



Nashville MTA/RTA TRANSIT PLAN

FINAL REPORT - DECEMBER 2016



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Chapter 1 Introduction

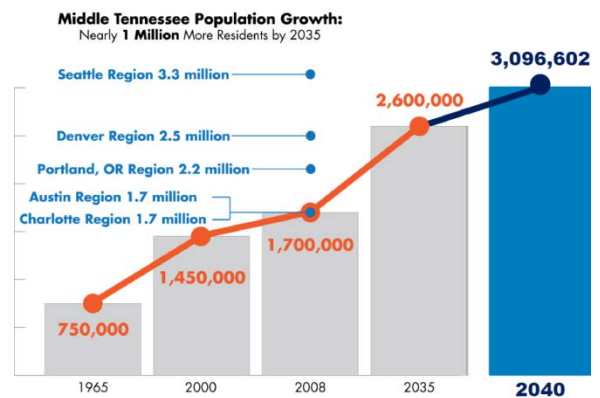
Nashville and Middle Tennessee make up a dynamic region that has become one of the fastest-growing metropolitan areas in the nation. With more than 1 million people expected to relocate to Middle Tennessee between now and 2040, transportation concerns have also grown and are becoming increasingly challenging to address.

FIGURE 1-1 | MIDDLE TENNESSEE COUNTIES



As with every metropolitan area, mobility in Middle Tennessee is currently defined by three key factors: patterns of development and growth, the natural limitations of the topography, and the manmade limitations imposed by the built environment. As the growth of this region adds pressure to our natural and built environments, Middle Tennessee must develop a strategy that will address the issues of congestion by providing a range of alternative mobility solutions. In particular, Middle Tennessee needs a comprehensive Transit Plan.

FIGURE 1-2 | MIDDLE TENNESSEE POPULATION GROWTH



The Need for a Transit Plan

The Nashville Metropolitan Transit Authority (MTA) and the Regional Transportation Authority of Middle Tennessee (MTA) have engaged in a regionwide public discussion of the best strategies to improve regional mobility under a Regional Transit Plan. This study has been undertaken with the clear understanding that transit alone will not solve all of the region's mobility issues, but an improved transit system must be a key and integral part of any solution. Roadway improvements, including roadway expansion, will need to be a part of future travel solutions. However, the region is reaching a point in size and density where mass transit and other "shared-use" mobility options will have to become a much larger part of the travel mix to assure continued economic prosperity for the region.

Purpose of this Plan

The recommendations resulting from the nMotion planning process aim to:

- **Improve access to opportunity** for those with limited auto availability
- **Expand the range of competitive travel options** for all Middle Tennesseans
- **Simplify and integrate** various means of transportation to develop a seamless, connected system to provide Middle Tennesseans with the maximum travel flexibility
- **Prioritize major transit investments** in transit-supportive areas
- **Significantly increase ridership**, especially in target markets

What nMotion Is and What It Is Not

In undertaking this process, MTA/RTA set out to create a long-term plan for a transit system for Middle Tennessee. We did so with the understanding that this plan would not, in and of itself, answer all of the transit questions that must be answered. Here's what this plan is:

- A framework for the types and magnitude of changes that could be advanced;
- A concept of how individual projects/services can come together into a comprehensive system;
- A mechanism for promoting more in-depth conversations about what we want for future mobility in our region
- A springboard toward short-term implementation and planning for long-term improvement; and
- A determination of order-of-magnitude costs based on recent experience in benchmark regions.

However, nMotion is not:

- The in-depth planning required for a high-impact capital/corridor project.
- A detailed projection of future costs – instead, the costs presented herein are order of magnitude costs.
- A detailed funding plan, which still needs to be developed.
- A detailed implementation plan, which will be developed following development of the funding plan.

Partnerships and Collaboration

For a regional mass transit system to be effective, MTA and RTA will need to expand and enhance partnerships with public and private entities to make such a system a reality. These will range from other regional public transit agencies such as Murfreesboro Rover, Franklin Transit and Clarksville Transit to private transportation providers such as taxi operators, rideshare providers such as Lyft and Uber, car-share providers like Car2Go, and bike-share operators such as B-cycle. MTA and RTA will need to work more closely with the Tennessee Department of Transportation (TDOT) to incorporate improved mass transit facilities into key travel corridors, as well as local cities and towns to both improve transit facilities and allow for/encourage the types of development that will support a robust mass transit system. Partnerships with university communities and high-tech sector will be needed to advance technological enhancements such as open payment systems and advanced, intermodal itinerary planning applications. For large-scale projects, MTA and RTA will also explore the opportunities presented in recently adopted state legislation allowing for public-private partnerships in the development of advanced mass transit facilities.

Growth with Intention

The nMotion plan suggests a path forward to achieve these goals. However, bold solutions, such as high-capacity transit investments like rail, require higher-density development than currently exists in most of Middle Tennessee. This can change if the region “grows with intention,” as envisioned in NashvilleNext, the Metropolitan Planning Organization’s Regional Transit Vision, and other plans.

What does that mean? It means growing in a way that intentionally provides greater density that will support mass transit along certain corridors. Although public engagement efforts demonstrated widespread support for high-capacity mass transit facilities such as light rail, current development patterns, population and job density, and pedestrian access from neighboring areas to target corridors would not support these investments in a way that provides an adequate return on investment.

The rate and nature of regional growth suggest that such investments could be very effective over the long term if undertaken in concert with coordinated changes in land use, development, and complementary public policy and investments over the long term. Implementing these changes as our region grows will allow for the broadest range of living options and better position us to preserve the open spaces we cherish so dearly.

The Critical Importance of Downtown Nashville

In order to accomplish the goals of nMotion, future plans will need to address mobility in – and through – downtown Nashville. Downtown Nashville is the region’s most concentrated trip destination, and more people travel to

downtown Nashville than any other location in the region.

Because of that, downtown will remain the dominant focal point of high-capacity transit investments. Downtown Nashville is also a major point of cross-regional access – i.e., people moving from one part of town or the region to another would logically pass through downtown. Because of its importance to the region, downtown Nashville will require special consideration for transit priority.



nMotion Transit Plan

The nMotion transit plan is the result of more than a year of public engagement and technical analysis, and has been designed to meet future needs in a manner that reflects regional planning efforts and desires expressed through extensive civic engagement. This report includes an overview of public engagement, strategic recommendations and key actions for improving transit in Middle Tennessee, benefits and costs associated with the recommended plan, and a discussion of immediate and long-term next steps. This report is also accompanied by several appendices that document the extensive technical work and public engagement that inform the nMotion plan.

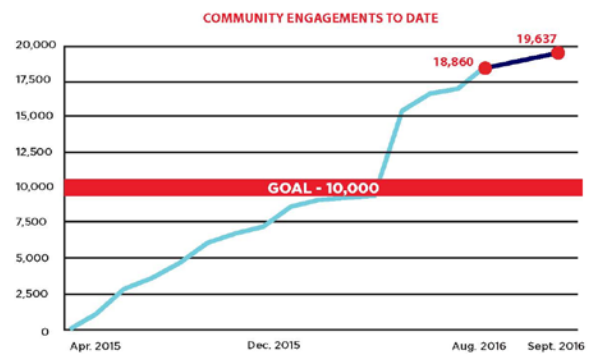
Chapter 2 Public Engagement

The Importance of Public Input in Creating the Plan

From April 2015 through October 2016, MTA/RTA have actively sought the opinions of Middle Tennesseans as they studied the state-of-the-art transit strategies now being deployed around the world and explored in depth the values and transit needs of this population. Through these efforts, nearly 20,000 individual engagements took place, including 9,000 responses to an online “scenario” survey asking people to express their preferences with respect to three alternate futures for mass transit and regional mobility. The overwhelming response was that Nashville and the Middle Tennessee region should pursue a bold, long-term investment in mass transit, along with ancillary investments in infrastructure to make such a system effective.

MTA and RTA have worked hard to ensure that this plan reflects the desires of Middle Tennessee’s residents and other major stakeholders such as the business community, and other major institutions. To do this, at the beginning of the nMotion planning process in April 2015, MTA and RTA set a goal of 10,000 engagements.¹ Through the middle of September, 2016, the project has produced more nearly 20,000 engagements.

FIGURE 2-1 | ENGAGEMENTS THROUGH JULY 2016



These included:

- Over 3,000 specific comments
- Over 15,000 survey responses
- Community meetings with over 30 groups in 10 counties
- Transit Talks with over 80 organizations throughout Middle Tennessee
- Over 100 news articles
- Over 700 Twitter followers
- Over 2,000 Facebook fans
- Emails to over 8,000 people and organizations

In addition, there have been nearly 33,000 unique visitors to the project’s website.

A detailed description of the public engagement process for nMotion is available in Appendix 6.

¹ An engagement is a submitted survey or a comment received via nMotion2016.org, comment cards, Facebook, Twitter or Nextdoor, or on various media websites. Some individuals have engaged with nMotion more than once during the process.

FIGURE 2-2 | PUBLIC MEETING COMMENTS



Development of Goals

At the very beginning of the project, MTA and RTA incorporated initial feedback into four goals that guided development of the plan:

- **CONNECT:** Connect people to life in Middle Tennessee
- **ENHANCE:** Make transit a competitive travel choice for more Middle Tennesseans
- **SIMPLIFY:** Make transit easy to use
- **SUSTAIN:** Develop a transit system that complements and advances broader regional goals and is financially sustainable in the long term

Then, between April and December 2015, the nMotion team engaged Nashville-area residents about future trade-offs for services and potential transit strategies.

FIGURE 2-3 | EAST NASHVILLE PUBLIC MEETING



Development of Scenarios

In early 2016, MTA and RTA developed and released three potential future transit improvement scenarios for public review and comment. These included:

1. Scenario 1, which presented improvements designed to produce a “**Comprehensive Regional System**” (which was most similar to the recommendations presented in this document).
2. Scenario 2, which presented a more modest package of “**Bus-Focused Expansion**.”
3. Scenario 3, which consisted of “**Modest Improvements**” designed to grow the system generally in line with population growth.

Beginning in February 2016, MTA and RTA asked Middle Tennesseans what they liked – and didn’t like – about the three future scenarios for the region’s transit system. Responses were collected using a colorful survey pamphlet and MetroQuest, an online survey tool. An original visual campaign was created to advertise the

survey and encourage input using the slogan “Decide Your Ride.” Over 9,000 people responded to the survey.

Public Input on the Scenarios

The large majority of input received was supportive of a large investment in a regionwide transit system. Some common themes expressed by survey responders include:

- We are behind other cities in developing transit options.
- We have already waited too long to address traffic issues.
- We don’t want to become “the next Atlanta.”
- A large investment over 25 years is needed to create new transit options.
- People have no intention of giving up driving, but would like to be less dependent on their cars and have other options.
- They think it will help Nashville and Middle Tennessee continue to recruit millennials and young professionals.
- Many are skeptical that large numbers of Middle Tennesseans will ever ride buses, leading many to prefer a rail solution.
- As in the Amp debate, people remain conflicted about dedicated lanes for transit. While most perceive dedicated lanes will be necessary to improve transit travel times and reliability, they also remain skeptical about how dedicated lanes would impact overall traffic flow.

Finally, an overwhelming number of respondents recognize that robust mass transit must be accompanied by good sidewalks and easier access to transit stops and stations.

Draft Recommendations

Based on the input received on the scenarios, MTA and RTA produced and publicized draft recommendations. These draft recommendations were most similar to Scenario 1, and very similar to the plan described in Chapter 3.



Middle Tennesseans then had the opportunity to review the draft recommendations and voice their opinions

- At three community open houses
- At a panel discussion co-hosted by The Tennessean
- On the nMotion2016.org website
- On Facebook, Twitter and Nextdoor
- At three community events

Public Input on the Draft Recommendations

Overall, people are supportive of the transit recommendations, and many want to see new transit projects begin as soon as possible. Others were apprehensive about the \$6 billion cost. Common themes included:

- Strong approval of the plan and all of the proposed improvements
- A sense that Middle Tennessee is already behind, and that

improvements are needed as soon as possible.

- A desire among current transit users for improvements to existing service before big investments in high-capacity services like rail.
- A desire for premium options for surrounding counties, especially given the \$6 billion cost.

While the large majority of input was supportive, there was also opposition, largely due to the cost of the plan. Many who support for the plan also expressed concerns about the cost. Finally, many also expressed frustration that the plan will take 25 years to fully implement.

Chapter 3 The Plan

This chapter describes the entire package of transit improvements recommended and adopted for implementation under the 2040 nMotion Transit Strategy. The improvements are grouped into seven general strategies, each with several actions designed to work together to produce a strong network of interconnected services. These improvements will develop a comprehensive regional transportation system inclusive of multiple technologies and mobility strategies.

SERVICE IMPROVEMENT RECOMMENDATIONS



Make Service Easier to Use



Improve Existing Services



Improve Access to Transit



Make Service More Comfortable



Develop a Network of Regional Transit Centers



Expand Services to New Areas



Build High Capacity/Rapid Transit Network

Make Service Easier to Use

- **Simplify service** to make it easier to understand and ensure that riders get to their destinations without problems
- Develop a **single seamless system** that will operate under a single name with a seamless fare system and with strong connections between Metro and regional services
- Provide a **better passenger experience** through a variety of improvements, including:
 - A “Smart Technology Platform”
 - Better information that’s easier to access
 - Easier fare payment options

Improve Existing Services

- Provide **more frequent service for longer hours** on nearly all existing routes
- **Improve AccessRide Service** for those who cannot use fixed-route service
- **Streamline service in downtown Nashville** to make it faster and simpler
- Develop new **crosstown and through-city routes** to provide better service to non-downtown locations
- Develop a **Frequent Transit Network** that will provide **frequent service to Davidson County’s** most heavily traveled corridors

Improve Access to Transit

- Improve **pedestrian and bicycle access**
- Provide more conveniently located **park-and-ride** lots
- Partner with other providers

Make Service More Comfortable

- Upgrade stations and stops** with more shelters and benches
- Provide service with **more comfortable vehicles**

Develop a Network of Regional Transit Centers

- Develop **outlying transit centers** to develop a more interconnected network that will further reduce the need to travel via downtown Nashville

Expand Services to New Areas

- Add **service to new areas**, particularly in outer counties

Build High Capacity/Rapid Transit Network

- Provide **High Capacity/Rapid services** that will be fast, frequent, and comfortable, including **light rail, commuter rail, Bus Rapid Transit, Rapid Bus, Freeway BRT, and express bus on shoulder service**
- Provide **convenient airport service** – light rail, Rapid Bus, express bus, (and local bus)

A map of recommended major Metro area services under the nMotion 2040 plan is shown in Figure 3-1 and a similar map for regional services is shown in Figure 3-2.

As shown in the table below, each of the recommended strategies helps achieve the four goals identified during the nMotion planning process as described in Chapter 2. The following sections provide more detailed information and specific projects to advance each of the goals of the nMotion 2040 plan.








		nMotion Goals			
		CONNECT	ENHANCE	SIMPLIFY	SUSTAIN
	Make Service Easier to Use		✓	✓	
	Improve Existing Services	✓	✓		✓
	Improve Access to Transit	✓		✓	✓
	Make Service More Comfortable		✓	✓	
	Develop a Network of Regional Transit Centers	✓		✓	
	Expand Services to New Areas	✓	✓		✓
	Build High Capacity/Rapid Transit Network	✓	✓		

FIGURE 3-1 | METRO AREA SERVICES

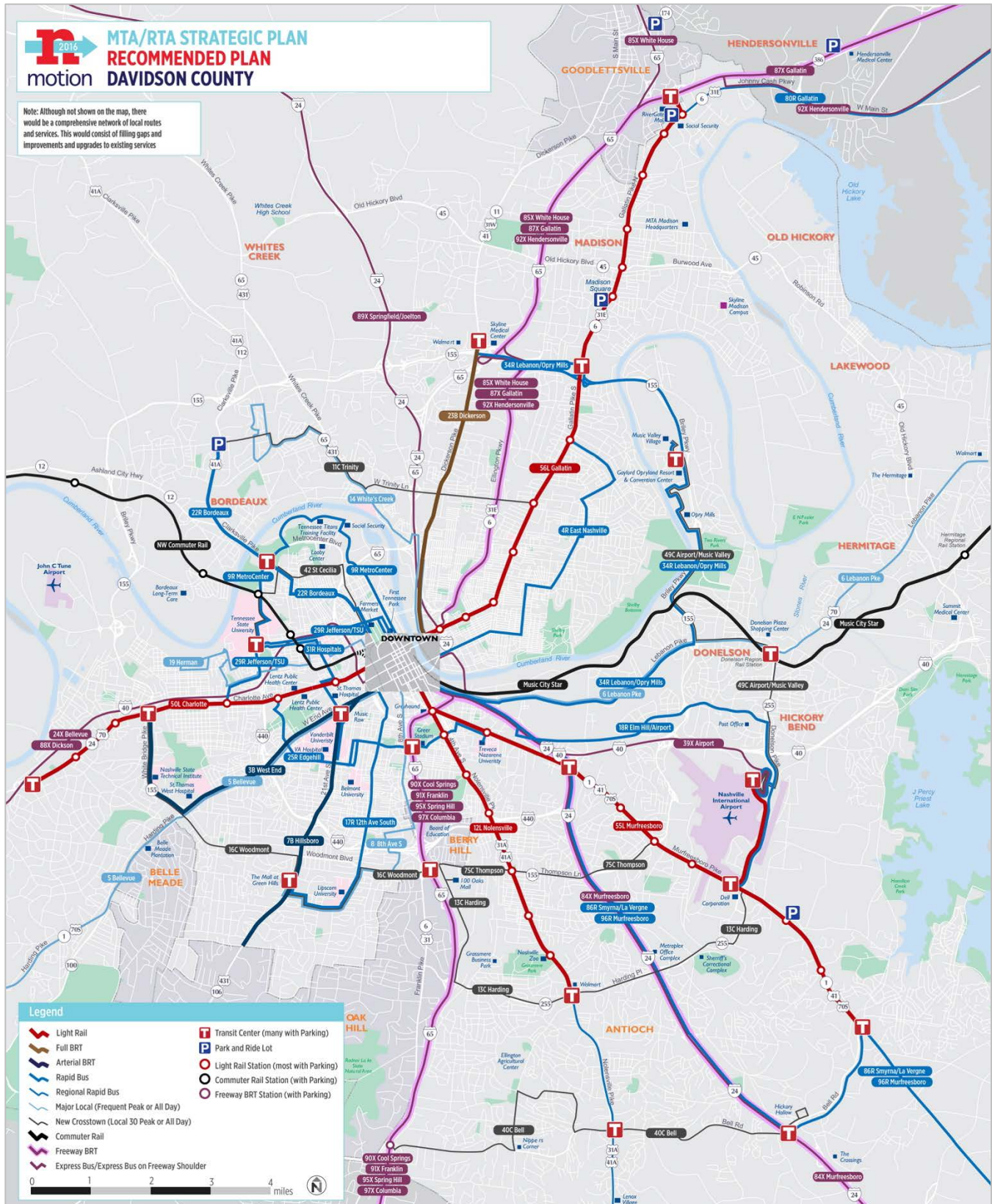
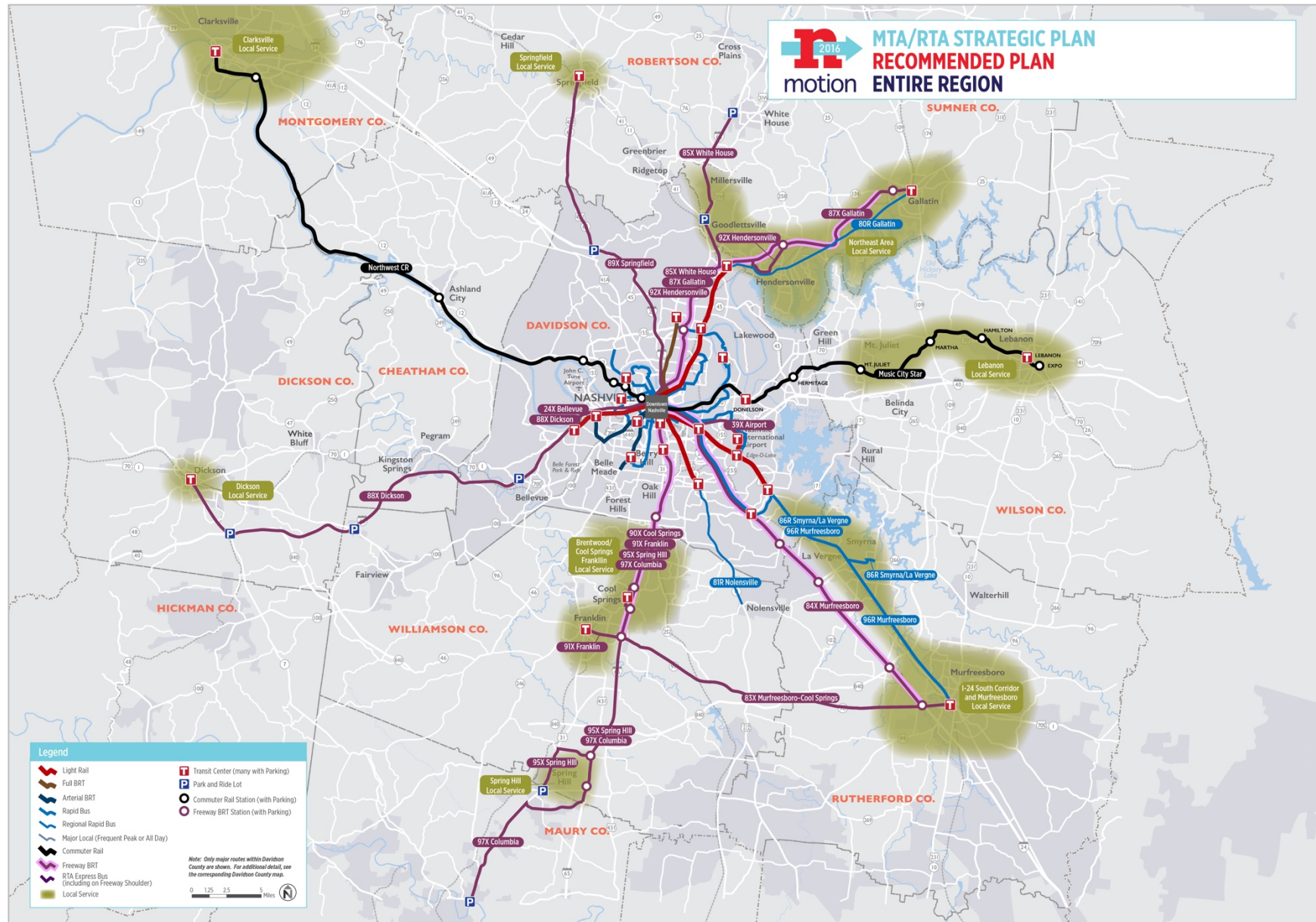


FIGURE 3-2 | OUTER COUNTY SERVICES





Make Service Easier to Use

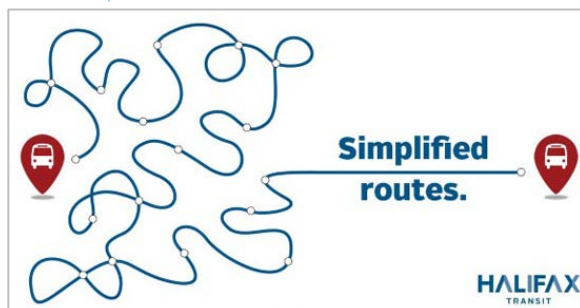
One of the first sets of improvements that MTA and RTA will undertake under the nMotion plan will be to make existing local and regional transit service easier to use.

Simplify Service

Because Nashville MTA operates a small number of routes relative to Nashville's size, it attempts to serve many people and places with many individual routes. As a result, some service can be very complicated with many route variants and indirect service. MTA and RTA will update their services to make them simpler, which will help riders get where they want to go with a simpler ride. This will be a short-term effort occurring within the first five years of implementation. Improvements will be developed in the following manner:

- Extensive public participation (as in nMotion 2016)
- A market analysis to determine underlying market demands
- A comprehensive evaluation of each individual route to determine strengths, weaknesses, and potential improvement opportunities
- The development of potential short-term service changes
- The evaluation and vetting of potential improvements with stakeholders
- The development and implementation of recommendations

FIGURE 3-3 | HALIFAX TRANSIT AD FOR NEW SIMPLER SERVICE



Develop a Single Seamless System

MTA and RTA will present the services of their two agencies as part of a single transit network branded under a single name. This effort will include consolidating network information and communications, developing and implementing a simpler unified fare system, improving and strengthening connections between Metro and regional mobility services, and investigating other improvements that may be identified by the region's stakeholders. This process will include significant public and stakeholder conversations during the development and implementation phases. The process will begin immediately and will likely extend over a three to five-year duration for most of the improvements. This will be an ongoing effort to continually improve and connect mobility options seamlessly in the Middle Tennessee region.

Provide Better Information

Different people access information in different ways. In recognition of this, MTA and RTA will provide information in a variety of ways to make it easy to obtain and will improve existing communication methods. These improvements will include:

- A **single website for regional transit information**. This single website would provide information on services provided by the MTA and RTA, as well as other local providers (for example, Clarksville Transit System, Franklin Transit, and the Murfreesboro Rover).
- The provision of **schedule and real-time information via websites and smartphone apps** for all transit services in Middle Tennessee (MTA, RTA, and local providers).
- **Real-time information at major stations and stops and park-and-ride lots.**
- **Route information, including schedules and maps,** at all stops.
- **Wayfinding and local information signage** at major stops.

FIGURE 3-4 | BUS STOP INFORMATION



FIGURE 3-5 | OFF-BOARD TICKETING (NYC) AND ON-BOARD CARD READER (CHICAGO)



Make Fare Payment Simpler

Fare payment technology is improving rapidly and will likely continue to do so. To take advantage of this, MTA and RTA have already begun to aggressively pursue improvements that would make fare payment much easier. Improvements may include:

- **Regional joint fares**
- **Stored value tickets** to make fare payment easier for occasional riders
- **Open payment systems** that allow use of credit card, debit card, and other third party fare payment systems
- **Mobile ticketing** to provide another payment option and make fare payment easier
- **Off-board ticketing machines** that accept credit and debit cards

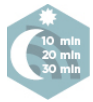
- The development of **open systems** that could be used interchangeably with private transportation providers and parking facilities

Use Smart Technology

The Nashville Chamber of Commerce has proposed that the City of Nashville develop a Smart Technology Platform that would provide “one stop” shopping for a variety of transportation options, including information and payment options for:

- Public transit
- Parking
- First mile/last mile services such as Lyft, Uber, carshare, bikeshare, etc.
- Future mobility options as they are developed

MTA and RTA will work with the City of Nashville, the Nashville Chamber of Commerce, and others to develop this platform.



Improve Existing Services

In addition to making existing services easier to use, MTA and RTA will make fundamental improvements and upgrades to existing services.

Provide More Frequent Service for Longer Hours

Nearly all services will operate for significantly longer hours during mornings, evenings, and weekends, and much more frequently than they do now. This increased service will begin within the first two years of implementation with longer hours beginning earlier in the day and extended later into the night. Within two to five years, more frequent service will be added as new vehicles are purchased to implement the greater frequency. The increased hours and frequency will be phased in during a five- to 10-year period to match the growth of the region.

- **Metro Area Local Bus:** Increases will depend upon the type of route and ridership levels, but there will be earlier and later service, more weekend service, and more frequent service throughout the day on nearly all routes.
- **Regional Routes:** All day, seven-days-a-week service would be provided on major routes, including commuter rail.
- **Express Routes:** In addition, much more frequent service will be provided on MTA and RTA express routes, including midday and early evening service.

Improve Service in Downtown Nashville

Transit service in downtown Nashville will be reconfigured to make it simpler and more direct, and more legible.

What About Autonomous Vehicles?



Source: Wired

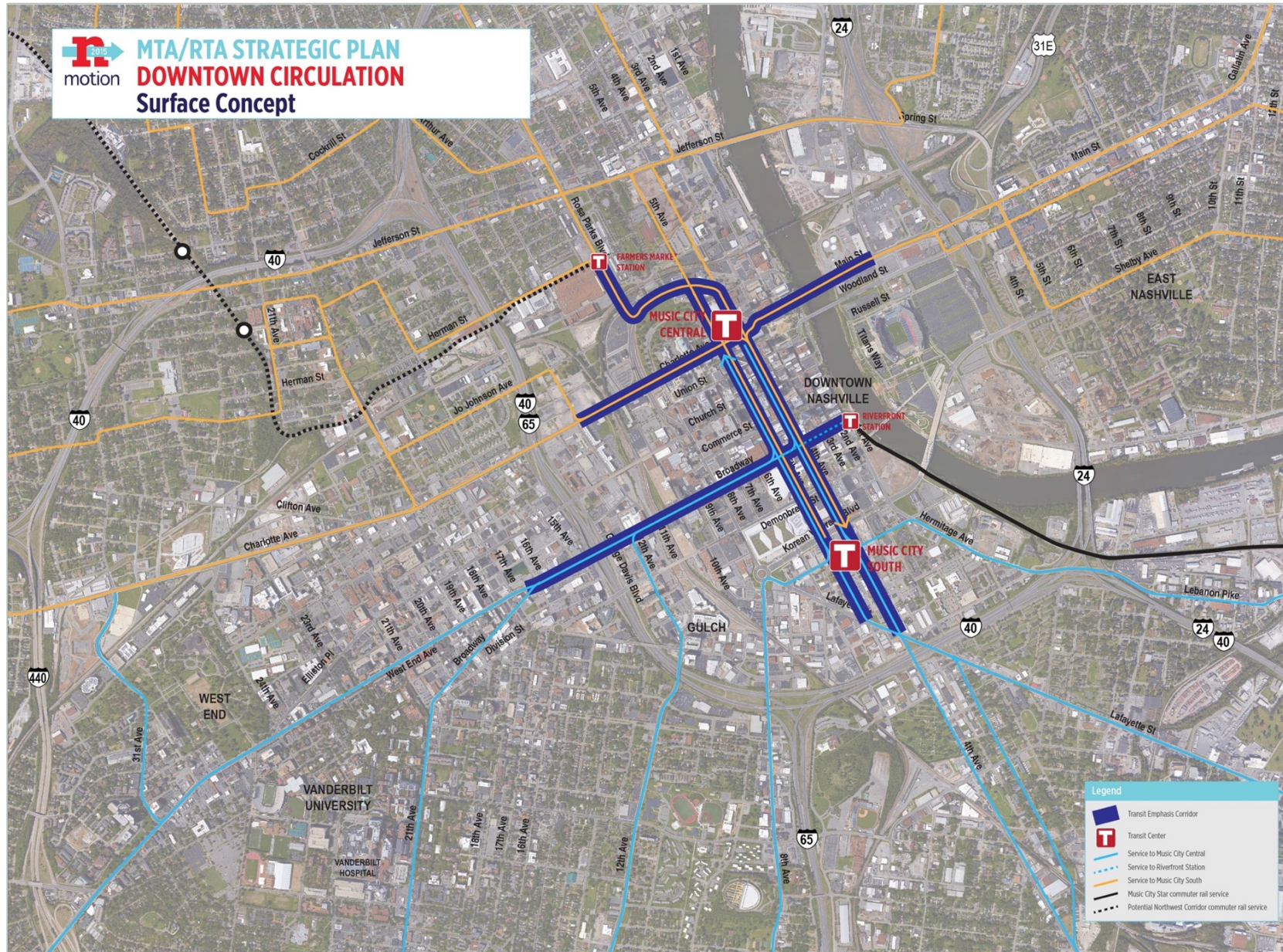
Autonomous vehicles are coming. These vehicles could create big changes to how we move between and around our cities and towns. However, while there is much speculation on when and what their impacts will be, there is little agreement.

The nMotion plan recognizes that autonomous vehicles will very likely have a connection to future transit service and infrastructure. In particular, fully autonomous vehicles could jointly use “managed lanes” with BRT and emergency vehicles. Neighborhood and regional transit centers could serve as the connecting points between localized, autonomous circulation and the regional mass transit system. Recommendations will continue to be responsive to changes in the industry as these vehicles make their way onto our roads.

Changes may consist of (see Figure 3-6):

- A **second transit center** south of the Convention Center
- **Transit Emphasis Corridors:**
 - North-south through the downtown core
 - Charlotte Avenue/James Robertson Parkway
 - Broadway
- **Much simpler circulation** patterns and **very frequent service** in the Transit Emphasis Corridors. The very frequent service in the Transit Emphasis Corridors will provide shuttle-like service within downtown.
- **Transit priority measures** along Transit Emphasis Corridors and other key locations.

FIGURE 3-6 | DOWNTOWN CIRCULATION CONCEPT



Note: This figure illustrates the overall concept; however, Transit Emphasis Corridors could be use alternative streets and a second transit center could be located elsewhere.

Downtown Nashville: Where It All Comes Together



Source: Nashville Downtown Partnership

Downtown Nashville is the center of Middle Tennessee and the place where most transit riders travel to and from. However, it is also where transit gets bogged down with buses currently averaging about six miles per hour in downtown. These slow speeds make transit unattractive, and a common theme heard during the nMotion 2016 civic engagement process was, “I’d use transit if it weren’t so slow, especially in downtown Nashville.”

Today’s slow service is due to a combination of relatively narrow streets, traffic congestion, and a lack of transit priority. Other cities with even worse congestion have made transit work more effectively in downtown, and a key to making transit more effective, for both Davidson County and all of Middle Tennessee will be to make it work well within downtown Nashville.

Implement Crosstown and Through-City Routes

Existing MTA and RTA services are currently very heavily focused on downtown Nashville. To make it easier to use transit to reach other locations, new “crosstown” and “through-city” routes will be developed. New crosstown services will provide service between (see Figure 3-8):

- Bordeaux and Gallatin Pike via Trinity Lane (Route 11C Trinity)

- 100 Oaks Mall and Murfreesboro Pike via Harding Place (Route 13C Harding)
- Charlotte Avenue and One Hundred Oaks Mall via Woodmont Avenue and the Mall at Green Hills (Route 16C Woodmont)
- Murfreesboro Pike and Nashville International Airport (with continuing service to downtown) (Route 18R Elm Hill/Airport)
- Charlotte Avenue and Trevecca Nazarene University via Edgehill Avenue (Route 25R Edgehill)
- Jefferson Street and Blakemore Avenue via Metro General Hospital, Saint Thomas Midtown Hospital, and Vanderbilt Medical Center (Route 31R Hospitals)
- Gallatin Pike and downtown Nashville via Opry Mills (Route 34R Lebanon/Opry Mills)
- I-65 at Old Hickory Boulevard and Hickory Hollow via Old Hickory Boulevard and Bell Road (Route 40C Bell)
- Nashville International Airport and Opryland/Music Valley via Donelson Station (Route 49C Airport/Music Valley)
- 100 Oaks Mall and Murfreesboro Pike via Thompson Lane (Route 75C Thompson)

In addition, MTA will combine a number of radial routes that now operate to and from downtown Nashville through the city to provide more one-seat rides. The specific routes will be determined as a short-term action, but candidate routes include:

- West End – Dickerson (Routes 3B West End and 23B Dickerson)
- MetroCenter – 12th Avenue South (Routes 9R MetroCenter Rapid and 17R 12th Avenue South Rapid)
- Whites Creek – 8th Avenue South (Routes 14 White’s Creek and 8th Avenue South)
- Bordeaux – Elm Hill Pike/Airport (Routes 22R Bordeaux Rapid and 18R Elm Hill Rapid)

- Jefferson/TSU – East Nashville (Routes 29R Jefferson/TSU Rapid and 4R East Nashville Rapid)

Improve AccessRide Service

MTA's AccessRide service currently goes well beyond what is required by the Americans with Disabilities Act (ADA) and, relative to its fixed-route services, is significantly more extensive than what is provided in most other areas. Going forward, MTA will continue to implement improvements, with most aimed at making service more convenient:

- **Real-time information** that will allow users to track the location of their vehicle to provide more accurate pick-up time information
- New “**no advance reservation**” services, such as the ability to use

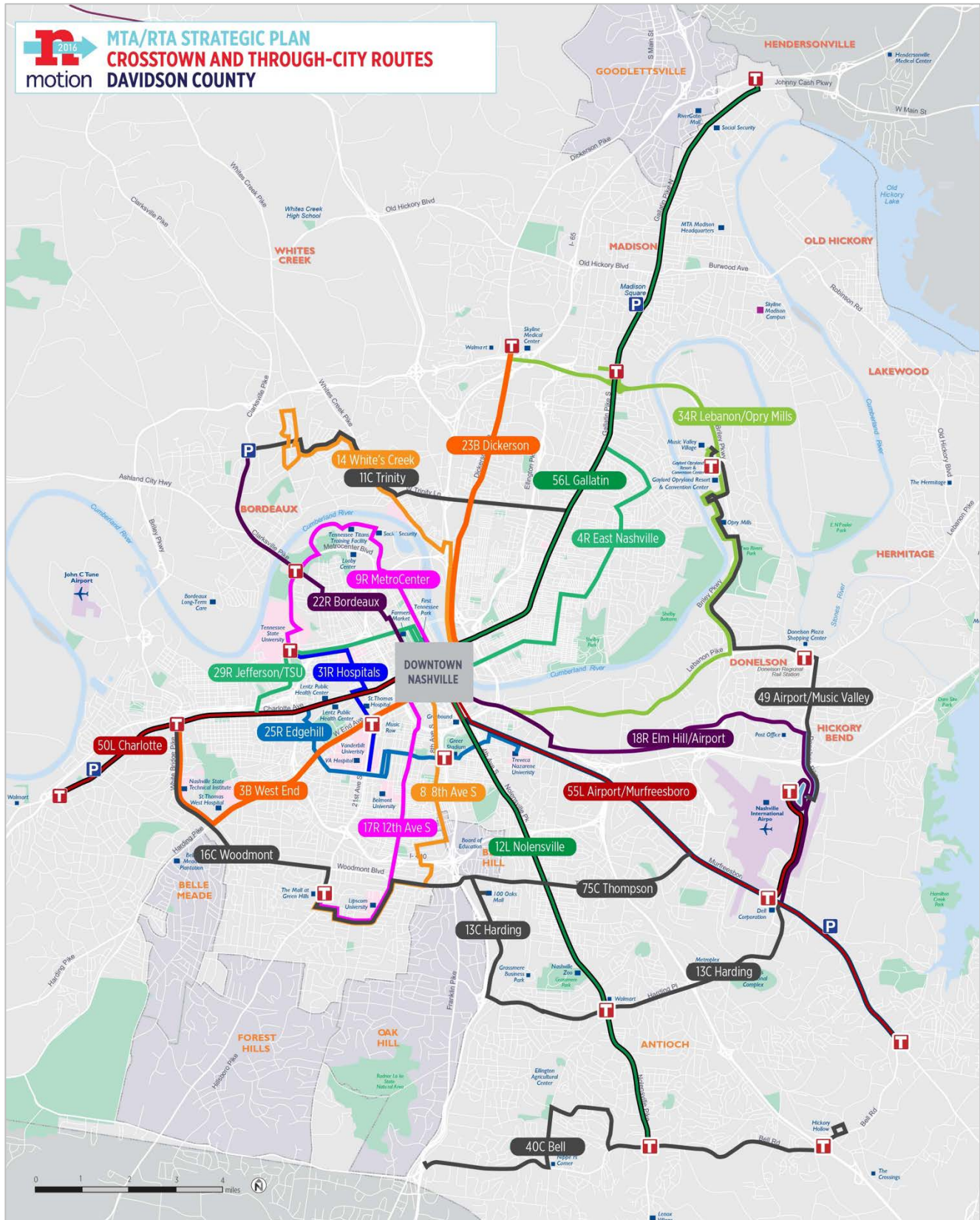
additional transportation providers such as Uber, Lyft, and regular taxis

- **New fare payment options** to make fare payment easier
- The development of a **charitable organization to provide fare subsidies for low income riders**

FIGURE 3-7 | ACCESSRIDE SERVICE



FIGURE 3-8 | CROSSTOWN AND THROUGH-CITY ROUTES



Service to Music Valley/Opryland

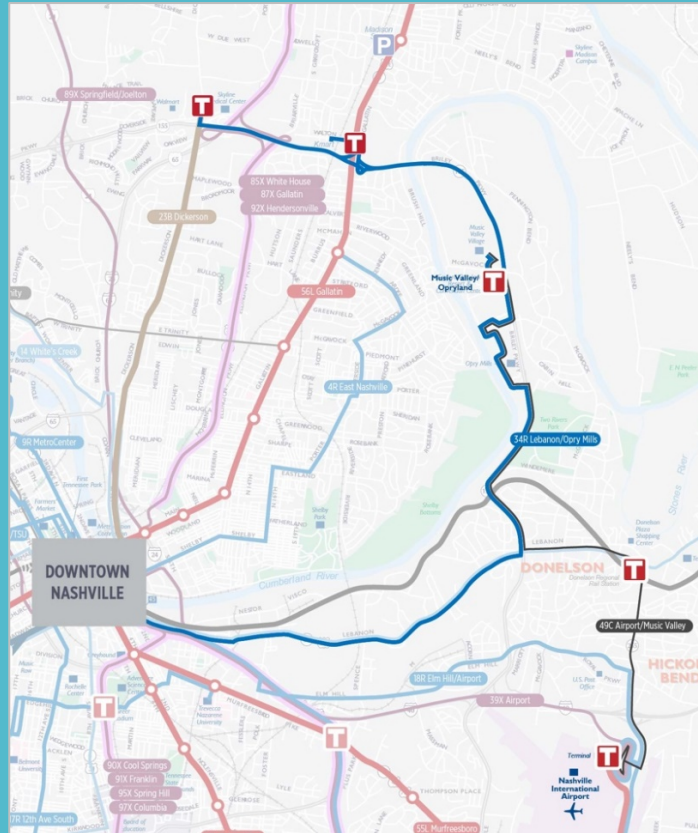


Source: marriott.com

Opryland is one of Nashville's major destinations, but one that now has only limited transit connections. Service will be fundamentally improved in two ways:

- Route 34 Opry Mills, which now provides only very limited service to Music Valley, will be upgraded to a Rapid Bus route (Route 34R Lebanon/Opry Mills) and will provide frequent service from early morning until late night seven days a week. This route will also provide connections to light rail on Gallatin Pike and BRT on Dickerson Pike and to points beyond.
- New local service will be developed between the airport and Music Valley via the Donelson Music City Star Station. This service will operate every 30 minutes seven days a week.

Music Valley Service



Develop a Frequent Transit Network

MTA will start the development of a Frequent Transit Network with local bus routes and Rapid Bus routes that will serve as the foundation for a future Frequent Transit Network, eventually including Bus Rapid Transit (BRT) and light rail (see Table 3-1). With this network, riders will be able to travel to Davidson County's most frequented destinations without a schedule and with only very short waits.

These routes of the Frequent Transit Network will operate seven days a week from early morning to late night/early morning. The major local routes will operate at least every 15 minutes during weekday peak periods and at least every 30 minutes during weekday off-peak

periods and on weekends. The Rapid Bus routes, and eventually the BRT and light rail lines, will operate at least every 10 minutes throughout the day through mid-evening, and slightly less frequently after that time.

Major Local

- Bellevue to downtown Nashville via Harding Pike and West End Avenue (Route 5 Bellevue)
- Hermitage to downtown Nashville via Lebanon Pike (Route 6 Lebanon Pike)
- Mall at Green Hills to downtown Nashville via Lipscomb University and 8th Avenue South (Route 8 8th Avenue South)
- Bordeaux to downtown Nashville via Whites Creek Pike and World Baptist Center Drive (Route 14 Whites Creek)

Rapid Bus

- East Nashville between Gallatin Road at Ardee Avenue to downtown Nashville via areas east of Gallatin Pike (Route 4R East Nashville)
- TSU to downtown Nashville via MetroCenter and 3rd Avenue North (Route 9R MetroCenter)
- Mall at Green Hills to downtown Nashville via 12th Avenue South (Route 17R 12th Avenue South)
- Nashville International Airport to downtown Nashville via Elm Hill Pike (Route 18R Elm Hill/Airport)
- Bordeaux to downtown Nashville via Clarksville Pike (Route 22R Bordeaux)
- Crosstown service between Charlotte Avenue and Trevecca Nazarene University via Edgehill Avenue (Route 25R Edgehill)
- Charlotte Avenue to downtown Nashville via TSU and Jefferson Street (Route 29R Jefferson/TSU)

- Crosstown service between Jefferson Street and Blakemore Avenue via Metro General Hospital, Saint Thomas Midtown Hospital, and Vanderbilt Medical Center (Route 31R Hospitals)
- Gallatin Pike to downtown Nashville via Opry Mills (Route 34R Lebanon/Opry Mills)

Bus Rapid Transit (BRT)

- 21st Avenue South/Hillsboro Pike (Route 7B Hillsboro)
- Broadway/West End Avenue (Route 3B West End)
- Dickerson Pike (Route 23B Dickerson)

Light Rail

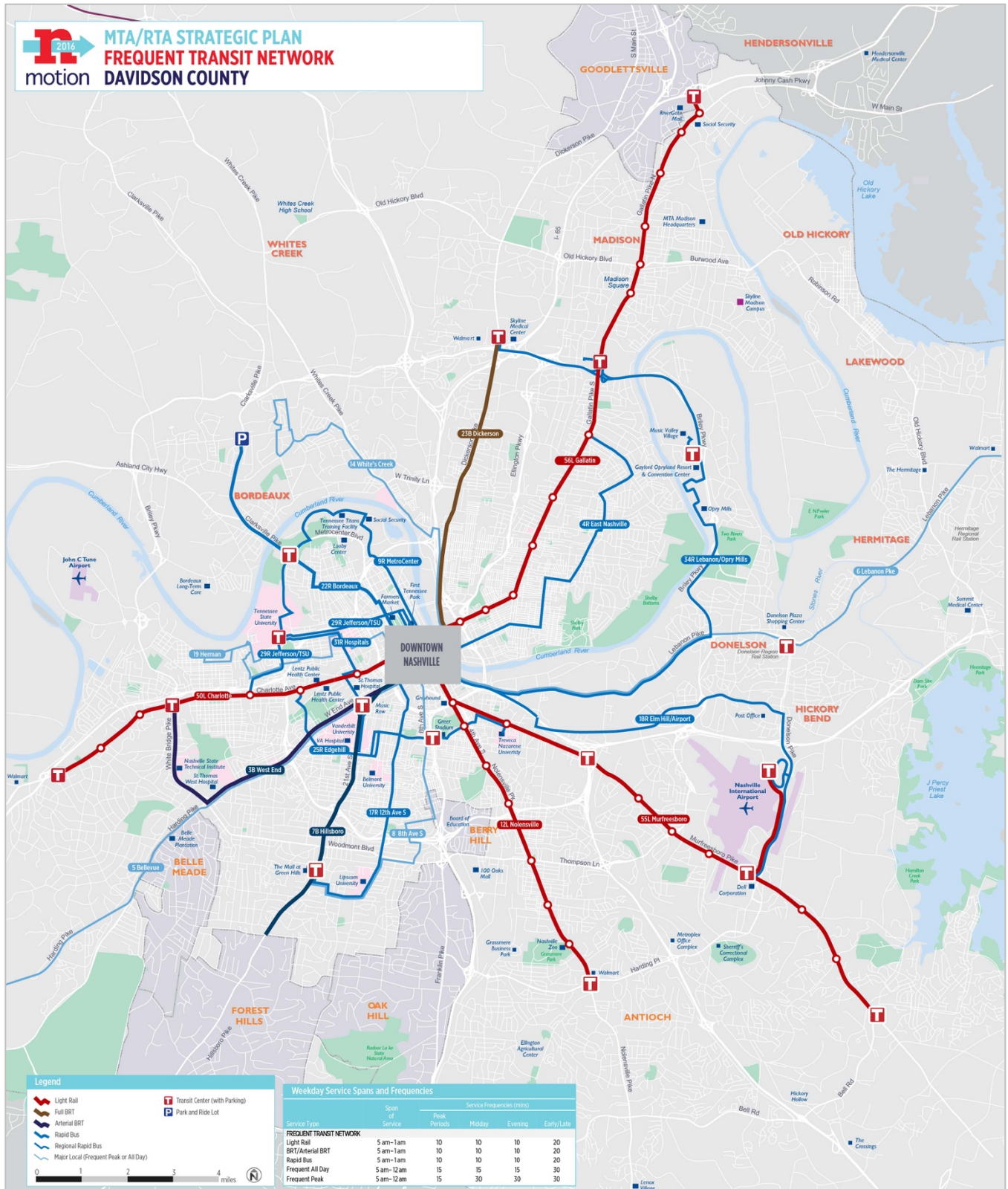
- Gallatin Pike
- Murfreesboro Pike/Airport
- Nolensville Pike
- Charlotte Avenue

TABLE 3-1 | WEEKDAY SERVICE SPANS AND FREQUENCIES

		Service Frequencies (mins)			
Service Type	Span of Service	Peak Periods	Midday	Evening	Early/Late
Frequent Transit Network					
Light Rail	5 am – 1 am	10	10	10	20
BRT	5 am – 1 am	10	10	10	20
Rapid Bus	5 am – 1 am	10	10	10	20
Regional Rapid Bus	5 am – 11 pm	30	30	30	60
Frequent All Day	5 am – 12 am	15	15	15	30
Frequent Peak	5 am – 12 am	15	30	30	30
Local Routes					
Local 30 All Day	5 am – 11 pm	30	30	30	30
Local 30 Peak	5 am – 11 pm	30	60	60	60
Local 60 All Day	5 am – 9 pm	60	60	60	60
Circulator	5 am – 7 pm	30	30	60	
Lifeline	9 am – 3 pm		60		
Regional Routes					
Commuter Rail	5 am – 11 pm	30	60	60	60
Freeway BRT	5 am – 11 pm	30	60	60	60
Commuter/Express	5 am – 9 pm	30	120	120	

Note: Spans and frequencies represent minimums for each type of service; additional service could be provided.

FIGURE 3-9 | FREQUENT TRANSIT NETWORK





Improve Access to Transit

At the present time, a significant barrier to using transit is that it is difficult to get to and from existing routes. MTA and RTA will implement and participate in the development of a number of efforts to improve access to transit service for local communities and businesses including improving pedestrian access, creating more conveniently located park-and-ride lots, and making better bicycle connections.

While MTA and RTA will participate in the development of these services, the primary responsibility for providing the services would be with others (local transit agencies; businesses such as taxis, Lyft, and Uber; TMAs; local communities, etc.). However, MTA and RTA will also work to provide transit services in areas where other alternatives are not available. These connections could include.

- Private rideshare services such as Uber and Lyft
- Car share/private short-term car rental companies such as ZipCar and Car2Go
- The development of Transportation Management Associations (TMAs) to provide private connections

Finally, MTA and RTA will also work to partner with Transportation Network Companies such as Lyft and Uber to provide first/last mile connections

Improve Pedestrian Access

MTA and RTA will work with local communities to develop sidewalks, safe crossing locations, and other pedestrian improvements everywhere transit service is provided. MTA and RTA will also work with local communities to prioritize transit investments in corridors where communities invest in pedestrian and accessible infrastructure.

FIGURE 3-10 | EXAMPLE PEDESTRIAN IMPROVEMENTS



FIGURE 3-11 | BUFFERED BIKE LANE ON BUS ROUTE (SEATTLE, WA); BIKE LOCKERS AT DART STATION (DALLAS, TX)



Improve Bicycle Connections

In a similar manner as with pedestrian improvements, MTA and RTA will work with local communities to improve bicycling conditions to and from transit service. MTA and RTA will continue to provide bicycle racks on existing buses and will ensure space is provided on future technologies such as BRT vehicles and light rail vehicles.

Develop More Conveniently Located Park-and-Ride Lots

Most MTA and RTA park-and-ride lots are located at places where local businesses and organizations have agreed to let commuters park for free. This is a very low cost approach, but often results in lots that are inconveniently located. Going forward, MTA and RTA will develop “purpose-built” park-and-ride lots designed to maximize convenience. These lots will be developed along existing express routes, new Freeway BRT routes, and other key locations.

Work to Develop Private/Community Shuttles

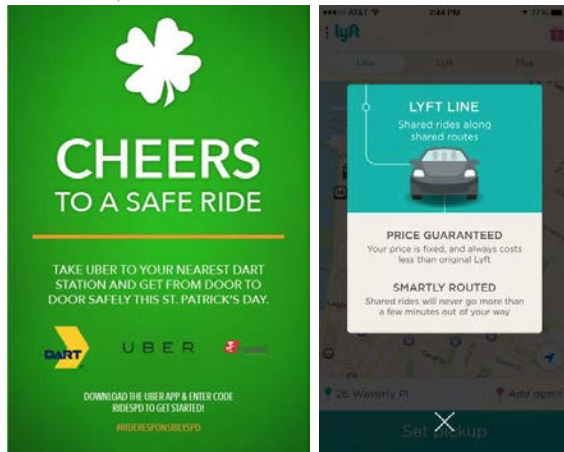
Elsewhere in the United States, shuttles are a very common way to provide connections between transit stations and locations where volumes are too low for traditional transit service operated with

30- or 40-foot buses, where destinations are highly dispersed, and where the times that people travel are highly concentrated. Most shuttles are provided by one of four types of organizations: (1) Transportation Management Associations (TMAs), (2) private employers, (3) cities and towns, and (4) public transit systems. Local shuttles typically provide coordinated connections that make timed transfers to higher-capacity transit routes. MTA and RTA will work with each of these types of organizations to encourage the development of shuttles to and from major transit locations.

Develop Partnerships with Transportation Network Company (TNC) Services

Services provided by Transportation Network Companies are already being well used to provide “first mile/last mile” connections with transit. MTA and RTA will work with these companies to make the joint use of services easier and to formalize relationships in a manner that will provide for joint fares and/or simpler fare payment. MTA and RTA will also investigate the use of these types of companies to provide MTA and RTA service to lower demand areas, including AccessRide services.

FIGURE 3-12 | UBER AND LYFT OPTIONS



Make Service More Comfortable

Major components of transit travel consist of waiting at stops and stations and riding in transit vehicles – sometimes for very long periods of time. MTA and RTA will make improvements in both these areas to make using transit more comfortable whether the trip is short or long.

Upgrade Stations and Stops

MTA and RTA will develop a program to improve amenities at targeted stops and stations to reach the vast majority of riders. Specific amenities to be assessed will include shelters, benches, lighting, trash cans, real-time signage, and more. To do this, MTA and RTA will develop a hierarchy of stops based on stop purpose and volumes and will define the types of facilities and amenities that would be provided at each, barring physical limitations at any site. MTA and RTA will also work closely with cities and counties to ensure ongoing maintenance and security standards around transit facilities.

Provide Service with More Comfortable Vehicles

As part of the development and provision of premium services, MTA and RTA will improve vehicle comfort levels. This will include local buses, express routes, BRT-lite routes, and Over-the-Road coaches on all RTA express routes. Other improvements including the provision of wi-fi and other amenities will be considered.

FIGURE 3-13 | PORTLAND, OR AND LOS ANGELES BUS STOPS



FIGURE 3-14 | LIGHT RAIL, BRT, AND EXPRESS BUS VEHICLES



Develop a Network of Regional Transit Centers

In conjunction with the development of new crosstown and through-city routes and the expansion of service to new areas (as described in the next section), MTA and RTA will develop new transit centers throughout Davidson County and the region that will facilitate non-downtown Nashville travel. The transit centers will be designed to act as regional and local “mobility hubs” that provide connections between local services, between local and regional services, and between non-downtown locations (see Figure 3-15).

The transit centers will be sized and developed based on local conditions and needs, and thus will range in size from very large with a wide range of amenities to more modest neighborhood transit centers. All will provide a comfortable location to make connections between transit routes and may include features such as:

- Strong pedestrian connections with the surrounding areas
- Parking (at outer area transit centers) and drop-off areas
- Bikeshare and bicycle parking
- Space for private shuttles and Transportation Network Companies (Lyft, Uber, etc.)
- Real-time passenger information

- Comfortable and attractive waiting areas

The transit centers will be connected to downtown and other outlying areas by reconfiguring existing routes and implementing new routes. Potential locations are shown in Figure 3-16.

FIGURE 3-15 | OUTLYING TRANSIT HUB MODEL

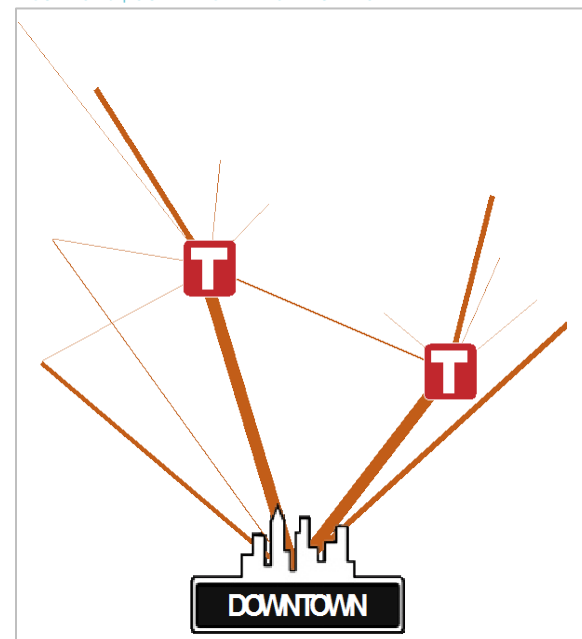
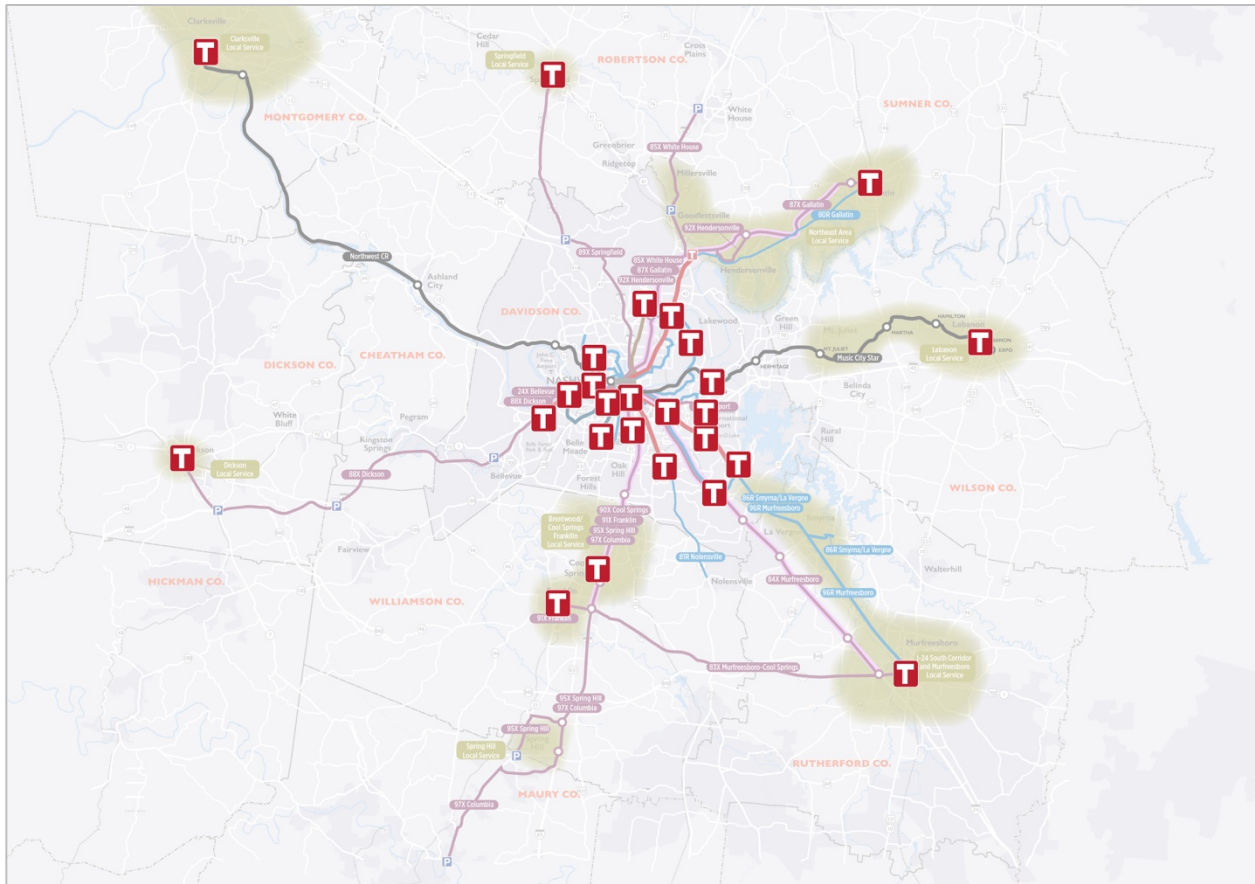


FIGURE 3-16 | TRANSIT CENTER LOCATIONS



Note: Additional transit centers at locations still to be determined will also be developed.

FIGURE 3-17 | MOUNTLAKE TERRACE TRANSIT CENTER (MOUNTLAKE TERRACE, WA) AND AIRWAYS TRANSIT CENTER (MEMPHIS, TN)





Expand Service to New Areas

Within Davidson County, MTA will expand service to fill gaps in coverage and extend service to new areas as the County continues to grow and as demand develops. In addition, and as described earlier, MTA will provide new linkages through the development of crosstown and through-city routes.

In the outer counties, RTA will work with Clarksville Transit, Franklin Transit, and the Murfreesboro Rover to improve and expand local services. In other areas where demand will emerge for local service, RTA will work with communities to develop new services that could be operated by either the communities or RTA. Areas that will be targeted for the development of new services will include:

- Springfield
- Goodlettsville
- Hendersonville
- Gallatin
- Lebanon
- Smyrna and La Vergne
- Spring Hill
- Dickson



Build High Capacity/ Rapid Transit Services

A large number of new High Capacity and Rapid transit services will be developed. These will include light rail, commuter rail, Bus Rapid Transit (BRT), Rapid Bus, Freeway BRT, Express Bus on Shoulder service, Regional Rapid Bus, and “regular” express bus services (see Figure 3-18 and Figure 3-19).

The larger infrastructure projects such as Light Rail, Commuter Rail, and dedicated BRT corridors will be longer term projects requiring significant effort to complete environmental clearances and detailed engineering prior to construction and operations. MTA and RTA will begin the

regulatory processes for environmental and engineering efforts on these so that they may be phased in over the mid- and long term phases of the nMotion 2040 plan.

Rapid Bus, Freeway BRT, Express Bus on Shoulder service, Regional Rapid Bus, and “regular” express bus services will require lesser degrees of environmental and engineering and will begin being developed in the short to mid-term periods of the nMotion plan.

The following information provides more description of these technologies and proposed alignments.

Light Rail

Light rail transit (LRT) is electric urban rail service that typically operates in exclusive rights-of-way (see Figure 3-20). Most often, it uses one to three car trains and is designed to serve high volume corridors at higher speeds than a local bus or streetcar service. Design and operational elements of LRT include level boarding (no stairs necessary to go from the station platform onto the vehicle), off-board fare payment (payment is not made on the vehicles), and traffic signal priority (rail vehicles have priority going through traffic lights at intersections with crossing traffic). LRT stations are typically spaced farther apart than bus stops for local transit services and are situated where there are higher population and employment densities. While longer stop spacing can increase walking distances for some riders, people are typically willing to walk farther to reach transit if service is fast and frequent.

Light rail service will be provided in four corridors where transit demand will be the highest and where there is the greatest potential for new development. These corridors are consistent with those identified in and envisioned by NashvilleNext:

- Gallatin Pike
- Murfreesboro Pike/Airport
- Nolensville Pike
- Charlotte Avenue

Commuter Rail

Commuter rail service is designed to transport large volumes of passengers over long distances in a fast and comfortable manner. The primary market for commuter rail service is usually commuters to and from city centers.

Experience in Middle Tennessee and elsewhere shows that commuter rail can shift far more people out of cars than express bus services. For example, comparing the current Music City Star commuter rail line to express bus services in Williamson and Rutherford Counties, the Music City Star serves a smaller market and has less frequency than the express bus routes, but it carries six times more passengers overall and over seven times more passengers per trip. This is the case for a number of reasons, the most important of which includes faster service with better on-time performance outside of typical rush hour traffic delays on the region's roads and highways.

However, as described in the call-out box on page 3-25, the potential for the development of commuter rail in Middle Tennessee is very limited. This is because most potential lines would need to use CSX tracks. For the foreseeable future, these tracks would be unusable or highly limited for commuter service due to very high volumes of freight traffic.

For this reason, commuter rail improvements are proposed along lines where there is limited freight activity: The Music City Star Line on the Nashville and Eastern Rail Corridor and the Northwest Corridor between Clarksville and Nashville including the Nashville and Western Rail Corridor.

Music City Star

RTA will work towards upgrading Music City Star service to all day, seven days a week service. A new station will be constructed at Hamilton Springs and service will be extended to Lebanon's planned Expo Center. Much or all of the line will be double-tracked to enable more frequent service. New rail

vehicles will be purchased. These improvements will be made incrementally over the mid- to long-term phases of the nMotion 2040 plan in order to comply with strict railroad agreements and federal regulations.

Northwest Corridor

RTA is nearing completion of the Northwest Corridor Transit Study, which is examining a number of options for transit improvements between Clarksville, Ashland City, and Nashville. It is expected that the study will recommend the development of commuter rail. However, it has also identified a number of hurdles. Two of the most important are:

1. The inability to bring service all the way into downtown Nashville, with the closest two potential terminals near the Farmer's Market and the Gulch. While very strong connections to local bus service could be provided from either location, the need to transfer from one mode to another could negatively affect ridership levels.
2. Significantly more growth and development needs to occur at key locations along the corridor to increase potential ridership levels and to make the service cost-effective.

The development of Northwest Corridor commuter rail service will be a long-term project. When service is implemented, it is envisioned that two types of service will be provided:

- Commuter service between Clarksville and Nashville
- Local service within Nashville between North Nashville and the vicinity of downtown.

Northwest Corridor service would be provided with self-propelled rail cars that would be similar in appearance to light rail vehicles, and the service within Davidson County would be similar to light rail service in many respects.

FIGURE 3-18 | METRO AREA HIGH CAPACITY AND RAPID SERVICES

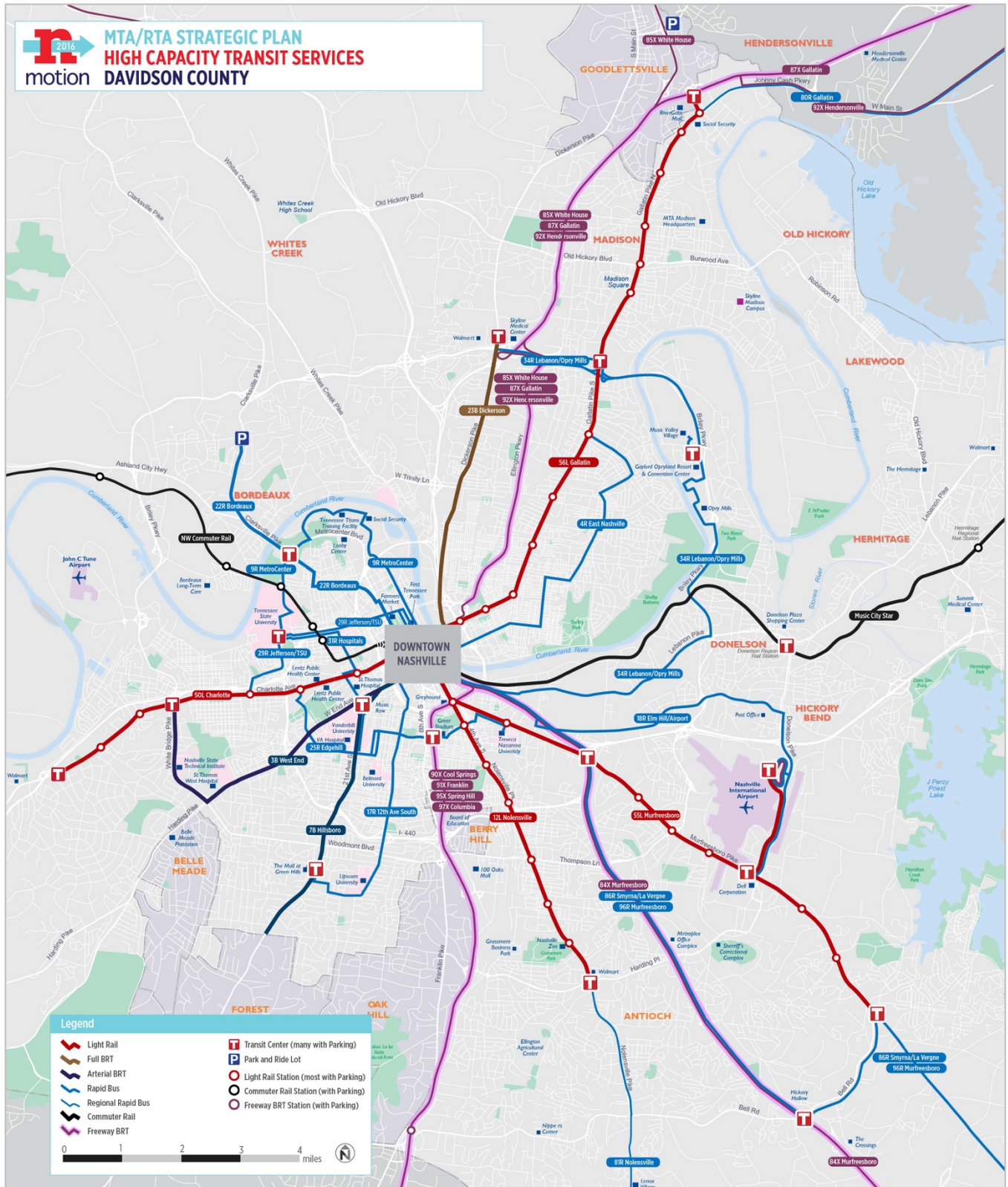


FIGURE 3-19| OUTER COUNTY HIGH CAPACITY AND RAPID SERVICES

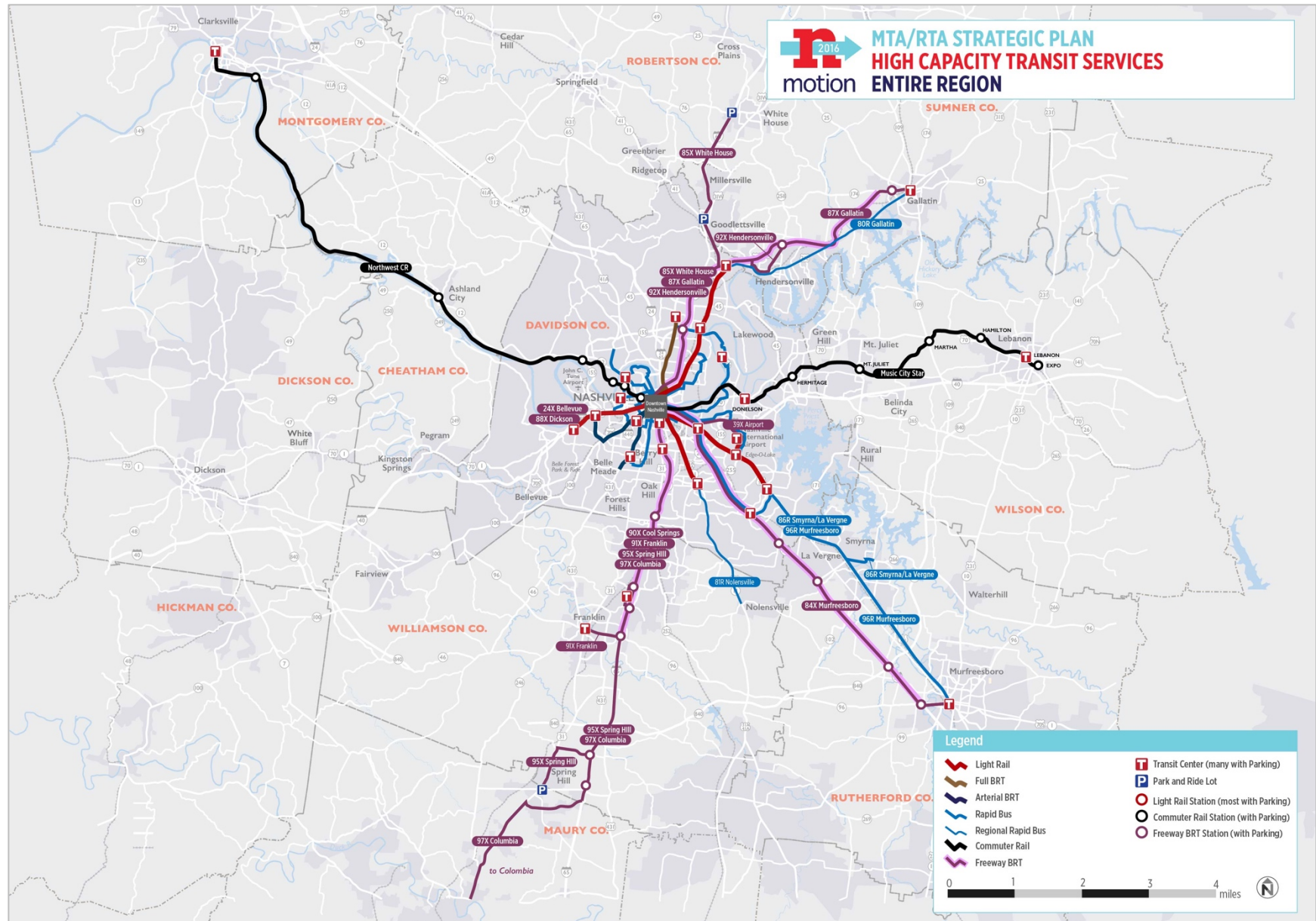


FIGURE 3-20 | MAX LIGHT RAIL (PORTLAND, OR) AND DENVER LIGHT RAIL



FIGURE 3-21 | MINNEAPOLIS NORTHSTAR AND NASHVILLE MUSIC CITY STAR



Bus Rapid Transit

Bus Rapid Transit, or BRT, is a form of bus service that operates in a similar manner and in similar dedicated corridors as light rail. Typically, BRT serves areas that are not as densely developed as light rail corridors. Under the nMotion plan, BRT will be developed in three corridors:

- Dickerson Pike (Route 23B Dickerson)
- 21st Avenue South/Hillsboro Pike (Route 7B Hillsboro)
- Broadway/West End Avenue (Route 3B West End)

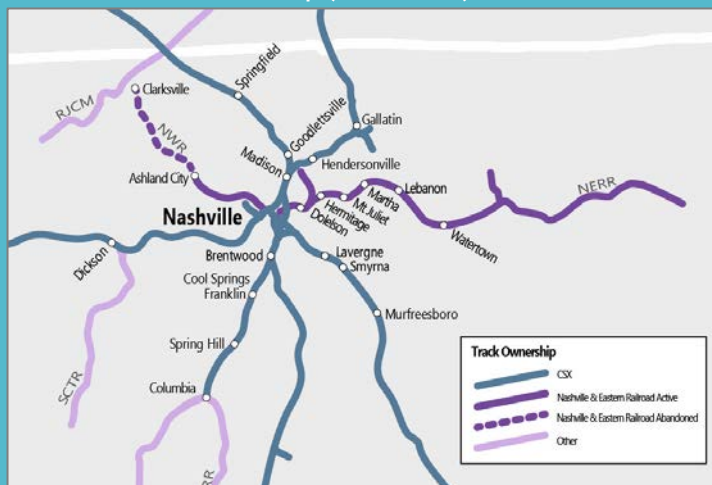
It is envisioned that service in the Dickerson Pike corridor will be “full BRT,” with dedicated lanes along most or all of the alignment. BRT service in the Hillsboro and West End corridors is proposed as “Arterial BRT,” which has fewer LRT-like facilities. Arterial BRT will typically include some areas of full BRT service and some areas with service at curbside bus lanes and long sections without dedicated BRT lanes.

Why Not Develop More Commuter Rail?

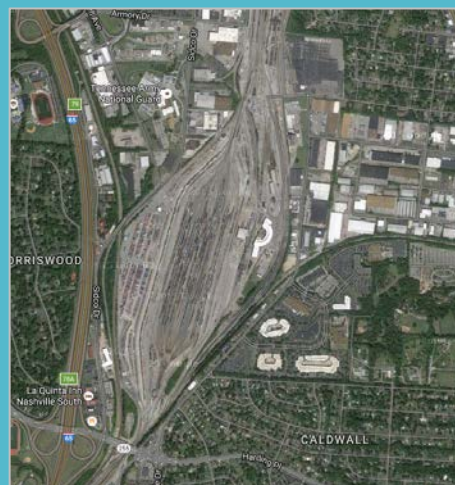
A significant amount of desire has been expressed for the development of new commuter rail lines in Middle Tennessee, particularly to Murfreesboro and Franklin/Spring Hill. However, one of the challenges to the development of new commuter rail lines in Middle Tennessee is that the most desirable rail corridors are CSX lines that have very heavy freight traffic. All new commuter rail lines that have been implemented since the 1990s, including the Music City Star, have been developed in rail corridors with low levels of freight traffic or the ability to develop parallel tracks within existing freight rights-of-way. In those cases, the freight railroads either had sufficient excess capacity to accommodate commuter rail and/or the receipts from the sale of the rail corridors more than offset negative impacts to freight service.

This is not the case in Middle Tennessee. Except for the Nashville and Eastern Railroad line to Clarksville, other potential commuter rail lines would be CSX lines that are heavily used for freight traffic. Beyond the freight traffic alone, Nashville is also a major center for related freight activities, and the company has a major rail yard in Nashville (Radnor), an intermodal terminal, an automobile distribution center, and a bulk transfer terminal. CSX's Nashville area freight traffic is near capacity, and consequently, CSX not willing to share its tracks with passenger traffic.

Middle Tennessee Track Map (CSX in Blue)



CSX Radnor Yard



As a result, it will not be possible to expand commuter rail in Middle Tennessee in the foreseeable future. Longer term, this situation may change. For example, continuing increases in freight traffic may exceed the capacity of CSX's Nashville area network, which could require a large-scale solution such as the development of a rail bypass around Nashville for some freight traffic. This type of change would be well beyond the scope of what the MTA or RTA could do, but could also free up the capacity needed to develop new commuter rail lines. To further explore the potential for this type of solution, RTA will work with TDOT and CSX to initiate a study to examine options for freeing sufficient capacity on CSX lines to enable further expansion of commuter rail service.

Rapid Bus Service

Rapid Bus, in most respects, is BRT service without dedicated bus lanes or only limited bus lanes. It can also be considered as a more full-featured version of MTA's existing BRT lite service.

Within Davidson County, MTA will upgrade nine major routes to Rapid Bus:

- East Nashville between Gallatin Road at Ardee Avenue to downtown Nashville via areas east

of Gallatin Pike (Route 4R East Nashville)

- TSU to downtown Nashville via MetroCenter and 3rd Avenue North (Route 9R MetroCenter)
- Mall at Green Hills to downtown Nashville via 12th Avenue South (Route 17R 12th Avenue South)
- Nashville International Airport to downtown Nashville via Elm Hill Pike (Route 18R Elm Hill/Airport)
- Bordeaux to downtown Nashville via Clarksville Pike (Route 22R Bordeaux)
- Crosstown service between Charlotte Avenue and Trevecca Nazarene University via Edgehill Avenue (Route 25R Edgehill)
- Charlotte Avenue to downtown Nashville via TSU and Jefferson Street (Route 29R Jefferson/TSU)
- Crosstown service between Jefferson Street and Blakemore

Avenue via Metro General Hospital, Saint Thomas Midtown Hospital, and Vanderbilt Medical Center (Route 31R Hospitals)

- Gallatin Pike to downtown Nashville via Opry Mills (Route 34R Lebanon/Opry Mills)

In addition, four Regional Rapid Bus routes will be developed in regional corridors:

- Gallatin to the outer end of the Gallatin Pike light rail line (Route 80R Gallatin)
- Nolensville to the outer end of the Nolensville Pike light rail line (Route 81R Nolensville)
- Smyrna and La Vergne to downtown Nashville via Murfreesboro Pike and I-24 (Route 86R Smyrna/La Vergne)
- Murfreesboro to downtown Nashville via Murfreesboro Pike and I-24 (Route 96R Murfreesboro)

FIGURE 3-22 | CLEVELAND HEALTHLINE BRT AND BOSTON SILVER LINE BRT



FIGURE 3-23 | REGULAR BUS VS. RAPID BUS VS. BUS RAPID TRANSIT

REGULAR BUS	RAPID BUS	BUS RAPID TRANSIT (BRT)
<p>TYPICAL FEATURES</p> <ul style="list-style-type: none"> • No special branding • Frequent stops • Wide range of stop facilities – from very basic to elaborate • Wide range of service frequencies – from very infrequent to very frequent • Wide range of service spans – from early morning to late night to only a few trips 	<p>TYPICAL FEATURES</p> <ul style="list-style-type: none"> • Special branding • Simple service design • Limited stops • Enhanced stops/stations • Frequent service (at least every 15 minutes) • Service from early morning to late night • Real-time passenger information <p>OTHER COMMON FEATURES</p> <ul style="list-style-type: none"> • Unique vehicles, including high-capacity buses • Queue jump lanes • Transit signal priority • Off-board fare collection 	<p>TYPICAL FEATURES</p> <ul style="list-style-type: none"> • Special branding • Simple service design • Limited stops • High quality stations • High-capacity buses • Exclusive bus lanes • Transit signal priority • Very frequent service (at least every 10 minutes) • Service from early morning to late night • Real-time passenger information <p>OTHER COMMON FEATURES</p> <ul style="list-style-type: none"> • Unique vehicles • Level platform boarding • Off-board fare collection
 <p>Nashville MTA regular bus service</p>	 <p>Nashville MTA "BRT-Life" service</p>	 <p>Cleveland Healthline BRT service</p>

Freeway BRT

In the I-24 east, I-65 south, and Ellington Parkway/Route 386 corridors, RTA will develop Freeway BRT service. This service will operate within dedicated or managed lanes in freeway rights-of-way with stations directly linked to the freeways.

Freeway BRT will provide very fast regional and commuter service – service that during peak periods will be faster than traveling by car. Reverse commute service will improve access to jobs in these growing areas.

Eleven RTA routes will operate in these corridors:

I-24 East

- Route 84X Murfreesboro Express
- Route 86R Smyrna/La Vergne Rapid
- Route 96R Murfreesboro Rapid

I-65 South

- Route 90X Cool Springs Express
- Route 91X Franklin Express
- Route 95X Spring Hill Express
- Route 97X Columbia Express

Ellington Parkway/Route 386

- Route 85X White House Express
- Route 87X Gallatin Express
- Route 89X Springfield Express
- Route 92X Hendersonville Express

One route in each corridor (Route 84X Murfreesboro Express, Route 91X Franklin Express, and Route 87X Gallatin Express) will provide all day bi-directional service with at least the same levels of service as proposed for the Music City Star under future conditions.

FIGURE 3-24 | SEATTLE AND MINNEAPOLIS FREEWAY BRT STATIONS



Express Bus on Shoulder Service

In major corridors where Freeway BRT will not be provided, MTA and RTA will work with TDOT to implement Bus on Shoulder service. With this operation, buses will use freeway shoulders when general traffic lanes are congested, which will also make bus service faster than traveling by automobile. Eight routes will operate in this manner:

I-24 West

- Route 89X Springfield
- Route 94X Clarksville (until replaced by Northwest Corridor Commuter rail)

I-40 East

- Route 39X Airport I-40 West
- Route 24X Bellevue
- Route 88X Dickson

I-65- North

- Route 85X White House (north of I-65/Route 386 intersection)

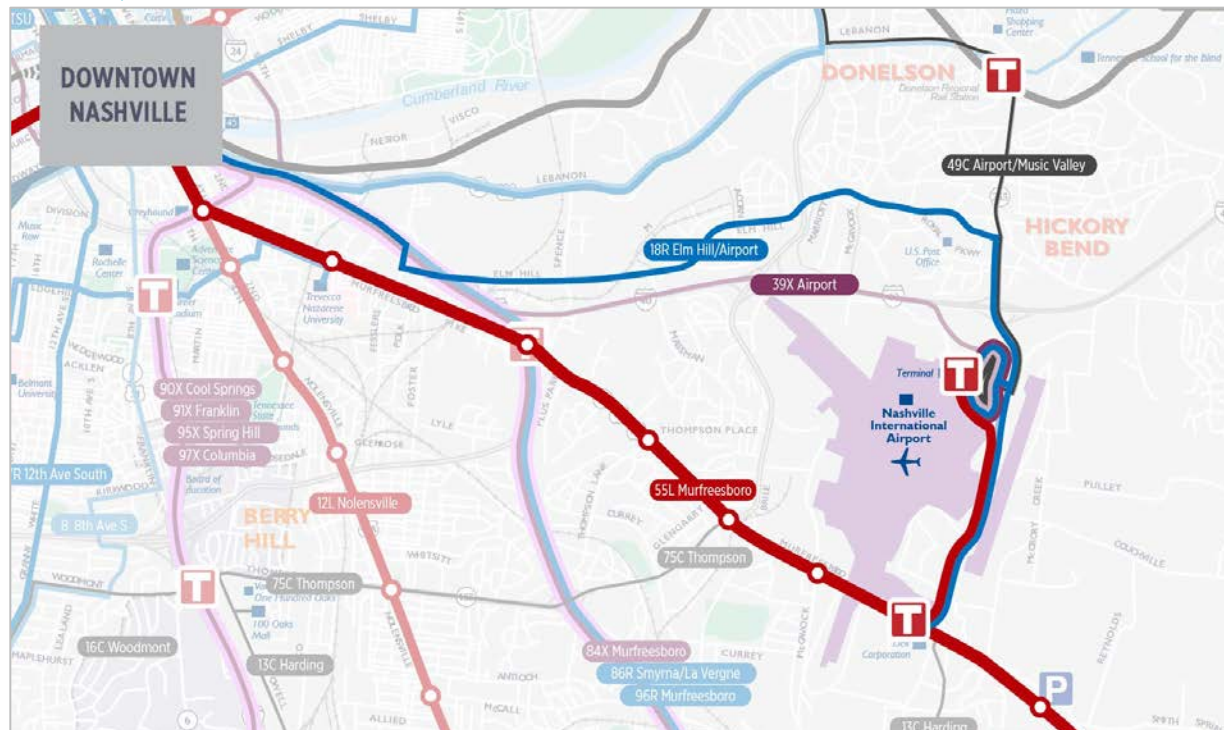
I-65 South

- Route 95X Spring Hill (south of Franklin)
- Route 97X Columbia (south of Franklin)

FIGURE 3-25 | MINNEAPOLIS AND RALEIGH, NC BUS-ON-SHOULDER OPERATIONS



FIGURE 3-26 | AIRPORT TRANSIT SERVICES



Airport Service

Most major cities have excellent transit service between their airports and downtown. nMotion 2016 envisions the same for Nashville with the development of multiple High Capacity and Rapid services and the use of the airport as a transit hub. Airport services will include:

- Local bus service between the airport and Music Valley/Opryland via Donelson Station (Route 49 Airport/Music Valley)
- Express bus service between the airport and the West End via downtown Nashville (Route 39X Airport). This service will operate seven days a week every 30 minutes from early morning until early morning.
- Rapid Bus service between Murfreesboro Pike and downtown via Elm Hill Pike and the airport (Route 18R Elm Hill/Airport). (This route would primarily serve jobs along Elm Hill Pike, but would also provide an additional option to the airport).
- Light rail service between the airport and downtown as part of the development of light rail service along Murfreesboro Pike (as a branch of Murfreesboro Pike service (Route 55L Murfreesboro/Airport)).

Chapter 4 Program Benefits & Costs

The nMotion program will provide many benefits. It will also require significant expenditures. This chapter describes both the benefits and the costs. More details of each measure and the methodologies used are provided in the technical memos in Appendix 7.

Program Benefits

Transit Ridership

MTA and RTA currently carry approximately 34,000 passengers per weekday. With all improvements in place, ridership is projected to increase by **550%** to nearly 190,000 passengers per weekday.

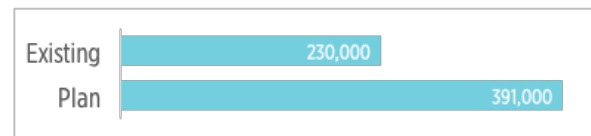
FIGURE 4-1 | PROJECTED WEEKDAY RIDERSHIP INCREASE



Number of Residents Served

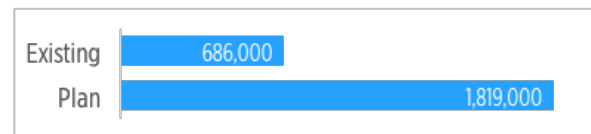
MTA currently provides service within ½ mile of approximately 230,000 Davidson County residents. With the improvements, and including the population growth that will occur, this will increase by **70%**, and service will be provided within ½ mile of 391,000 residents.

FIGURE 4-2 | NUMBER OF DAVIDSON COUNTY RESIDENTS SERVED



In outer counties, approximately 686,000 residents are now within ½ mile of local service or five miles of a commuter lot. With the improvements, this will increase by **165%** to 1.8 million residents.

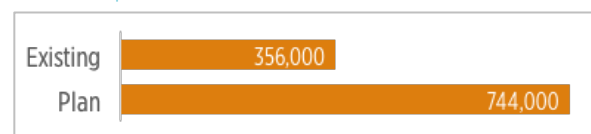
FIGURE 4-3 | NUMBER OF OUTER COUNTY RESIDENTS SERVED



Number of Jobs Served

One of the most important roles that transit serves is providing access to jobs. At the present time, MTA provides service within ½ mile of approximately 356,000 jobs in Davidson County. With the improvements, this will increase by **110%** to 744,000.

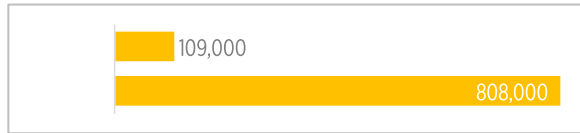
FIGURE 4-4 | NUMBER OF DAVIDSON COUNTY JOBS SERVED



In outer counties, the increase in the number of jobs served would be more dramatic. RTA and local transit providers currently offer service within ½ mile of 109,000 jobs. With the improvements, this will increase by **640%** to 808,000. This increase is particularly important as it will

provide much better links between lower income residents and jobs—jobs that many employers have difficulty filling because potential employees can’t get to them.

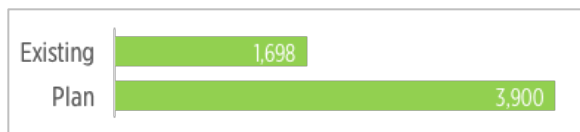
FIGURE 4-5 | NUMBER OF OUTER COUNTY JOBS SERVED



Service to Davidson County Low Income and Minority Residents

While existing service coverage is relatively good in Davidson County, the amount of service that is provided is often limited. Nearly all of the service improvements within Davidson County will also improve service to low income and minority residents. In terms of weekday hours of bus service, the amount of service to low income neighborhoods (those where the number of low income residents exceeds the countywide average) will increase by **231%**.

FIGURE 4-6 | SERVICE HOURS TO LOW INCOME AND MINORITY DAVIDSON COUNTY RESIDENTS



In terms of weekday bus service hours

Service Quality

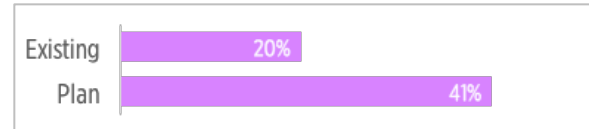
As described above, a large number of the service improvements will significantly improve service quality particularly in terms of service frequency, speed, and access.

Frequent Service

Many stakeholders listed infrequent service as a major reason that transit is not convenient. At present, only 20% of MTA and RTA routes provide service every 15 minutes or more frequently. With the

improvements, this will increase by **105%** to 41% of all service.

FIGURE 4-7 | PERCENT OF SERVICE THAT IS FREQUENT



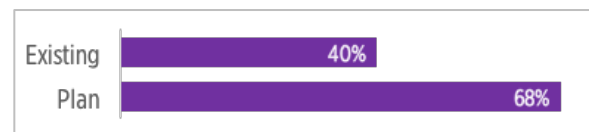
Service that operates at least every 15 minutes during peak periods; large majority would operate every 10 minutes for most of the day

Fast/Faster Service

A second major reason that stakeholders view service as inconvenient is that it is slow. At present, only 40% of routes provide relatively fast service, with fast service defined as the Music City Star, BRT-lite, and express bus routes. However, even though these routes are theoretically fast, as noted by many stakeholders, they often get bogged down in traffic. Furthermore, many provide relatively little service.

With the improvements, the percentage of routes that will provide fast service will increase by **70%** to 68% of routes. Furthermore, these routes will provide much more robust service.

FIGURE 4-8 | PERCENT OF SERVICE THAT IS FAST



Fast services include LRT, BRT, Rapid Bus, commuter rail, Freeway BRT, and express routes

These routes will be fast for a variety of reasons, including the development of High Capacity Transit (HCT) services such as LRT, BRT, Rapid Bus, and others, and use of dedicated or semi-dedicated rights-of-way. For example, there will be more than:

- **150 route miles of HCT services**
- **50 miles of dedicated bus lanes**
- **60 miles of Freeway BRT service in bus or managed lanes**

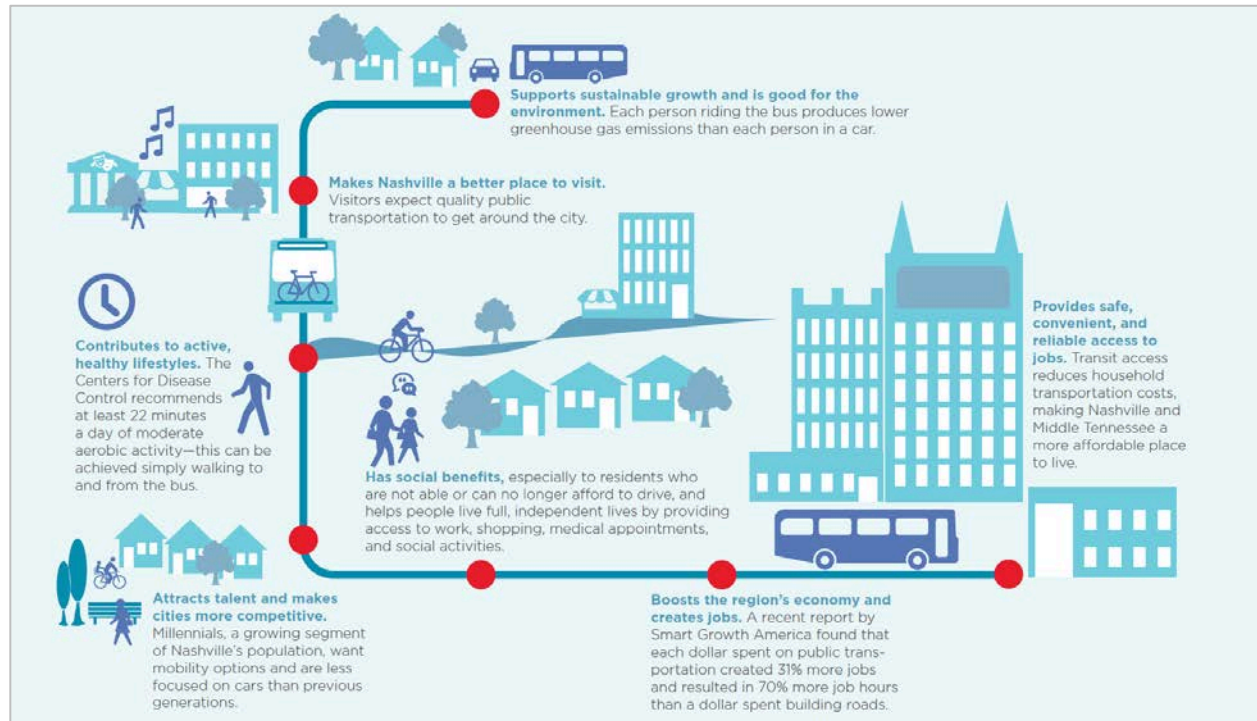
Pedestrian Improvements

One of the key challenges with the use of transit today is poor pedestrian infrastructure—it is difficult to walk to and from transit. To address this situation, the plan includes the reasonable development

and improvement of sidewalks along all LRT, BRT, and Rapid Bus routes. In total, there could be over **200 miles of pedestrian improvements**.

Additional benefits of transit are shown in Figure 4-9.

FIGURE 4-9 | BENEFITS OF TRANSIT



Costs

The proposed plan represents a major investment in Middle Tennessee's future, and costs will be much higher than what the region is spending today for transit-related capital and operational expenditures.

Summary of Costs

In terms of order of magnitude costs, and as shown in

Table 4-1, operating costs for both MTA and RTA would increase from a current total of \$83.2 million to \$346.8 million. Total capital spending through 2040 would be nearly \$6.0 billion.

TABLE 4-1 | SUMMARY OF OPERATING COST ESTIMATES

Annual Operating Costs (millions)	Existing System (FY 2016)	Recommended Plan (\$2015)
MTA	\$73.6	\$227.4
RTA	\$9.6	\$119.2
Annual Operating Costs	\$83.2	\$346.8

TABLE 4-2 | SUMMARY OF CAPITAL COST ESTIMATES

Total Capital Costs (millions)	Recommended Plan (\$2015)
MTA	\$4,157.9
RTA	\$1,841.2
Total Capital Costs	\$5,999.1

Costs by Program Component

As described in this document, the nMotion program has a large number of program components that range in cost from very high to relatively low. The highest capital cost elements would be for the development of light rail and new and

improved commuter rail service (see Table 4-3). Major operating cost increases will be for the development of the Frequent Transit Network (including light rail, BRT, Rapid Bus, and frequent local services) as well as service span and frequency improvements throughout the MTA and RTA systems.

TABLE 4-3 | OPERATING AND CAPITAL COSTS BY PROGRAM COMPONENT (IN MILLIONS)

	MTA		RTA	
	Operating Costs	Capital Costs	Operating Costs	Capital Costs
Frequent Transit Network				
Light Rail	\$45.8	\$3,017.8	\$34.4	\$698.7
Bus Rapid Transit	\$5.2	\$362.9	\$9.3	\$745.7
Rapid Bus	\$54.2	\$316.7	\$18.8	\$83.5
Frequent Local	\$14.1	\$36.7	\$10.6	\$69.5
Total	\$119.4	\$3,734.2	\$73.1	\$50.0
Local Services				\$1,647.4
More Frequent Service for Longer Hours	\$29.4	\$61.6	\$24.1	
New Local Services	\$7.4	\$13.2	\$7.3	\$43.4
First Mile/Last Mile Connections	\$6.5	\$0.0	\$31.5	\$0.0
Total	\$43.2	\$74.8	\$14.9	\$43.4
Regional Services				\$6.2
Commuter / Express Bus Service	\$10.5	\$23.0		
Paratransit Service	\$54.2	\$22.6		\$12.5
Facilities				\$20.0
Station & Stop Improvements		\$75.0		\$16.7
Second Downtown Transit Center		\$40.0		\$17.5
Downtown Circulation Improvements		\$33.3		\$22.5
Outlying Transit Centers		\$50.0		\$30.0
Park-and-Ride Lots		\$15.0	\$119.5	\$1,841.2
Maintenance Facility Expansion		\$40.0		
Total		\$253.3	\$346.8	\$5,999.1
Technology Improvements		\$50.0		
Total	\$227.4	\$4,157.9	\$34.4	\$698.7

Note: Operating costs for facilities included in vehicle operating costs.

Per Capita Costs

On a per capita basis, total annual costs for operations and capital expenditures would increase to \$249, which would be an increase of \$182 from the current level of \$67. Note, however, that a significant—and yet to be determined—portion would likely be funded through non-local sources. As a result, per capita local costs could be much lower.

Finally, the transit improvement programs that have been undertaken in Denver and Salt Lake City have received a significant amount of attention in Middle Tennessee. By comparison, the annual per capita costs for those two programs have been approximately \$420 and \$621, respectively.

TABLE 4-4 | ANNUAL PER CAPITA COSTS

Costs in millions	Existing System (FY 2016)	Recommended Plan (\$2015)
MTA and RTA Total	\$67	\$249

Note: Per capita costs are based on “full build out,” All costs are order of magnitude costs and more detailed estimates would be produced during project development.

Chapter 5 Next Steps

As described in Chapter 3, the nMotion program is large and comprehensive and will require significant implementation efforts. These will include near-term work to jump-start improvements, the development of a long-term

implementation strategy that will define which improvements will happen when and how, and further coordination with local, regional, state, and federal partners to identify funding initiatives.

FIGURE 5-1 | PRELIMINARY IMPLEMENTATION TIMELINE



Next Steps

The next steps for MTA and RTA to implement the nMotion program will be to develop an implementation plan that describes and defines short-term improvements as well as projects with longer implementation timelines.

All major transit investment programs, including those in Denver, Salt Lake City, and Phoenix, represent long-range efforts. Most include the development of a “Program of Projects” that defines which projects will be implemented when and how they will be financed. MTA and RTA will develop short-term and long-term implementation strategies that will define how this will be done for all projects.

Short-Term Improvements

MTA and RTA will begin implementing short-term improvements identified in the strategies described in Chapter 3. These initial improvements include the following actions.

Improve Existing Bus Services

MTA and RTA will initiate a Comprehensive Operational Analysis (COA) to identify changes that can be made with their existing budgets to simplify and improve service. The types of changes that will be made could include making service more direct, improving connections (including crosstown routes), developing through-city routes, and improving schedules. The COA will also assist in setting priorities for short-term service expansion.

Provide More Service for Longer Hours

MTA will begin to provide more frequent service for longer hours throughout the system, including on weekends. Initial improvements will include longer hours in

the mornings, evenings, and weekends on the highest ridership routes. Over a period of five years, MTA will continue to increase service hours and add more frequent service throughout the service area to cover the entire system. As the region grows, MTA will continue to add service to match growing population needs.

Improve Express Bus Service

MTA and RTA will initiate a program to improve commuter service. This will include new schedules that serve a broader range of work hours within the first two years and the start of the development of “purpose-built” park-and-ride lots in more convenient locations with real-time information signage and better stop facilities within the first five years.

Begin Development of Community Transit Centers

The COA will help to identify specific locations to build better connections outside of downtown Nashville. Concurrent with those changes, MTA and RTA will begin the construction of new outlying community transit centers as places to make those connections. The first transit centers will begin the public input and design process within the first year of nMotion implementation.

Improve Stop and Station Locations

MTA and RTA will begin a program to improve bus stops. This will include more shelters and better signage throughout the MTA and RTA service area. MTA will set guidelines for installation of stop amenities and will establish a goal to prioritize locations to increase the percent of riders accessing these improvements.

Rebrand Service

In conjunction with the COA changes, MTA/RTA will rebrand itself with a new unified name and image. While MTA and RTA will remain as separate entities, service will be presented to the public as if it is provided by a single system. Specific subcategories of services (such as commuter express service and the frequent transit network) will also be branded to reduce complexity.

Provide Better Information

Along with presentation of MTA and RTA service to the public as a single system, the agencies will provide information through a single website. Recent MTA service enhancements, such as real-time information, will be extended to RTA and AccessRide services.

Unify Fares

MTA has recently begun an effort to determine how to simplify fare payment. As part of that effort, MTA and RTA will adopt a simpler, more flexible, single-fare structure. MTA and RTA will also investigate and implement ways to make fare payment easier, including mobile fare payment.

Improve Downtown Transit

MTA and RTA will participate in Nashville's Downtown Mobility Study to identify transit improvements through the downtown. It is anticipated that this will produce short-term transit priority improvements that can be implemented within the constraints of downtown's existing infrastructure plus more extensive improvements to follow.

Improve Airport Service

MTA will upgrade express bus service between West End and Nashville International Airport with downtown to operate every 30 minutes seven days a week from early to late. This will provide fast and consistent service for both visitors and airport employees.

Start Planning and Design for Mid-Term Improvements

Increase Music City Star Service

Additional service must be accompanied by enhanced safety systems and additional track infrastructure (including passing sidings and double tracks) that must be designed and constructed. Design of federally-required safety measures will begin in the first year of plan implementation and are expected to take five years to fully implement. MTA/RTA will provide additional service, including on Saturdays, which is projected to begin in the 5- to 10-year service period after improvements are installed.

Implement Express Bus-on-Shoulder Service

MTA and RTA will seek to implement a pilot project in one major freeway corridor to determine costs and needs for additional projects. MTA and RTA will work with TDOT to determine the measures necessary to implement express bus-on-shoulder service. Highway infrastructure would require additional pavement widths and depths prior to full implementation.

Upgrade BRT-Lite Service

The nMotion program includes the development of Rapid Bus service on

many routes in the proposed Frequent Transit Network, including existing BRT-lite routes. Key improvements will be to provide all limited-stop service, better stop facilities, new branding, and transit priority measures. MTA will start by upgrading existing BRT-lite routes with signal priority and better stop facilities.

Start Development of Longer-Term Improvements

Begin Development of High-Capacity Transit Services

Typically, the development of new High Capacity Transit (HCT) services takes 10-plus years from the beginning of required planning studies to the start of service. MTA will start this process as quickly as possible. For new HCT services within Davidson County, MTA has already begun a project to examine different HCT approaches in five corridors. This project, which will be completed within the next year, will also prioritize initial corridors. Based on this prioritization, MTA will proceed with development of its first light rail or BRT line.

RTA will also pursue its first regional HCT project, which it will identify in conjunction with the Nashville Area MPO and the outer counties. One potential approach could be to expand the MPO's upcoming South Corridor Transit Study to include project development for the first regional HCT line.

Partnerships

Development of the full 25-year nMotion program will require strong partnerships. Most new transit lines will operate on highways and streets controlled by local communities and TDOT. As such, they will need to support the roadway changes needed to implement HCT services such as

light rail, BRT, and Freeway BRT. In addition, for transit to be successful, people will need to be able to walk to and from stops and stations. If light rail were implemented tomorrow on any of our major travel corridors without the development of associated pedestrian facilities, it would fail as too few people would be able to access the service.

It should also be understood that the nMotion program, especially in Davidson County, is designed to serve more concentrated mixed-use development, which is very different from what now exists in many areas. Transit can stimulate development, but it cannot by itself create it. Local communities must enable and encourage transit-supportive development, and a transition to that type of development must accompany or precede the development of HCT (see Figure 5-1).

Develop Funding Plan

The nMotion process was designed to identify improvements based on need, with the recognition that additional funding will be required for implementation. One of the first of MTA and RTA's next steps to advance the long-term improvements will be to work with local and regional partners to outline possible funding and financing scenarios. These scenarios will help to identify proposed funding sources and the steps needed to implement them (for example, legislative approval or a ballot measure).

Chapter 6 More Information

The plan was based on extensive public engagement as well as a very large amount of technical work. Information on all of this work, which provides further context for the plan, is presented in the following separately bound appendices:

- **Appendix 1 MTA State of the System Report**, which presents an overview of existing MTA services, an analysis of the markets for transit service in Davidson County, a peer review that compares MTA services with those provided in current and “aspirational” peer cities, and an initial assessment of potential MTA improvement opportunities.
- **Appendix 2 RTA State of the System Report**, which presents an overview of existing RTA services, an analysis of the markets for transit service in the outer counties, and an initial assessment of potential RTA improvement opportunities.
- **Appendix 3 Service Improvement Opportunities Briefing Book**, which is a summary of the Service Improvement Opportunities document provided in Appendix 4.
- **Appendix 4 Service Improvement Opportunities**, which presents an overview of the strategies developed to serve identified market demands, and that were incorporated into three transit expansion scenarios.
- **Appendix 5 Scenarios at a Glance**, which presents an overview of the three transit expansion scenarios.
- **Appendix 6 Community Engagement Report**, which presents a detailed description of the public engagement process for nMotion.
- **Appendix 7 Technical Memos**, which include detailed descriptions of the metrics used to evaluate the impacts of the nMotion program and the methodologies used to calculate those impacts.
- **Appendix 8 Strategy Papers**, which provide more in-depth information of the strategies that includes: (1) a description of the strategy, (2) examples of how the strategy is used elsewhere, and (3) examples of how the strategy could be used in Middle Tennessee.
- **Appendix 9 Scenario Details Papers**, which present detailed information on how individual strategies were incorporated into the scenarios.

These appendices and additional information are available on the project website at nMotion2015.org. This additional information includes a briefing book, which is a summary version of this document (Figure 6-1).

FIGURE 6-1 | TRANSIT PLAN BRIEFING BOOK

