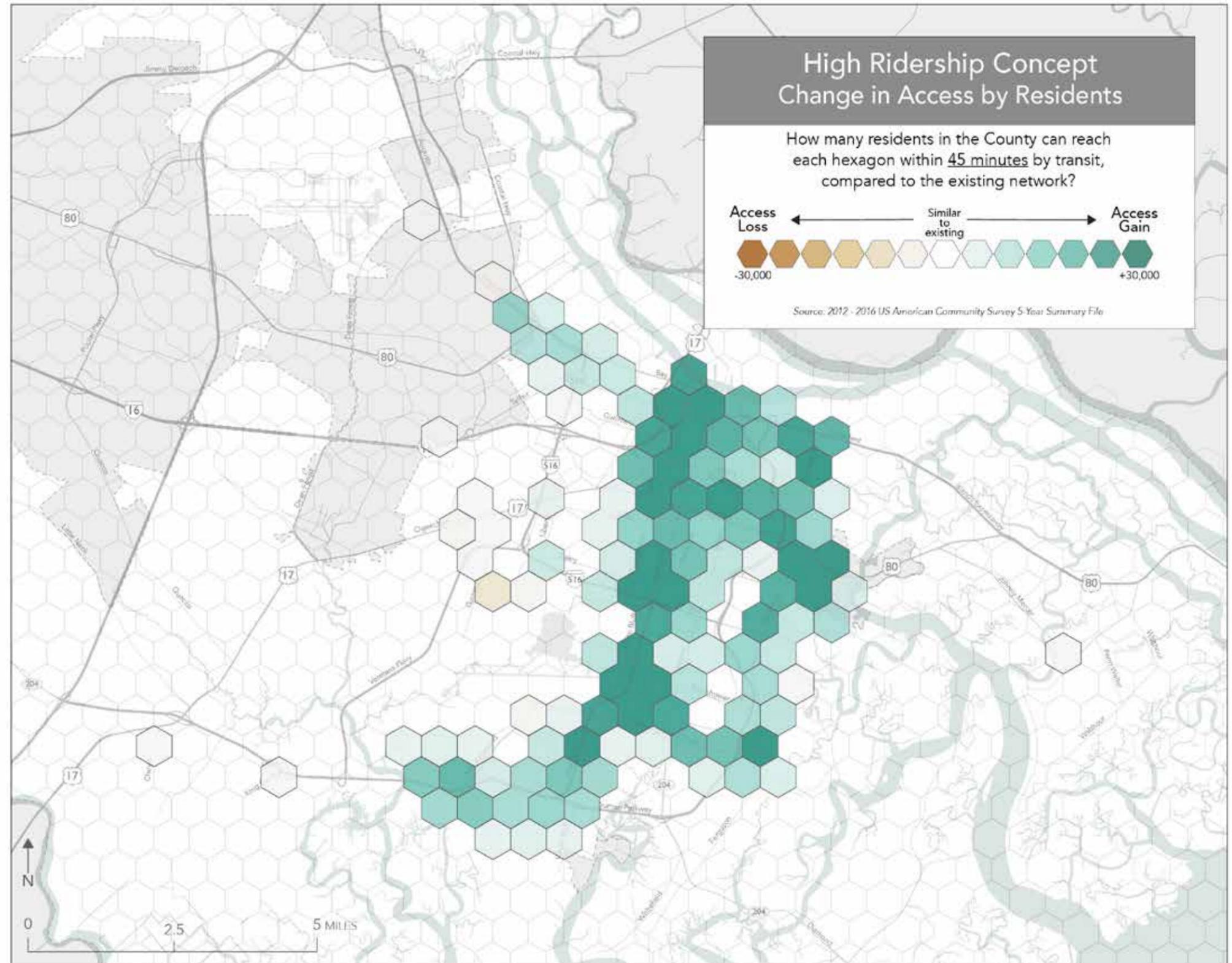


Map: County Businesses' and Institutions' Access to Residents in the High Ridership Concept

The map at right shows how access by County residents would change to each hexagon in the County, under the High Frequency, High Ridership Concept.

Many areas would see a major gain in the number of residents who could reach them within 45 minutes. Most of the County's jobs, schools, colleges, social services and commercial outlets are concentrated in the hexagons that are shaded green on this map. An increase in the number of residents who can reach them means there would be an increase in potential clients, workers, customers and visitors for those organizations.

This is a reversed view of the same information conveyed by the map of job access on page 35. That map showed neighborhoods where the residents would have access to more jobs, while this map shows neighborhoods where the businesses and organizations would become accessible to more residents.



Glossary

Access	The number of jobs or residents reachable from a starting location by transit and walking. Access is often calculated for many starting points in a network, based on some assumed travel-time “budget,” and summarized on a map.
Arterial road	A high-capacity through road.
Circulator	Circulator is often used to describe a service that provides transit coverage to a low-density area, because the travel paths that result are so often circular in shape. In some places a circulator is also operated downtown. Large circular transit routes that offer high speed or high frequency and serve high demand areas, however, are generally referred to as loops.
Commuter express service	An FTA designation that distinguishes between fixed-routes that must be supplemented by paratransit, and fixed-routes that may not. From the FTA’s website: “Commuter bus service means fixed-route bus service, characterized by service predominantly in one direction during peak periods, limited stops, use of multi-ride tickets, and routes of extended length, usually between the central business district and outlying suburbs. Commuter bus service may also include other service, characterized by a limited route structure, limited stops, and a coordinated relationship to another mode of transportation.” http://www.fta.dot.gov/12876_3906.html
Connection	A connection or transfer takes place when a person uses two transit vehicles to make a trip.
Coverage	Coverage can refer to the amount of geographic space, the proportion of people or the proportion of jobs that are within a certain distance of transit service. An assumption about how far people will walk to a given transit service—often ranging from 1/4 to 1/2 mile—must be made in order to estimate coverage. Coverage can also refer to service that is made available in a place without an expectation that it will attract high ridership. It’s availability is what is valuable.
Deadhead hours	The time a vehicle spends between the garage and the start or end of revenue service, or between the end of a trip on one route and the beginning of a trip on another route.
Dial-a-ride	Demand-response service, usually requires booking a day in advance, over the phone.
Efficiency	Lay-people some times refer to “transit efficiency,” by which they mean the number of people served relative to cost. In the transit industry, the more correct word for this is “productivity,” passengers per service hour. “Efficiency” technically means the number of service hours that an agency can deliver for a given cost, i.e. how efficiently they put service on the street (not how much it is used by riders).
Express	Express can have a range of meanings when applied to transit. It most often describes a route with a long non-stop segment, such as CAT’s 100X route between downtown and the airport. It can also be used to describe a route with wide stop spacing and overall faster speeds, though that is more commonly called a Rapid.

Farebox recovery	Farebox recovery is a measure of how much of a transit system, network or route’s operating cost is recovered through fares.
Fixed-route transit	Fixed-route transit describes any transit service that is operated on the same predictable route. In contrast, paratransit and demand-responsive service may always or often follow different routes for each vehicle trip, as they serve different customers and their trips.
Frequency	Frequency is often expressed in minutes, i.e. a service that comes every 15 minutes has “15 minute frequency.” A more technical term for frequency is headway.
Headway	Headway is the time between successive trips at a stop, a more technical transit term for frequency. A service that comes every 15 minutes can be said to have a “15 minute headway.”
Investment	In this report, investment refers to service hours per capita, a measure of the relative level of transit service.
Isochrone	An illustration to help visualize where someone can go from a location, in a certain amount of time, using transit or by walking.
Land use	Land use describes the way a parcel of land is being used, for example as commercial, industrial or multi-family residential. Land use descriptions can be general or very specific. Land use is distinct from zoning, as land may be rezoned under existing uses and buildings long before changes to its use take place.
Layover	Time for driver breaks between trips. Usually included in revenue hours. Unlike recovery time, layover time sometimes cannot be skipped even when a bus is behind schedule.
Longline	Some routes have a more frequent inner segment and a less frequent outer segment. At the end of the inner segment, some buses turn around and come back, while others continue on to a more distant turnaround point. The outer, less-frequent segment is often called the “longline,” though technically the longline is the longest path that buses on that route travel, and its length is the inner segment plus the outer segment. The inner segment is called the “shortline.”
Microtransit	Demand-response service, like dial-a-ride, but usually distinguished by same day or instant booking, often with an app.
Mobility	Mobility is generally used to express the ease with which people can move from place to place. It is distinct from access, which describes the extent to which people can meet their needs nearby. In some places, people have high access (they are able to meet all of their needs without travelling very far or at all) and low mobility (because traveling long distances is difficult or slow). In other places, mobility is high and access is low.
Mode share	Mode share is a technical term for the percentage of a population that uses a particular mode (e.g. transit, walking, driving) for traveling. Mode share information in the U.S. is generally reported for commute trips.

National Transit Database	The National Transit Database is a federal clearinghouse of general information about transit in the U.S. and information specific to each transit agency. Agencies of a certain size are required to submit financial and performance data to the NTD each year. https://www.transit.dot.gov/ntd/
One-seat-ride	A trip that requires boarding only one transit vehicle (no transfers).
Paratransit	Paratransit is a transit service that provides on-demand curb-to-curb travel for people with disabilities, per the American's with Disabilities Act. It is required by this U.S. law to be provided to people who have a disability that prevents them from using fixed-route transit service, within 3/4 mile of fixed-route transit, during all times when fixed-route transit is operating.
Peak	In some places, two peaks of travel (and transit) demand take place each day: in the morning and afternoon, as people travel to and from work and school. However, in many places travel demand peaks only once, in the midday or afternoon, as service shifts change and students leave school.
Peak-only	A transit service that is peak-only operates only during the morning and afternoon travel peaks.
Productivity	The word productivity is often used in transit to describe the number of people served per unit of cost. Productivity can be expressed for an entire transit system, a subset of the system, individual lines or even for segments of lines.
Proximity	A proximity analysis measures the number of residents or jobs within a certain distance of a transit line or transit stop.
Pulse	A pulse takes place when two or more transit services arrive together at the same place at the same time, so that their passengers may transfer among them with minimal waiting.
Radial	A route or network design where most routes go to and from a central point (typically a downtown). As opposed to a grid network.
Rapid	Rapid can have a range of meanings when applied to transit. It most often describes a route with wider stop spacing and overall faster speed.
Recovery time	Extra time between trips to make up for a delay. Unlike layover, which is a driver's break time, recovery time can be cut short so that the next trip can depart on-time.
Relevance	In this report, relevance refers to boardings per capita, a measure of how relevant transit is to the population it serves.
Revenue hours	The time a transit vehicle and its operator spend out in public, available to passengers and (potentially) collecting revenue. Usually includes layover and recovery time, but excludes deadhead. In this report, the term "Service Hours" is used instead.

Ride check	The National Transit Database requires that transit agencies regularly sample on all of their services to collect ridership and on-time performance information. This is often performed using surveyors on transit vehicles, though increasingly it is performed by automated counters and GPS devices on transit vehicles. It is sometimes called a ride check.
Ridership	Ridership refers informally to the number of boardings or trips taken on a transit system or a particular transit service.
Service hours	The time a transit vehicle and its operator spend out in public, available to passengers and (potentially) collecting revenue. Usually includes layover and recovery time, but excludes deadhead. The more technical transit term is "Revenue Hours."
Shortline	Some routes have a more frequent inner segment and a less frequent outer segment. At the end of the inner segment some buses turn around and come back, while others continue on to a more distant turnaround point. The outer, less-frequent segment is often called the "longline," though technically the longline is the longest path that buses on that route travel, and its length is the inner segment plus the outer segment. The inner segment is called the "shortline."
Span	The span of a transit service is the number of hours it operates during the day, e.g. a service that runs from 6:00 a.m. to 11:30 p.m. would have a 17.5 hour span. Span can also describe the number of days per week and per year that a service is operated.
Street connectivity	The degree to which streets connect to one another, and multiple paths exist between any two points, is describe as that place's connectivity. Areas with many cul de sacs or loops and few through routes have low connectivity; areas with grid-like street patterns have high connectivity. Low connectivity discourages trips by slower modes (such as walking or bicycling), and presents challenges for transit routing.
Transfer	When a person uses more than one transit vehicle to make a trip, they transfer in between vehicles. This is also often called a connection.
Tripper	A tripper is a special type of transit service that makes only a few or a single trip each day. Transit agencies often send one or more trippers to relieve crowding on certain routes, or to provide direct service where none exists at other hours. Trippers often run at the start and end of school days or work shifts.
Vehicle hours	The time during which a transit vehicle is away from the garage, whether providing revenue service (called "Service Hours" or "Revenue Hours"), driving between the garage and the start or end of service (called "Deadhead Hours"), or in layover and recovery time.