# Nashville Strategic Transit Master Plan

Nashville Metropolitan Transit Authority

August 27, 2009

Certified per TCA 13-4-202 as a part of the Nashville-Davidson County General Plan adopted by the Metropolitan Nashville-Davidson County Planning Commission and including all amendments to this part as of April 14, 2011.

Executive Secretary

Nashville MTA

Prepared for the Nashville Metropolitan Transit Authority and adopted by the MTA Board of Directors on August 27, 2009.

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# Executive Summary

The purpose of the *Strategic Transit Master Plan* for the Nashville Metropolitan Transit Authority is to set forth a set of guiding principles and policies for improving public transportation in Nashville/Davidson County, as well as describe actions and projects for the short, medium and long term.

## Current Conditions and Trends

The Middle Tennessee region has been growing both in employment and population for the past several decades, and that growth is projected to increase through 2035. Nashville/Davidson County has also been growing, although its growth is at a slower pace than for the outer counties. Within Davidson County, growth is occurring more quickly in outer areas—indeed, many of the zones expected to grow greater than 100 percent between 2002 and 2030 were located to the south in Davidson County beyond the central service area of the MTA.[i] Employment in Davidson County was shown growing in outer areas as well as part of the core, thus continuing to disperse along with population.

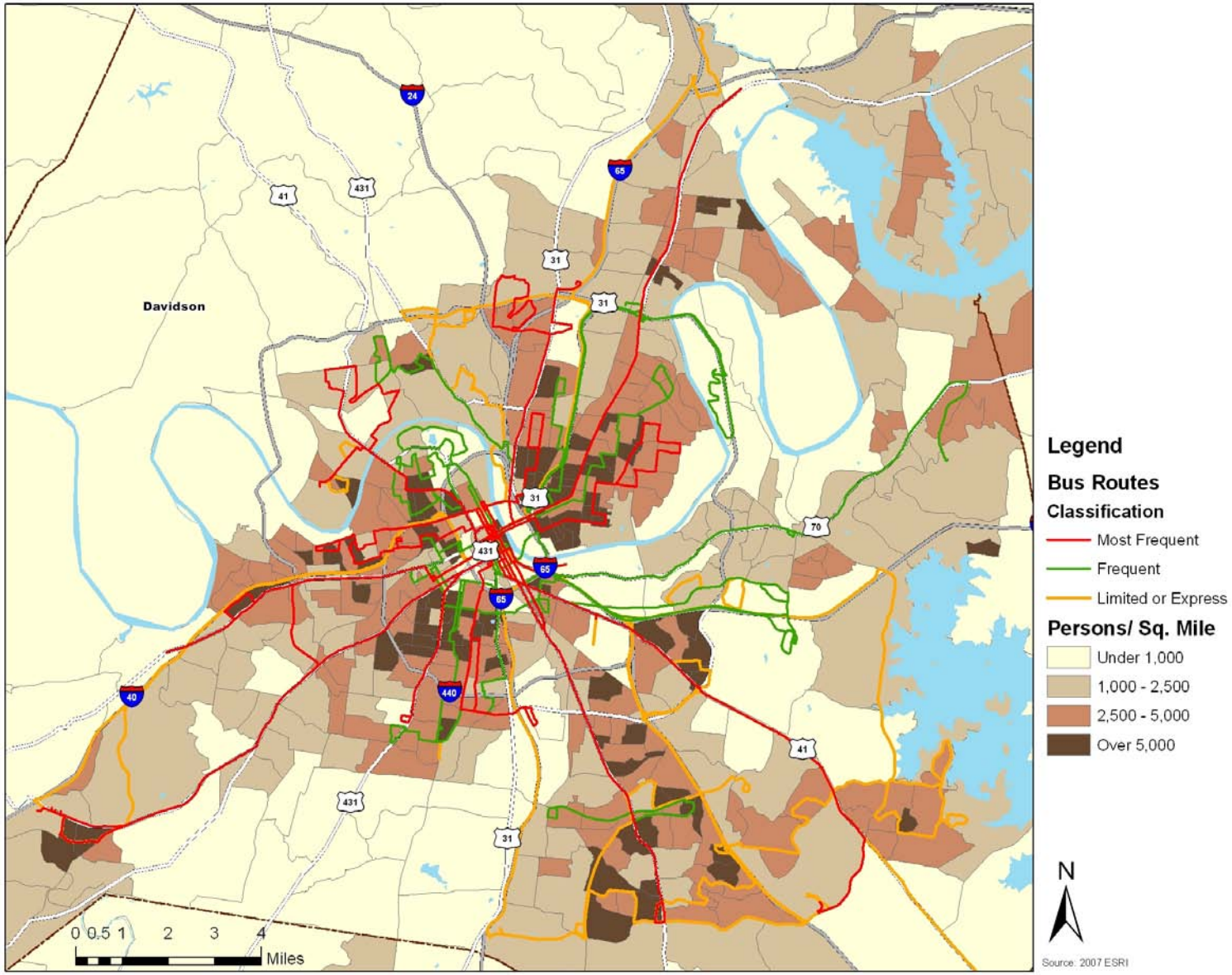
A major challenge for the MTA in Davidson County and for transit in the greater Middle Tennessee region is that the population density is much lower than for similar regions. A list of the top 100 transit cities in the United States in terms of passengers per capita ranked Nashville 48th in population—so right in the middle of the list. In terms of density, Nashville/Davidson County ranks as 85 out of 100.

An analysis of households and employment compared to MTA service in Davidson County shows that the current service comes close (distance-wise) to a majority of current households, employers and other key destinations. In total, around 60 percent of households are within ½ mile of MTA routes and 80 percent of employers and employees are within ½ mile. Industry standards would say that an area should have a density equivalent to 5000 persons per square mile to justify fixed route service, and in Davidson County, most of the census block-groups with densities greater than 5000 persons per square mile have some MTA route within ½ a mile. Density of households and attractions is important in transit, because most customers walk to transit, and the more customers within walking distance, the more successful a system can be in attracting ridership. Figure E-1 shows Davidson County, the population per square mile in each of its census block groups in 2007 and the MTA route system.

Despite the challenges due to a low population density, the Nashville MTA has been improving service and growing ridership. MTA ridership has been growing steadily since 2002, reaching 9.4 million riders in Fiscal 2008, however, ridership has receded somewhat with the current economic slowdown. The MTA has also been providing service effectively. In fact service effectiveness (as measured by passengers per hour) has been growing constantly over this decade—and that improvement can be seen in MTA corridor routes, neighborhood routes and commuter routes alike.

Indeed, in comparison with an average of 17 other peer transit agencies, Nashville MTA does quite well. Although we are challenged due to the lower density of population in the service area compared to most of the 17 peer agencies, Nashville MTA has done a good job of putting service where it can be best used. The result is that MTA has a higher level of service effectiveness than its peer average as measured by passengers per vehicle hour. This number is computed by dividing an estimate of yearly ridership by the total vehicle hours in a year. Total vehicle hours reflect service hours and time to get buses to and from the bus garage, both of which drive service costs.

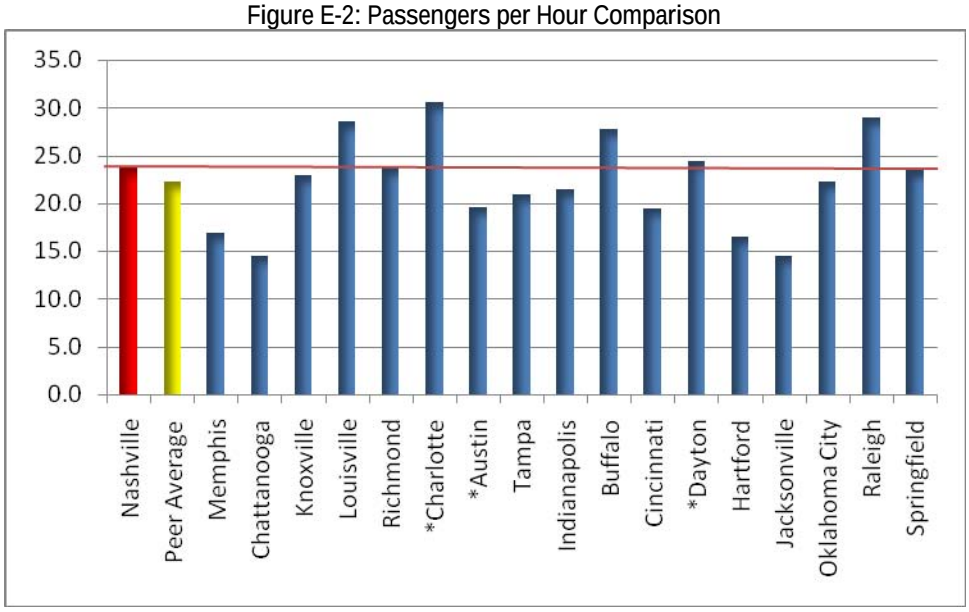
Figure E-1: Persons per Square Mile in 2007 (based on Census Block Groups)



The amount of transit service provided in Nashville/Davidson County is still small compared to other communities of similar size. On the list of 100 top transit cities, Nashville ranked 74 out of 100 in terms of hours of service provided per person living in the service area. Looking only at the 17 peer agencies, the peers provide on average 40 percent more hours of service on a per capita basis. Correspondingly, the peers spend around a third more per capita than Nashville.

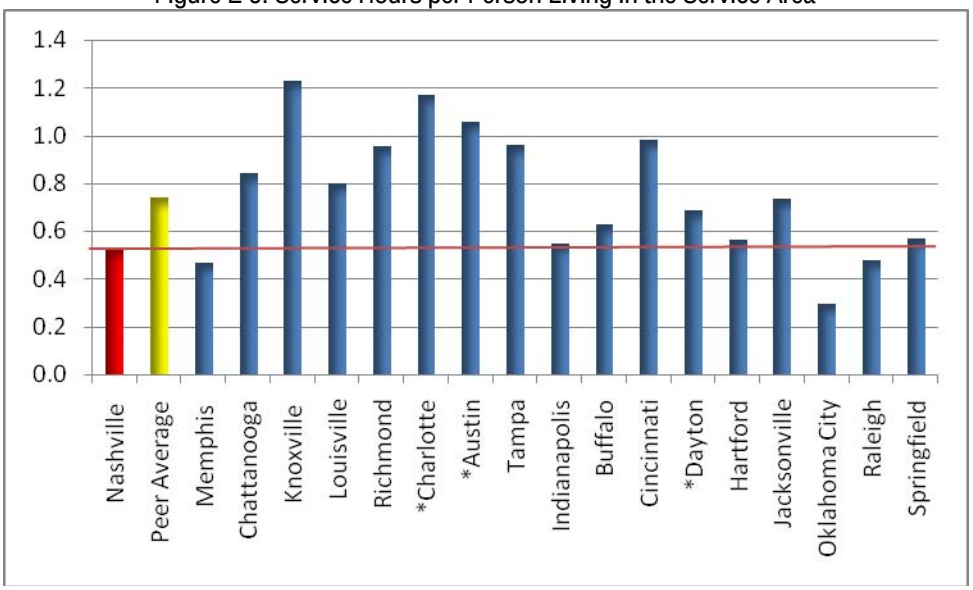
Figure E-2 and Figure E-3 show the comparison between Nashville and 17 peer agencies for passengers per hour, and hours of service per person per year in Davidson County. In these figures, the red horizontal line shows Nashville's performance value so that it can be compared with each of the other areas. Asterisks indicate areas with dedicated funding sources.

Figure E-2: Passengers per Hour Comparison




*Regions with Dedicated Funding for Public Transportation

Figure E-3: Service Hours per Person Living in the Service Area




*Regions with Dedicated Funding for Public Transportation

## The Strategic Transit Master Plan Process

In addition to researching current conditions and trends, an important part of determining what improvements are needed in public transportation came through the public process for the *Strategic Transit Master Plan*. The project included five public workshops in November of 2008 as the project was getting underway, five workshops in January of 2009 with a report on the market analysis and initial opportunities, and a meeting of a large number of MTA stakeholders in December of 2008 which considered priorities and alternative futures for the MTA. A set of final public meetings was held in July of 2009 to consider the *Strategic Transit Master Plan*.

Part of the approach to determining what transit improvements are needed was to create a proposed *Service Delivery Policy* for the MTA based on similar policies adopted by transit agencies around the United States, but giving consideration to Nashville's unique condition. A *Service Delivery Policy* (included as Appendix C) was used to assess current service.

## The Need for Transit Improvements

### *Re-establish Basic Levels of Transit Service*

One conclusion from the master planning process was the need to re-establish base levels of transit service throughout the MTA system. In all of the public processes undertaken for the *Strategic Transit Master Plan*, increasing frequency of service appeared most important. People asked for more buses to eliminate overcrowding, and for more service throughout the day, in the evenings and on weekends.

Research based industry guidance states that bus service that is provided less than once per hour is unattractive to all riders.[ii] For service to be attractive to those who have automobiles available, it should be provided at a minimum half hour, and preferably, every 15 minutes. While service in peak hours may seem to be the most critical for transit service, research shows that there is considerable payback to overall ridership when good service is provided throughout the day, extended into the evenings and available through the weekends.[iii] This is because if customers can generally count on the service being available, they won't get in the habit of finding alternatives. Also, later evening trips allow people to use transit during the day who need to return in the evening. Therefore, adding service outside the peak period can be expected to increase ridership in the peak as well. Alternatively, removing service in the evenings and on weekends, or even midday may improve service effectiveness in the short term, but can be expected to hurt in the longer run.

### *Improve Competitiveness of Transit*

Another need raised in the *Strategic Transit Master Plan* process was the need for transit to be more competitive to the automobile. This can be couched in terms of speed of travel or overall trip time for transit versus the automobile and also in terms of availability of space on the buses. This need was expressed in public meeting participant requests for faster service and for cross-town routes to avoid a downtown transfer, and in responses to questionnaires about the types of service improvements needed. Faster transit is needed to reduce automobile trips thus reducing congestion, pollution and greenhouse gases. Also, public meeting participants complained about crowded buses, especially during peak periods.

### *Serve Those in Unserved Areas*

Some of the complaints expressed at public meetings were from neighborhoods that had lost transit service when routes were cut in July of 2008, as well as those who lost evening service. And while industry guidelines would say that most areas that lost service would not have met density standards for even hourly transit provision, there are still many individuals who were hurt by the loss of service. MTA is experimenting with a flexibly routed service in Madison, which may be a better way to serve areas with insufficient density to justify fixed route service.

*Attract New Users*

To continue to serve Davidson County and be supported financially, MTA will need to grow along with the population in the service area. To grow, MTA will need to increase usage in its core areas as well as provide services in the newer developing areas. In other words, it will have to continually attract new users. The key to attracting new users, in addition to providing service that is competitive with the automobile and that can meet basic service needs, is to make transit easier to use and to improve the image of transit. For those who seldom use public transportation, it can be difficult to figure out how to interpret schedules and how to pay the fare, for example. Potential new customers have to be convinced that riding transit will be a pleasant experience, and people like themselves use transit.

## Five Priority Areas for Transit Investment

The needs expressed by the public, by transit stakeholders and through other research and analysis led to recommendations that the MTA focus funding for improving transit on five priority areas.

- More buses more often (increase frequency of buses)
- Faster transit trips (fewer bus stops, traffic signal priority, avoid going downtown to transfer)
- Serve new or unserved areas (connect to areas that do not have service today)
- Make service easier to use (signage, better access to information, "How to Ride" training, simpler schedules, simple fare payment methods)
- Improve the image of transit (marketing, nicer buses, nicer shelters & benches at stops)

The suggested approach for using the five priority areas is to try to make progress in each of these whenever there is opportunity to make service improvements. Given that there is reasonably good transit coverage in Davidson County, the major part (60 to 80 percent) of new funding for operations and capital will be aimed at frequency improvements and speed improvements. Some funding, however, should be reserved to serve unserved areas, to make service simpler, and to improve the image of transit. The *Service Delivery Policy* provides more guidance for designing service in some of these priority areas.

## Application of the Service Delivery Policy

The *Service Delivery Policy* was used to examine MTA service in the areas of temporal availability, geographic availability, and service and cost effectiveness. In terms of temporal availability, the policy sets forth minimum standards as well as goals for service. These standards and goals describe the headways to be provided by time of day, and also the span of service by day of the week.

The frequency standards in the *Service Delivery Policy* were used to assess current MTA service, and an analysis was done to determine the cost of bringing services not meeting the standard into compliance. The geographic availability standards in the *Service Delivery Policy* were also used to assess current service. Although there were a few places that were unserved that should be served, most areas were well covered.

The performance of the current service was ranked according to cost and service effectiveness measures using the policy. The routes with the top and bottom 10 percent ranking were noted, and a process was recommended for taking corrective action with the routes in the bottom 10 percent. Corrective action will require good data on the routes so that different patterns and time of day can be assessed. Automatic passenger counters (APCs) expected in the summer of 2009 will help in this process. Other steps to be taken could include marketing of service, restructuring service, and if all else fails, reduction or elimination of service.

## Opportunities for Transit Investment in the Short Term (2009-2015)

Following along the theme of five priority areas for investment, MTA has identified the following projects for the short term.

### *Gallatin Road BRT*

*Implement a BRT service for Gallatin Road*. MTA is planning to use hybrid 60 foot long articulated BRT vehicles, as used by the Los Angeles MTA on its Orange Line BRT, on an new BRT along Gallatin Road. The proposed BRT will have stops around every ¾ mile with enhanced stop amenities such as electronic signs giving the arrival time of the buses in real time, enhanced shelters and amenities. Weekday service will be every 15 minutes all day and 30 minutes off-peak. The system will include traffic signal priority for the buses to give them some additional green time as they proceed along the corridor.

The BRT service will improve service frequency in the Gallatin corridor, increase speed of many trips, improve signage, and improve the image of transit. In short, the BRT will make improvements in 4 out of the 5 priority categories. The increased operating cost for the recommenced service is $2.3M per year. The increase in capital cost will be $9.4 M.

### *Increase Frequency of Service*

*Provide frequency improvements on eleven routes to bring them up to minimums as described in the Service Delivery Policy*. Note that many of these suggested service additions are in off-peak hours which do not require additional vehicles, and which can provide an excellent boost to ridership. The total operating cost per year for these improvements is estimated at $1,156,000 and the capital cost for new buses at $300,000 each is $5.1 M.

With the addition of improvements on Route 26 Gallatin Road, altogether 12 routes are recommended for frequency improvements. These frequency improvements will affect 44 percent of households which are located within ½ mile from each route that is improved. Frequency improvements on express routes will greatly increase the availability of higher speed transit to outer areas of the county. These are areas that are growing—and since ridership per trip on the existing express routes is quite good, providing additional trips should be an effective way to draw new riders.

### *Downtown Circulator*

*Institute a Downtown Circulator*. A Downtown Circulator will provide better connections between transit facilities such as Music City Central and the Music City Star, as well as connect state office buildings, downtown businesses/residents, and tourist destinations. The Downtown Circulator will speed transit service as it will provide very frequent pickups for any passenger arriving in the downtown.

While the exact routing(s) have not yet been established the service can be estimated to require 4 buses to provide a very frequent level of service. Operating 17 hours a day weekdays and 8 hours a day on Saturdays and Sundays would cost around $1.8 M for operations and $1.3M for vehicles and specially signed bus stops.

### *Service to New or Unserved Areas*

*Reserve funding for service to a new or unserved area*. While the densities in most unserved neighborhoods are not sufficient to recommend fixed route services, MTA will continue to refine the flexibly routed services concept, BusLink, that can link neighborhoods with important destinations and other fixed route services. In particular, neighborhoods with densities of greater than 2500 persons per square mile with a pedestrian environment that would encourage walking to transit stops would be good candidates for a pilot project. A budget of $700,000 would allow for two buses operating 12 hours weekdays and 10 hours on Saturday.

*Marketing*

*Provide an additional marketing budget to help non-users learn how to use the service*. This effort will continue the work done by Transit Now on a video for helping non-users to learn how to use the service. A budget of $30,000 is recommended for this project. Note that BRT implementation also calls for a special marketing budget of $50,000.

The table below summarizes the short-term list of projects along with the five areas for improvement: As can be seen, all of the priority areas are affected by the improvements. The total of the recommended service improvements comes to around $6M in additional operating funding and $16M in capital funding.

Table E-1: Recommended Short-Term MTA Improvements and Priority Areas

| Service | Operating Cost ($1000) | Capital Cost ($1,000) | Increase Frequency | Faster Transit | Serve New Areas | Easier to Use | Improve Image |
|---|---|---|---|---|---|---|---|
| Gallatin Road BRT | $2,305 | $9,400 | X | X | | X | X |
| Frequency improvements on 11 routes to bring to minimums | $1,156 | $5,100 | X | | | X | |
| Downtown Circulator | $1,800 | $1,300 | X | X | | X | X |
| Service to new or unserved areas (undesignated) | $700 | $250 | | | X | | |
| Program to show new users how to use the service | $30 | | | | | X | X |
| Total | $5,991 | $16,050 | X | X | X | X | X |

## Opportunities for Transit Investment in the Mid Term (2016-2025)

In the mid term this plan assumes that MTA, working with the Mayor's Office, Metro Council, Tennessee DOT, the Nashville MPO, Cumberland Region Tomorrow and other stakeholders will have been successful in finding a new source of funding for regional transit services. If this is the case, it is likely that the MTA will be able to offer additional regional service. Recommendations for Nashville/Davidson County include:

- Extend the Gallatin BRT service from the Music City Central (MCC) to Vanderbilt/ West End.
- Improve night service on certain routes to continue in the same pattern as during the day. Routes affected would be Routes 2 Belmont, 4 Shelby, 7 Hillsboro, 19 Herman, 20 Scott, 28 Meridian, 29 Jefferson, and 30 McFerrin.
- Establish mini-hubs at Clarksville Pike and Gallatin Road.
- Provide signal priority and BRT elements for other corridors including Route 15 Murfreesboro Road, Route 12 Nolensville Road, and Route 23 Dickerson Road.
- Add park and ride capacity for Routes 35X Rivergate Express and 41 Golden Valley.

- Extend and expand park and ride service to Rutherford, Sumner and Williamson Counties. In particular, offer half hour service during the peak hour to Murfreesboro and Hendersonville. Institute park and ride service to Franklin.
- Expand service to unserved areas including new fixed route or flexible service in areas meeting density standards such as:
    - Two neighborhoods to the east of Gallatin Pike and just north of the new Madison Bus Link area. These might be served by expanding BusLink service northward to Anderson Lane.
    - An area between Routes 3 West End and 7 Hillboro, part of the Hillsboro-West End area. This area would be a candidate for a neighborhood route or flexible route connecting to the Mall at Green Hills.
    - A area south of I-440 between MTA Route 12 Nolensville Road and I-24. Feeder routes could connect neighborhoods north of Route 72 Edmondson Pike Connector with the 100 Oaks Shopping Center.

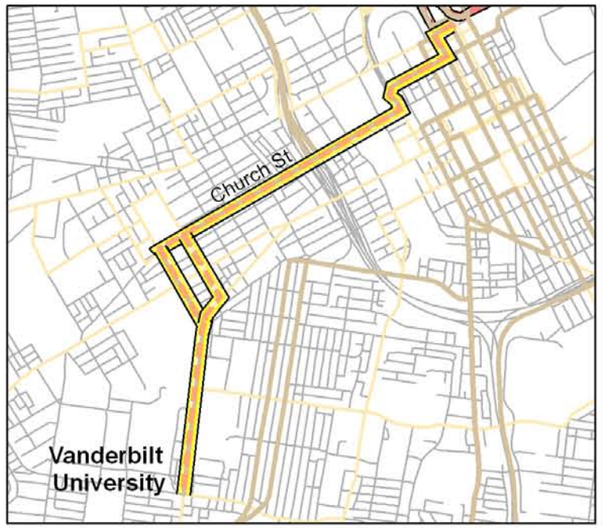
## Opportunities for Transit Investment in the Long Term (2026-2035)

Long-term (2026-2035) project recommendations include providing high capacity transit service beyond Davidson County (BRT or commuter rail) to Rutherford, Sumner and Williamson Counties, further improving transit capacity between Nashville and the West End with streetcar or dedicated bus lanes, extend current route services to reach developing residential and employment centers, and institute additional mini-hubs to improve connections.

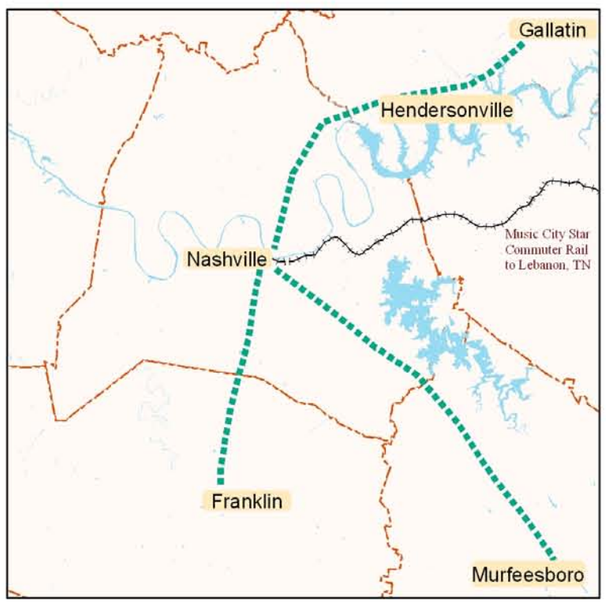
- Extend Route 23, Dickerson Road to reach emerging employment areas north of the current service area.
- Extend Route 6 southward to reach new developing communities and employment areas, including Summit Medical Center.
- Further improve transit capacity between downtown Nashville and the West End with light-rail or if BRT, with dedicated bus lanes and/or queue jump lanes.
- Provide high capacity service (BRT, light rail or commuter rail) to Rutherford, Sumner and Williamson Counties. If BRT service, improve existing right-of-way for buses with exclusive lanes or queue jump lanes.
- Provide additional service to the developing neighborhoods currently served by Route 37X Tusculum/McMurray Express and Route 38X Antioch Express. These neighborhoods are expected to reach densities that would justify more than peak hour service. The express bus services could be expanded throughout the day and into the early evening or alternatively, the service could be used to connect with the regional high capacity service.
- Institute an additional mini-hub at 100 Oaks to improve connections.

Table E-12 and Figure E-4 following illustrates the short, mid and longer term recommendations for service improvements for the MTA.

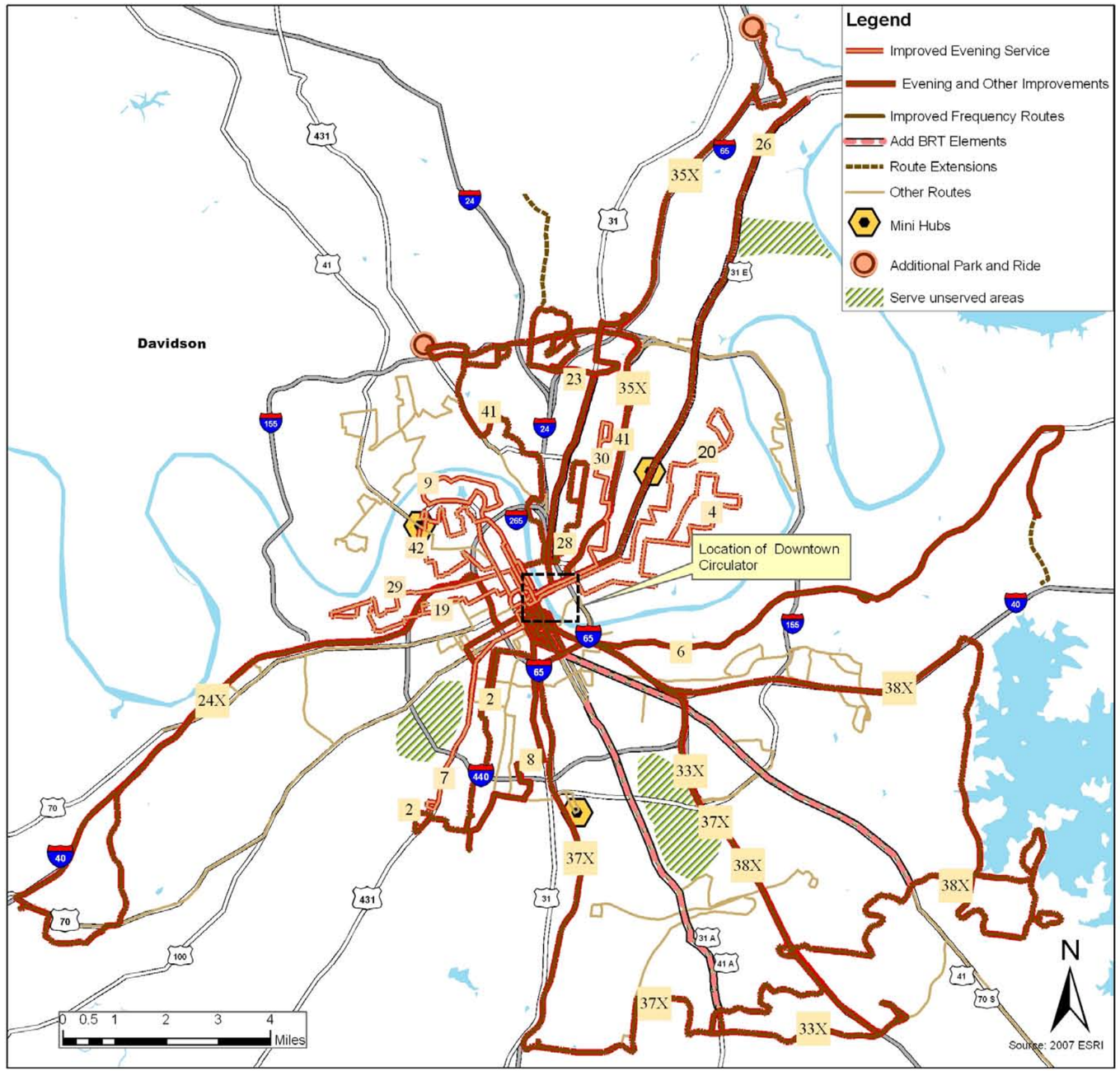
Figure E-4: Short, Mid and Long Term Recommendations




High Capacity Improvements ( Light Rail or BRT Queue Jumps/Reserved Lanes)




High Capacity Regional Connections



## Conclusions

During most of the first decade of the 21st century, the Nashville MTA has been improving along several dimensions. Ridership has grown in response to service improvements and partnerships with Nashville employers. Service effectiveness (rides provided per each vehicle hour) has been increasing. The downtown Music City Central Station now provides a modern facility to shelter bus passengers and provide convenient transfers. Support from Nashville Metropolitan Government will allow further service improvements, such as a BRT on Gallatin Road. Also, the state of Tennessee now has enabling legislation to permit a larger regional solution to providing public transportation.

Nashville MTA is thus poised to take another step forward by increasing the level of service provided so that MTA will rise to the upper levels of some of our peer regions. One step along that path has been to produce this *Strategic Transit Master Plan* to help establish policies and future goals for the agency. This plan proposes a five dimensional approach to improving service which includes improving service frequency, improving speed of service, serving unserved areas, making service easier to use, and improving the image of transit. This plan also proposes the use of a *Service Delivery Policy* to guide the way that service is changed. Finally, this *Strategic Transit Master Plan* suggests a list of opportunities that the MTA will pursue in the short, medium and long range time frames.

Table E-2 Summary Table of Actions/Opportunities for Nashville MTA

| Short Term Actions (2009-2015) |
|---|
| Adopt a Service Delivery Policy |
| Pursue a dedicated funding source for public transportation |
| Implement 'green' building practices and continue to acquire hybrid buses |
| Implement BRT on Gallatin Road |
| Increase frequencies on eleven routes to bring them up to minimum standards |
| Implement a downtown circulator |
| Provide service to a new or unserved neighborhood |
| Provide a budget for increased marketing to help non-users learn how to use the MTA service. Provide a targeted marketing campaign for the Gallatin BRT. |
| **Mid Term Actions (2016-2025)** |
| Reallocate service using trip by trip ridership data from the Automatic Passenger Counters |
| Extend the Gallatin Road BRT from the Music City Central to West End/Vanderbilt |
| Improve night service on routes currently paired routes: (Routes 4 Shelby and 20 Scott, 28 Meridan and 30 McFerrin, 2 Belmont and 7 Hillsboro, and 19 Herman and 29 Jefferson.) |
| Institute mini-hubs on Clarksville Pike and Gallatin Road to serve multiple routes |
| Implement BRT service elements such as fewer and nicer stops, traffic signal priority, better buses and increased service on Murfreesboro Road, Dickerson Road and Nolensville Road. |
| Expand park and ride capacity for Route 35X Rivergate Express near Kmart-Goodlettsville. Add park and ride capacity to Route 41 Golden Valley. Provide and improve park and ride service to Rutherford, Sumner, Williamson and Davidson Counties. |
| Expand the Madison Bus Link northward to Anderson Lane. Add fixed or flexible service from the Hillsboro-West End area to connect to the Mall at Green Hills. Add fixed or flexible service from the Glencliff and Woodbine neighborhoods to 100 Oaks Mall. |
| Revise downtown system map to clarify routes in the downtown. Provide a targeted marketing campaign for new and improved services. |
| **Long Term Actions (2026-2035)** |
| Extend Route 23, Dickerson, to reach employment areas north of the current service area. |
| Extend Route 6 Lebanon Road to developing communities and Summit Medical Center |
| Further improve transit capacity between downtown Nashville and the West End with dedicated or queue jump lanes or streetcar service |
| Provide high capacity service (BRT with queue jumps, light rail or commuter rail) to Rutherford, Sumner and Williamson Counties). |
| Provide Frequent service to developing neighborhoods served by Route 37X Tusculum/McMurray Express and route 38X Antioch Express. |
| Institute a mini-hub at 100 Oaks. |

[i] 2030 Long Range Transportation Plan, Nashville Area Metropolitan Planning Organization, Amended November 14, 2007, p. 66.

[ii] Transit Capacity and Quality of Service Manual, 2nd Edition; Transit Cooperative Research Program (TCRP) Report 100:2003, Exhibit 3-12, p. 3-30.

[iii] Graham Currie, et. al., High Ridership Growth from Extended Transit Service Hours—an Exploration of Causes, Monash University, Australia, presented at the 2009 TRB Annual Meeting.

# Chapter 1 Introduction

## Purpose of the Report

This report provides a *Strategic Transit Master Plan* for public transportation on behalf of the Metropolitan Transit Authority (MTA) and the Nashville Metropolitan Planning Organization (MPO). The *Strategic Transit Master Plan* establishes a short (2009-2015), mid (2015-2025) and long-term (2025-2035) vision and provides a set of priorities and a list of projects to be implemented in those time periods. This report also provides the background information and analysis and summarizes the public input from an extensive public outreach effort.

## About the MTA

The Metropolitan Transit Authority (MTA) was formed in 1973 for the purpose of stabilizing existing public transportation services and meeting other transportation needs of the citizens within Davidson County and visitors who visit the city and local areas.

The Nashville MTA provides public transportation services, local and express routes, to citizens and visitors within the Metropolitan Nashville area and is a component unit of the Metropolitan Government of Nashville & Davidson County. MTA operates 36 bus routes throughout Metro-Davidson County and now provides more trips than at any other time in recent decades. Nashville MTA reached a milestone in ridership by providing our community with 9.4 million rides in fiscal year 2008.[i] This is nearly an 11 percent increase over the previous fiscal period and almost 1 million additional trips when compared to the previous year. Average rides per weekday are 30,000. Nashville also has contracts with the Regional Transportation Authority (RTA) to provide management services for the RTA and to run bus service to Murfreesboro and the Music City Star bus shuttles. In addition, the Nashville MTA provides special door-to-door paratransit services (AccessRide) for seniors and people with disabilities that are unable to ride the larger buses on the fixed routes.

MTA has formed several unique EasyRide transit partnerships with organizations which pay for their employees transit commute to and from work and school. Metro Government has recently joined others such as Vanderbilt University and Medical Center, Belmont University, the State of Tennessee, Bass, Berry & Sims, LP Building Products, the U.S. Corps of Engineers, U.S. Bankruptcy Court, U. S. Probation Dept., and area hotels such as Holiday Inn Select Vanderbilt, Renaissance Hotel, Hilton Hotel and Hampton Inn in participating in the Easy Ride program.

In October 2008, MTA opened Music City Central (MCC) Station which is a multi-level indoor transfer facility in the heart of downtown Nashville. This indoor facility has customer waiting rooms, a ticketing and information booth, and a coffee shop. A new state-of–the-art 800 MHz radio and data transmission system for all buses is also being implemented in phases over the next year. Once completed, this system will give customers access to “real time” bus arrival and departure information via digital signage around town, at the MCC, and in the future, via the internet.

Nashville MTA currently has 137 fixed route buses, 63 AccessRide buses and 475 employees. A five-member Board of Directors, appointed by the Mayor and approved by the City Council, governs the Nashville MTA. A management team, headed by a Chief Executive Officer (CEO), oversees the day-to day operations. Nashville MTA’s receives funding from federal, state and local governments.

## Project Approach and Report Organization

This project began with an extensive analysis of existing data on the MTA region and transit service. The project used purchased data sets from ESRI (2007 Block Group information for Davidson County); Dun and Bradstreet (employers and employees); land-use information from Metro Planning; data on transportation networks,

transportation analysis zones (TAZs), trip information, future population and employment forecasts from the MPO, and extensive data on transit performance and finance from both MTA and the National Transit Database. The analysis of the existing demographic trends is described in Chapter 2 of this report. Chapter 3 presents trends in public transportation in Nashville, and Chapter 4 compares Nashville MTA transit service and funding with that of other peer communities.

One of the early tasks in developing information on the market for transit was the development of a ridership analysis model for MTA. This model, called the MTA Service Analyzer, has been developed with 2006 TAZ trip tables and a detailed representation of transit service in the community. It has the capability to use future trip tables as well. Appendix A describes MTA Service Analyzer and some of the insights gained through it.

The project also included extensive public outreach with five public workshops in November of 2008 as the project was getting underway, five workshops in January of 2009 with a partial report on the market analysis and initial opportunities, and a final set of workshops in of the summer of 2009 to introduce the draft plan. In addition, MTA held a meeting of a large number of transit stakeholders in December of 2008 which considered priorities and alternative futures for the MTA. A summary report on the public outreach is contained in Appendix B.

A *Service Delivery Policy* was developed as part of the *Strategic Transit Master Plan* process and that policy is contained in Appendix C. Chapter 5 of this report provides an analysis of current MTA service compared to the *Service Delivery Policy.*

Chapter 6 considers the regional vision as contained in the long-term transportation plan and mission statements of organizations concerned with regional transportation planning and service. The MTA mission and priorities are considered in coordination with the larger regional vision. Based on market analysis, public input and other sources Chapter 6 provides an approach to prioritizing projects and spending,

Chapter 7 provides an analysis of options for implementing a Bus Rapid Transit service on Gallatin Road, MTA's highest ridership route. Actions are discussed for improving the speed and image of service. Chapter 8 provides information on opportunities where MTA can improve service as well as opportunities for environmental initiatives. Chapter 9 concludes the *Strategic Transit Master Plan* by providing a plan for phasing identified opportunities into short, mid and long term time frames.

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[i] The 9.4 million rides includes fixed route service, AccessRide Service and special events service.

# Chapter 2 The Past, Current and Future Condition for Transit in Nashville/Davidson County

This section presents information about the population, development and density trends and patterns of Nashville-Davidson County. The data for this analysis came from:

- The Metropolitan Government of Nashville/Davidson County GIS information on land use in the County.
- MTA route maps and GIS information.
- An employer data set using Dun and Bradstreet data from October 2008.
- An 2007 ESRI dataset which updates 2000 census data at the block group level.
- Forecasts from the MPO on future population and employment in the County.

## Population

The population of Nashville Davidson County has been growing over the past few decades. The MPO Long Range Plan and current census estimates provide information on the population growth and expected trends. Table 2-1 shows the population information for the county. Although the population is increasing in Nashville, the increases are taking place in outer, less dense parts of the county. This has resulted in residential areas being more and more spread out—hence more difficult for MTA to serve effectively. Looking at the broader five county area served by the MPO (including Davidson, Rutherford, Sumner, Williamson and Wilson Counties), the percentage of population in Davidson County has been declining as a percent of the region.

Table 2-1: Population of Nashville/Davidson County

| Year | Population | Percent of 5 County Region |
|---|---|---|
| 1990 | 510,786 | 58% |
| 2000 | 569,891 | 52% |
| 2002 | 595,124 | 50% |
| 2007 | 619,626 | 48% |
| 2030 | 713,055[i] | 42% |

The data sources cited above can be used to show population, demographics, employment, and land-use information for Nashville/Davidson County. They can also be used to analyze how well the MTA service covers Davidson county geographically. Using updated census data for 2007, relevant information for transit planning can be seen in plots of population density, income, auto ownership and percent of those persons 65 and over. Figure 2-1 through Figure 2-4 show this information for the county along with MTA's route network.

Figure 2-1 shows the population density in 2007 by block group. As can be seen in Figure 2-1, much of Nashville/Davidson County is below 5000 persons per square mile. However, MTA service does come close to most block groups that are 5000 persons and above in density. An industry standard is that a population density of around 3 dwelling units per acre is needed to justify fixed route transit, which translates to around 5000 people per square mile.[ii] Chapter 6 analyzes the higher density areas that are not well served by MTA routes.

Figure 2-1: Population Density in Nashville/Davidson County – 2007 (by Block Group)

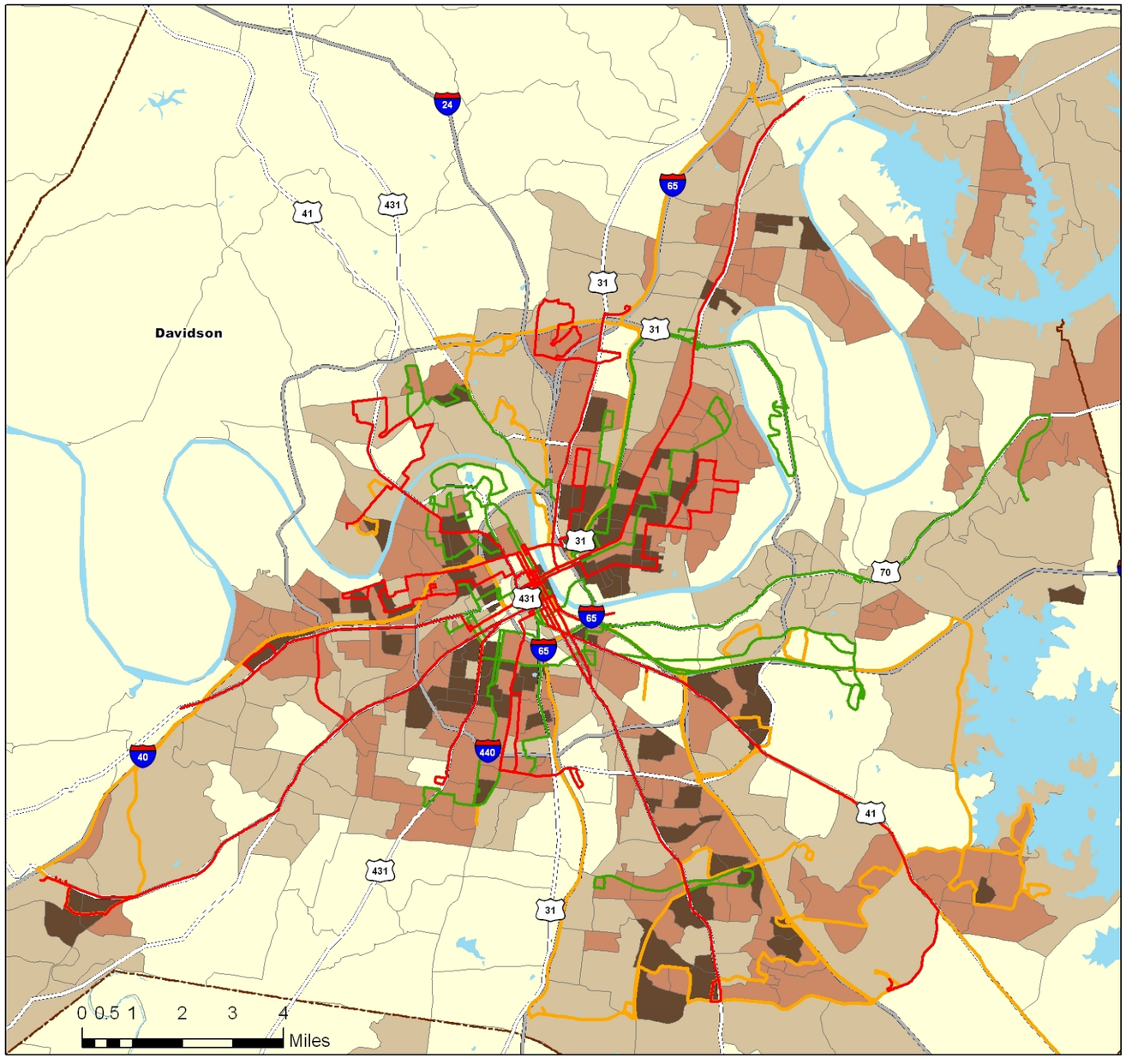


Figure 2-2: Median Household Income by Block Group – 2007

Figure 2-2 shows the median Income by block group in Nashville/Davidson County. The households below poverty level (households with incomes under $35,000) congregate towards the center of Nashville. Households in the income category of "workforce housing" (between $35,000 and $50,000) are more spread out throughout the county. A large area of higher incomes is found to the southwest of the center.

Figure 2-2 also shows MTA routes. MTA's route system comes within ½ mile of 70 percent of those with household incomes under $35,000 and 62 percent of households with incomes between $35,000 and $50,000.

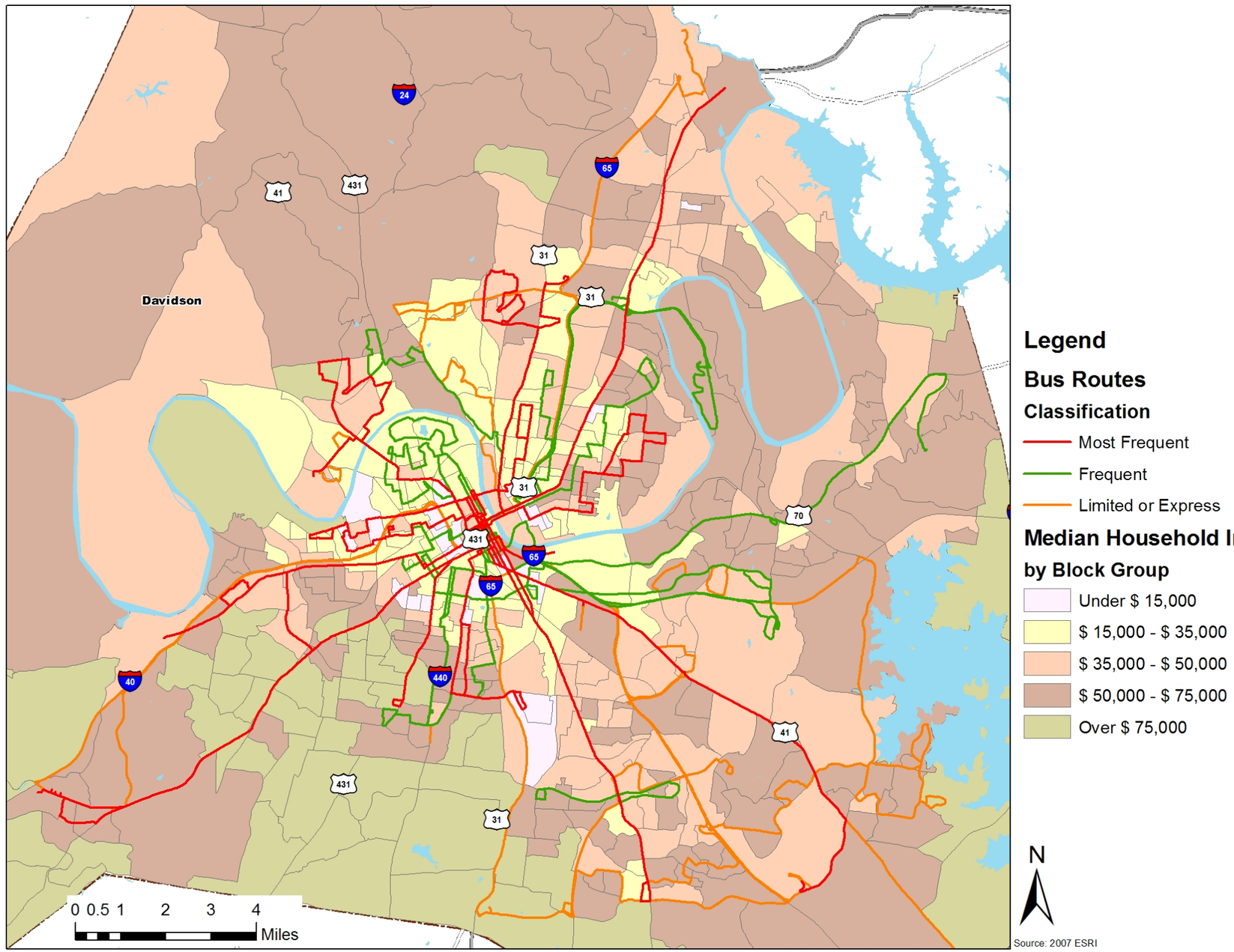


Figure 2-3: Percent Households without Automobiles - 2007

Figure 2-3 shows the percentage of households without automobiles by block group. Households without automobiles, whether by choice or due to lack of income, are going to use MTA service much more than those that have even one automobile. MTA routes come within ½ mile of 85 percent of the households without automobiles.

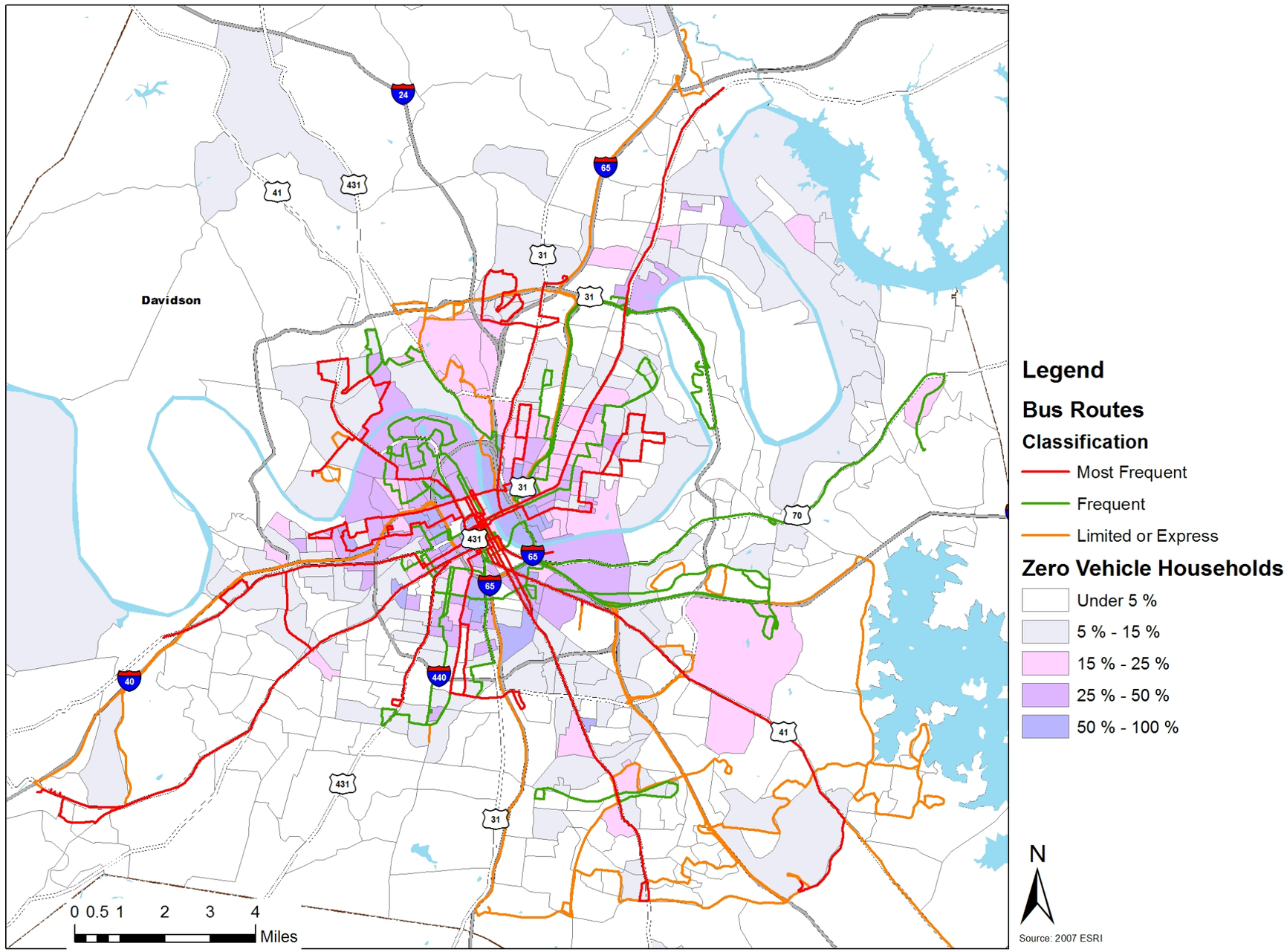


Figure 2-4: Number of Persons over 65 Years Old Per Acre

Figure 2-4 shows the number of persons over 65 years of age per acre. As can be seen, the areas with higher density of seniors are dispersed around the county. While many of these areas are near MTA routes, some are not. Note that there are areas of higher density near the end of Route 3 West End and Route 6 Lebanon Road.

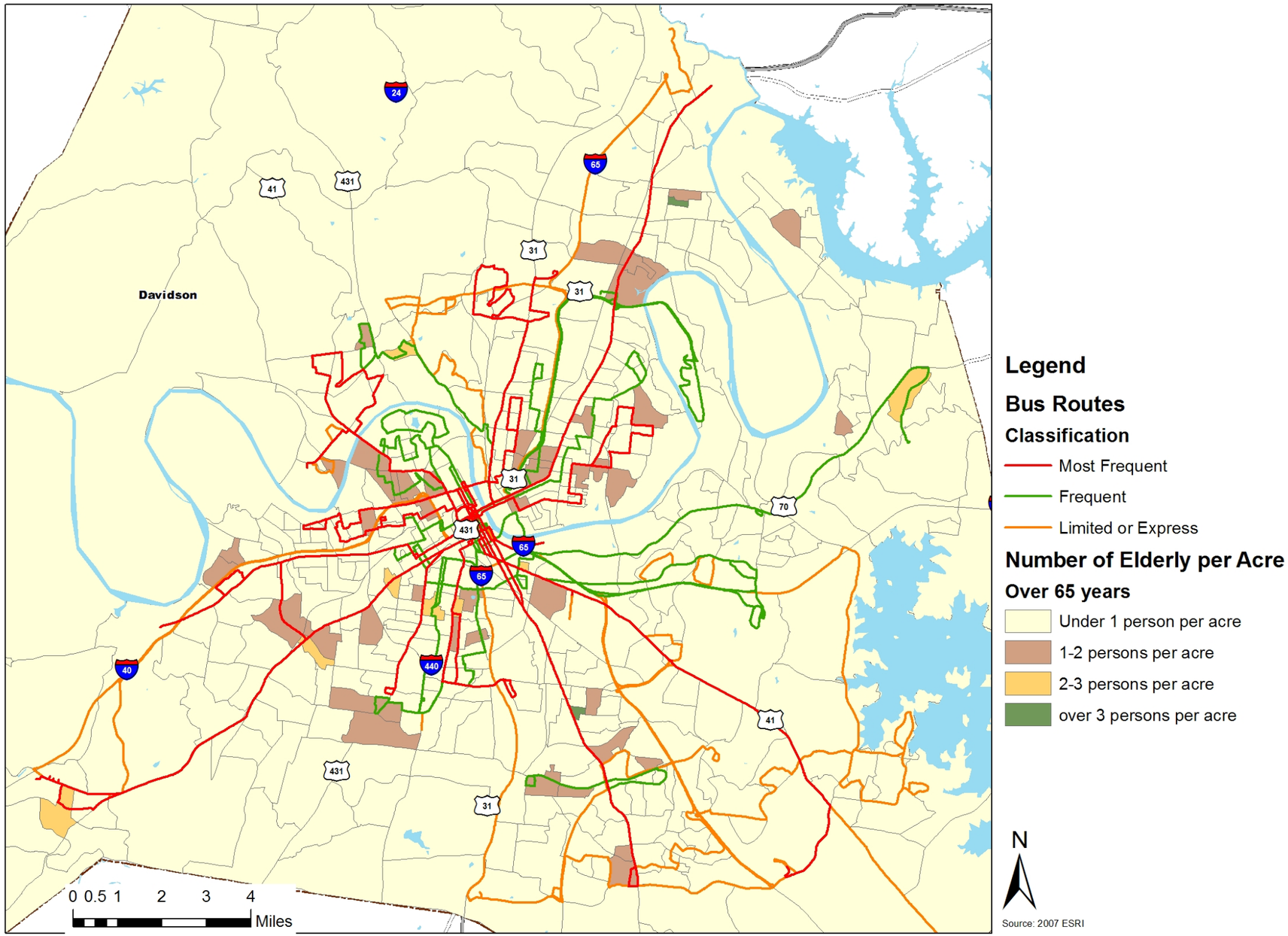


Table 2-2 summarizes how the MTA service covers Nashville/Davidson County by several of the categories shown above.

Table 2-2: MTA Coverage of Population and Households in Nashville/Davidson County

| Category | Total within Davidson County | Total within 1/4 Mile of MTA Routes | Total within 1/2 Mile of MTA Routes | Percent Covered within ¼ mile | Percent Covered within ½ mile |
|---|---|---|---|---|---|
| Population | 599,514 | 210,692 | 359,687 | 35% | 60% |
| Households | 253,981 | 86,416 | 151,912 | 34% | 60% |
| Households under $35,000 | 82,677 | 41,437 | 57,840 | 50% | 70% |
| Households between $35,000 and $50,000 | 39,216 | 15,461 | 24,313 | 39% | 62% |
| Zero car households | 21,624 | 14,866 | 18355 | 69% | 85% |

## Employment

Employment has also been growing in Nashville/Davidson County. Table 2-3 shows the growth over the past decades as well as the forecasted growth into the future. Nashville remains a center for employment in the 5 county region (including Davidson, Rutherford, Sumner, Williamson and Wilson Counties), although employment has been dispersing and that dispersal is expected to continue at a slow pace. Even by 2030, Davidson County is expected to employ over 60 percent of workers in the five county region.

Table 2-3: Employment in Nashville/Davidson County

| Year | Employment | Percent of 5 County Region |
|---|---|---|
| 1990 | 420,788 | 71% |
| 2002 | 540,142 | 66% |
| 2030 | 800,549 | 63% |

MTA's route system provides good coverage to the companies and employees within Davidson County. Table 2-4 below shows that 81 percent of employers and around 85 percent of all employees are within ½ mile of MTA routes.

Table 2-3: MTA Coverage of Employers/Employees in Nashville/Davidson County

| Category | Total within Davidson County | Total within ¼ Mile of MTA Service | Total within ½ Mile of MTA Service | Percent Covered within ¼ mile | Percent Covered within ½ mile |
|---|---|---|---|---|---|
| Employers | 1,319 | 916 | 1,063 | 69% | 81% |
| Employees | 195,832 | 144,010 | 168,279 | 74% | 85% |

Figure 2-5 shows employers with more than 50 employees in Davidson County based on a dataset purchased from Dun and Bradstreet in October of 2008. This data set is very useful as it shows the location of employment and number of employees at each location. It covers both public and private employers and so is very comprehensive.

Figure 2-5: Employment in Nashville/Davidson County

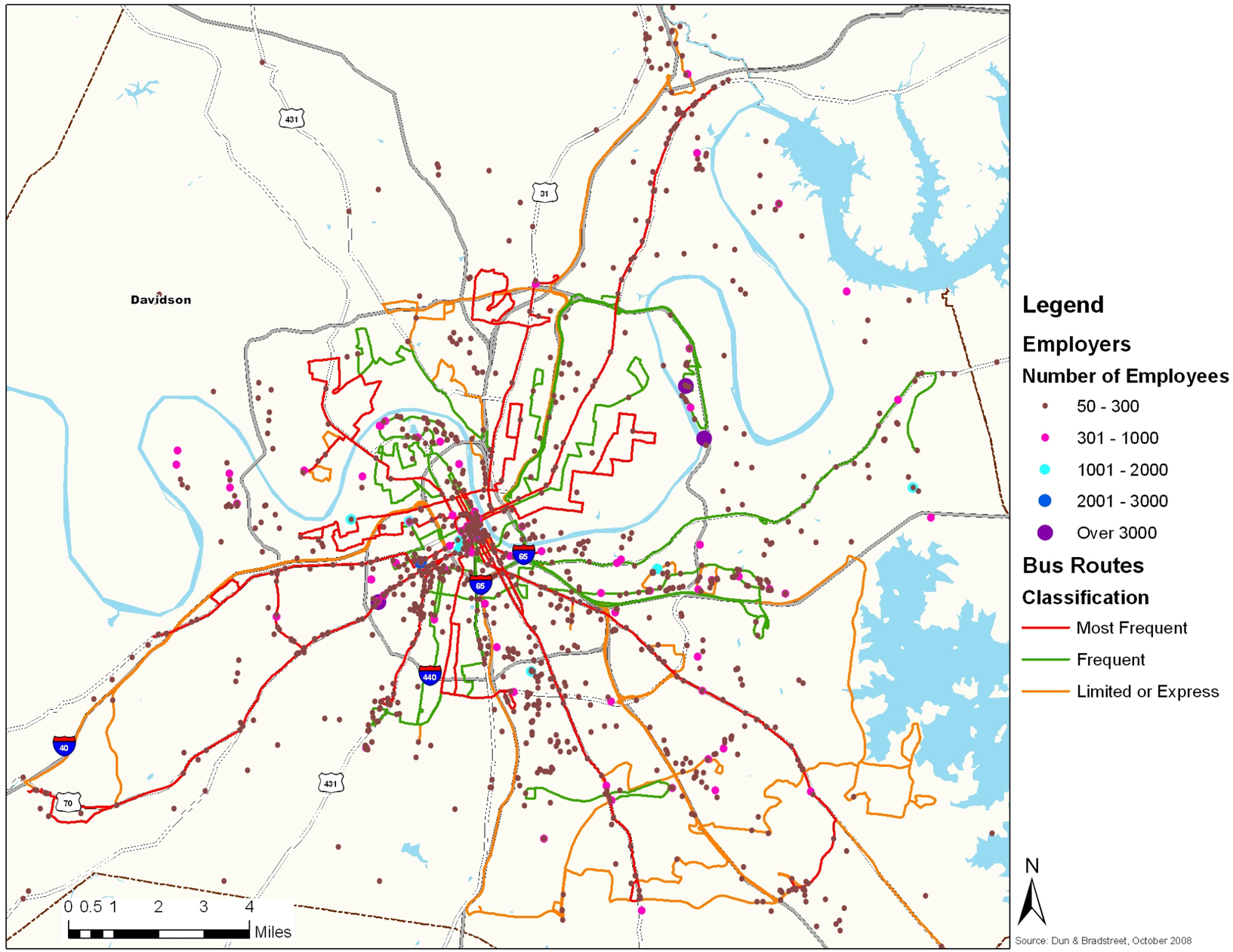


Figure 2-6: 2007 Population Density in Persons per Square Mile

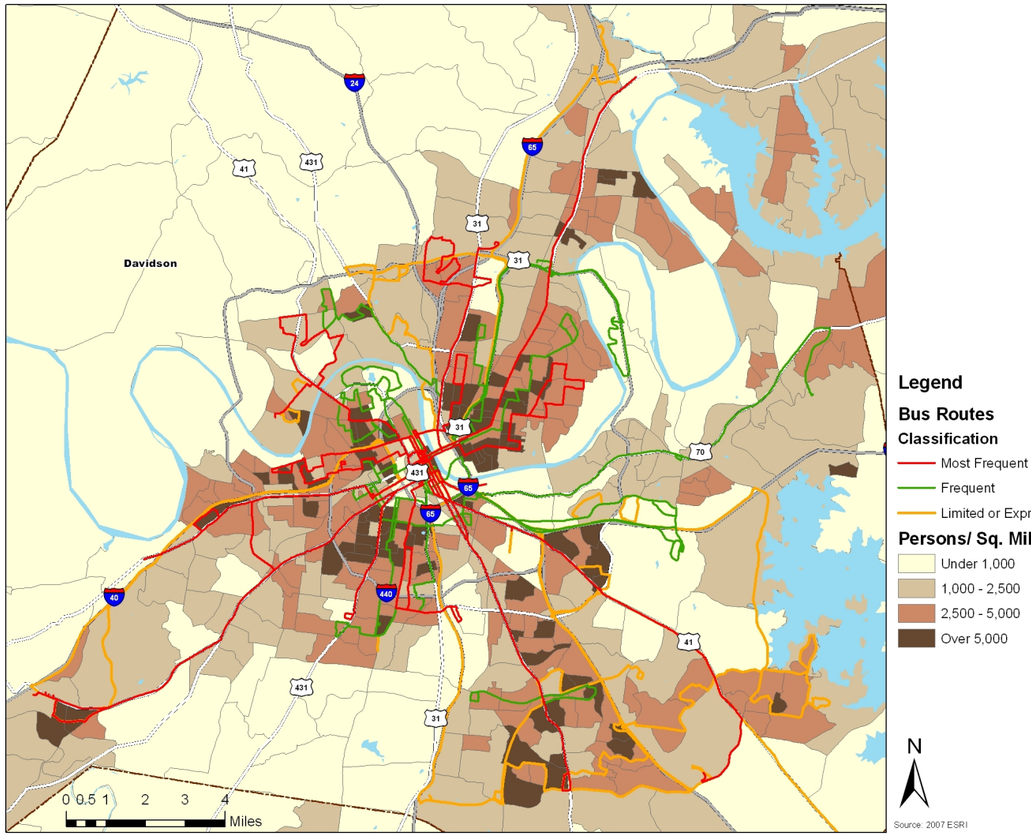
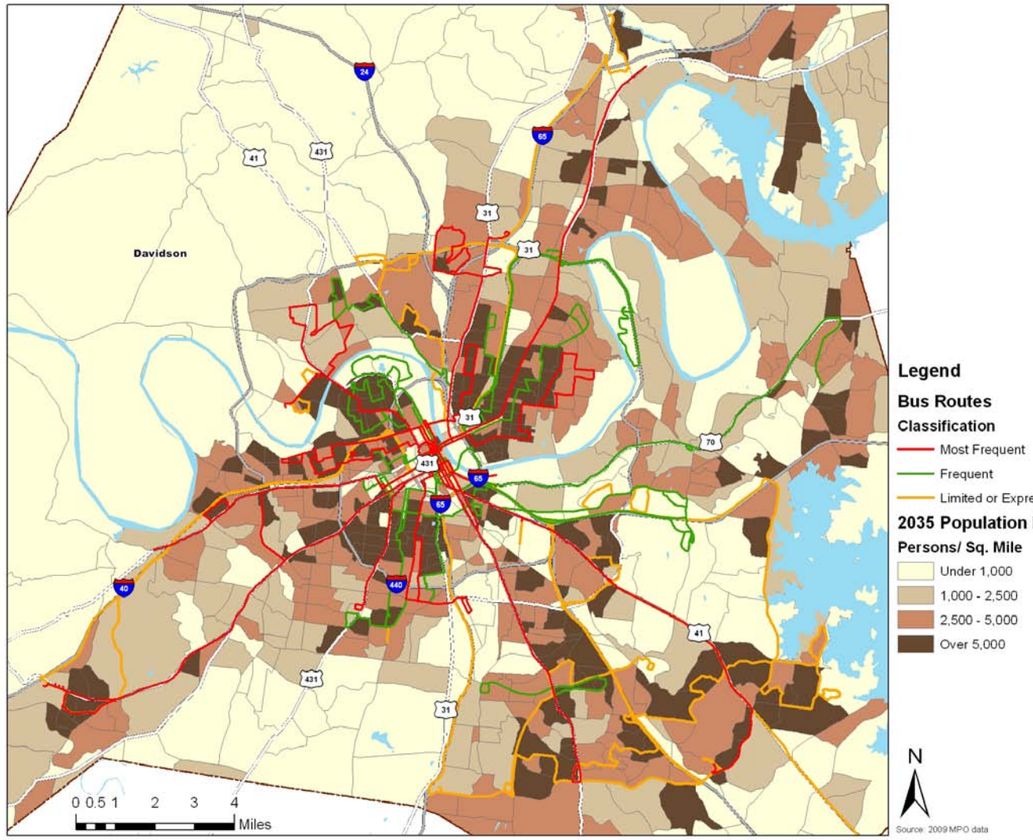



Figure 2-7: 2035 Projected Population Density in Persons per Square Mile




## Future Forecasts

Although the 2035 Long Range Transportation Plan is not yet complete, the MPO has provided estimates of 2035 population and employment by Traffic Analysis Zone (TAZ) by updating 2030 information using regional totals. While these data are not the final TAZ estimates, they do provide a reasonable picture of the way Davidson County is expected to grow.

While the MPO goals are for growth that will be more environmentally friendly and more compact, a continuation of current trends will lead to more dispersal. Figure 2-6 and Figure 2-7 are maps that compare 2007 population density with 2035 population density using the future estimates. As seen in Figure 2-7, the 2035 population density category of over 5,000 people per square mile increases in the Nashville core, particularly along some of the MTA's existing bus routes. There is an increase in density near the end of MTA Route 6 Lebanon Road as well as north of Priest Lake. A band of increased density also is forecast running from the southwest from Priest Lake to Edmonson Road.

Employment in Davidson County is forecast to grow in outer areas as well as part of the core, thus continuing to disperse along with population.[iii] Figure 2-8 and Figure 2-9 show employment density (employees per square mile) for 2006 and 2035 based on TAZ data from the MPO. There are areas of greater than 5000 employees per square mile where there appear to be little employment today. One of the largest of these is a new area of employment adjacent to I24 North beyond MTA's service area. Also, employment density is increasing on Murfreesboro Pike to the south of downtown Nashville.

This continuing dispersal of population and employment will be challenging to MTA in the future. To continue to grow, MTA will need to attract a larger percentage of trips in the central service areas than it does today, and continue to develop services such as express bus or flexibly routed services to reach the outer, less dense parts of the county.

Figure 2-8: 2006 Employment Density in Employees per Square Mile

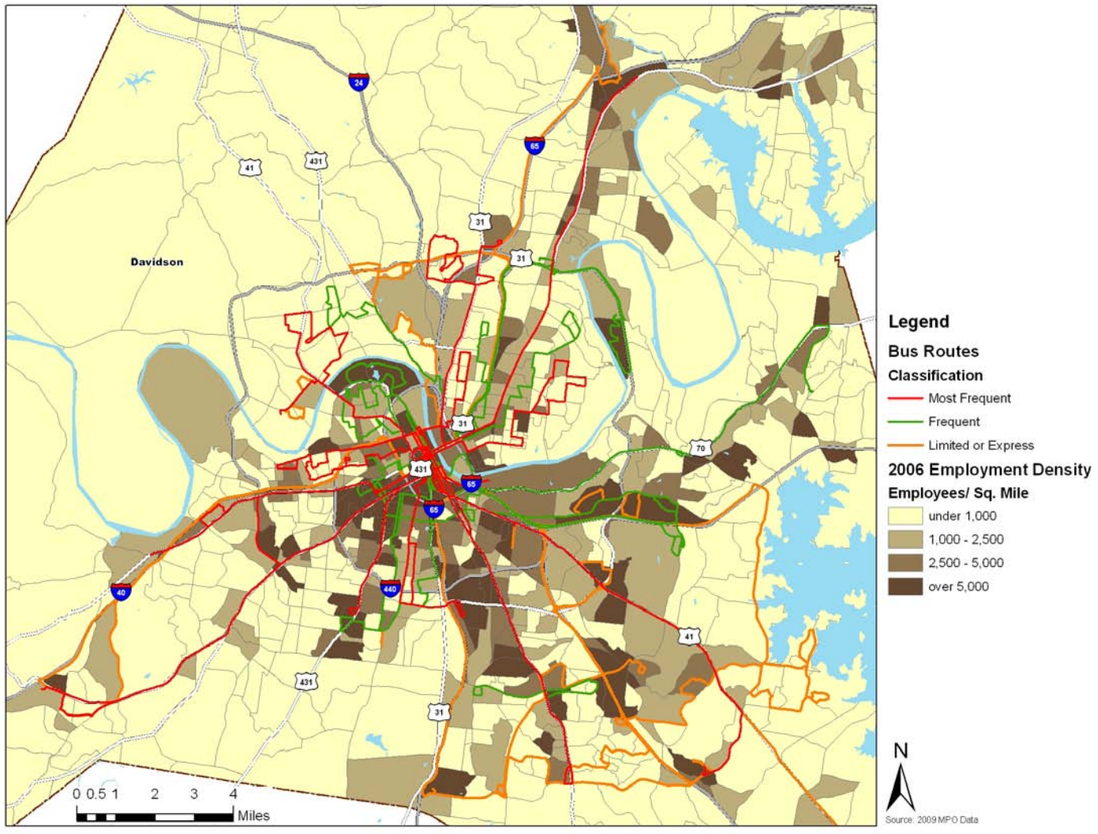
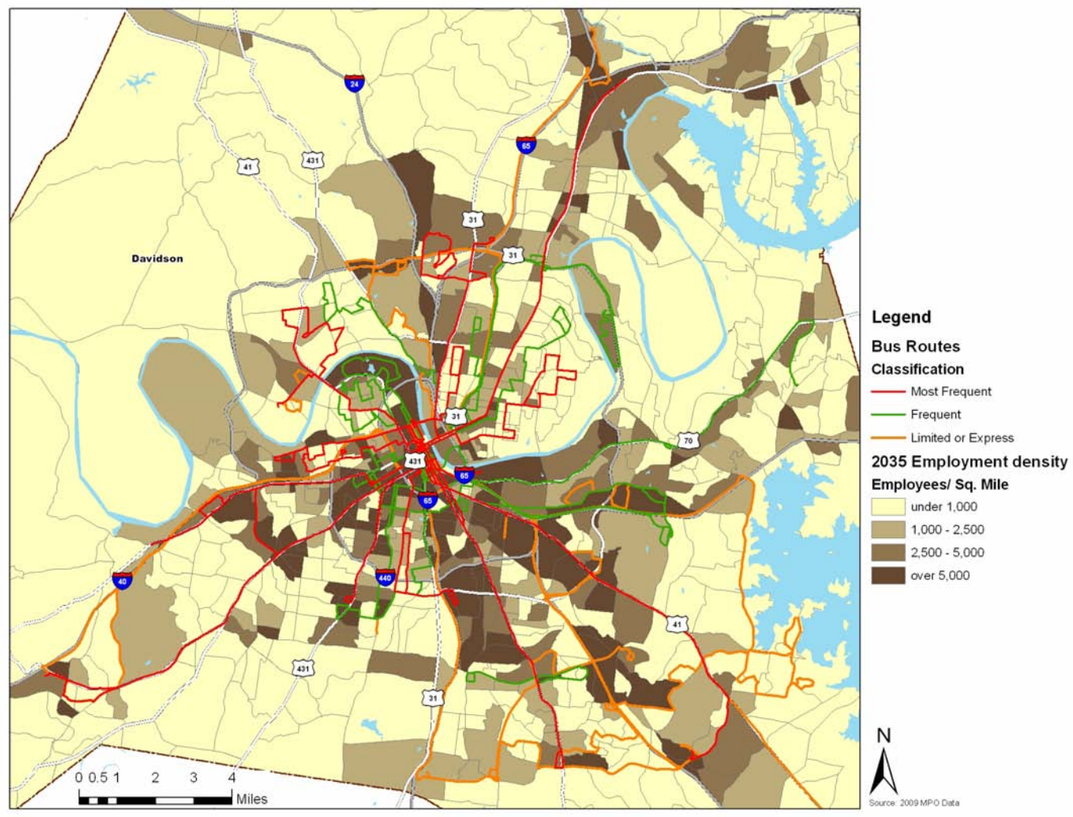



Figure 2-9: 2035 Projected Employment Density in Employees per Square Mile

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[i] Nashville Area Metropolitan Planning Organization 2030 Long Range Transportation Plan, Amended Nov. 14 2007, p. 44.

[ii] Transit Capacity and Quality of Service Manual (1st Edition); Transit Cooperative Research Program, Washington, D.C., 1999, 5-21, 5-22.

[iii] Nashville Area Metropolitan Planning Organization 2030 Long Range Transportation Plan, Amended Nov. 14 2007, p. 65.

# Chapter 3 Transit Trends

This chapter addresses trends in transit ridership, transit performance, expenses and sources of revenue over time.

## Transit Ridership and Performance Trends

After a period of ridership losses in the 1990s, MTA transit ridership has been growing.

Table 3-1 shows the system ridership including both bus and AccessRide service (but excluding special event service).

Table 3-1: MTA Ridership Trends (Source: MTA)

| Fiscal Year | Bus | Access Ride | Total |
|---|---|---|---|
| 1989 | 7,686,702 | | 7,686,702 |
| 1990 | 7,869,510 | | 7,869,510 |
| 1991 | 7,881,110 | | 7,881,110 |
| 1992 | 7,393,980 | 159,778 | 7,553,758 |
| 1993 | 6,765,443 | 146,301 | 6,911,744 |
| 1994 | 6,816,515 | 114,858 | 6,931,373 |
| 1995 | 6,813,085 | 109,138 | 6,922,223 |
| 1996 | 6,518,972 | 99,390 | 6,618,362 |
| 1997 | 6,789,048 | 99,432 | 6,888,480 |
| 1998 | 7,020,945 | 99,718 | 7,120,663 |
| 1999 | 6,979,999 | 86,024 | 7,066,023 |
| 2000 | 6,944,288 | 106,305 | 7,050,593 |
| 2001 | 6,527,926 | 118,121 | 6,646,047 |
| 2002 | 6,355,646 | 112,631 | 6,468,277 |
| 2003 | 6,651,286 | 120,995 | 6,772,281 |
| 2004 | 6,764,626 | 181,493 | 6,946,119 |
| 2005 | 6,715,387 | 212,382 | 6,927,769 |
| 2006 | 7,962,193 | 261,652 | 8,223,845 |
| 2007 | 8,680,107 | 280,883 | 8,960,990 |
| 2008 | 9,003,547 | 298,747 | *9,302,294 |

*Total ridership in FY 2008 was 9.4 million including special event ridership

Figure 3-1 graphs the ridership statistics from Table 3-1 and shows the dramatic increase in total ridership since 2002.

Figure 3-1: Total Ridership Trends (Source: MTA)

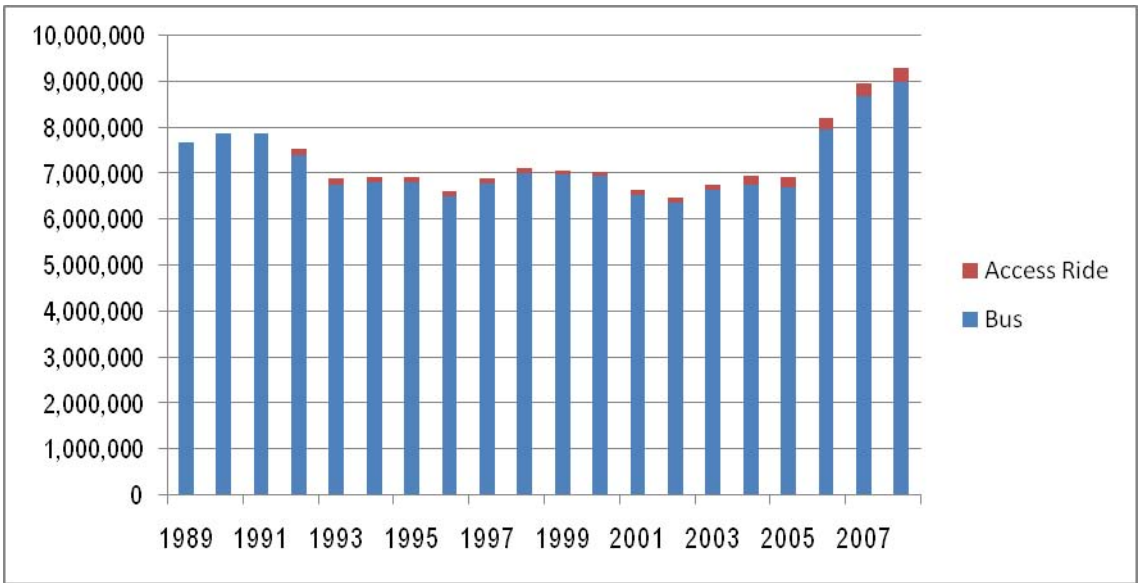
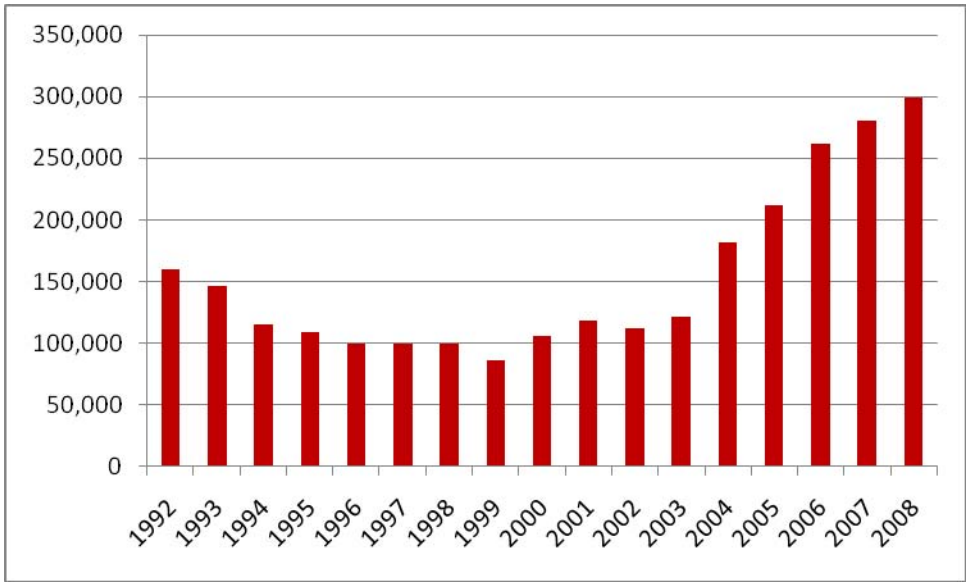


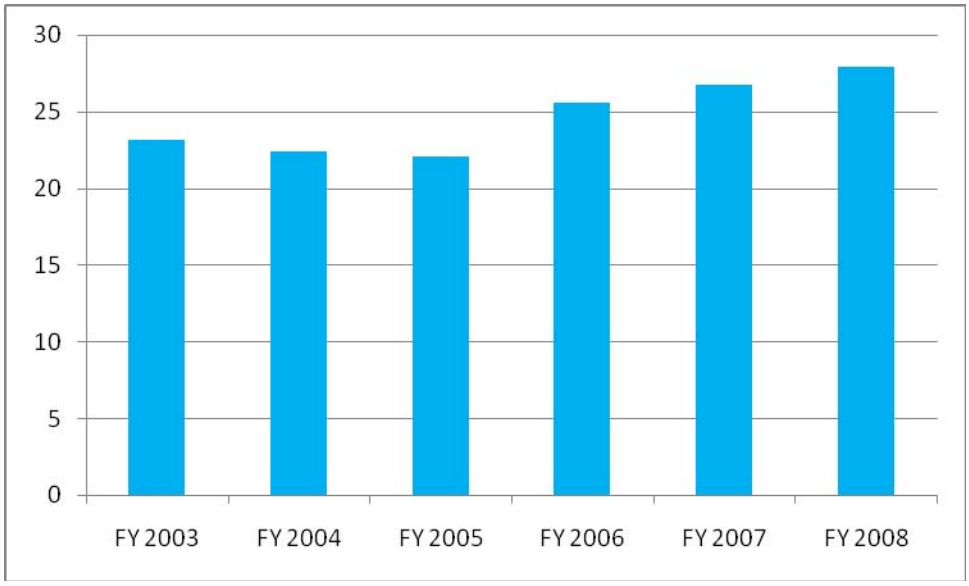

Figure 3-2 shows the ridership increase for Access Ride alone—demonstrating that the growth occurred in both regular bus service and in Access Ride. Bus ridership grew by 35 percent between FY 2003 and FY 2008, while Access Ride ridership grew by 147 percent.

Figure 3-2: Access Ride Ridership Trends (Source: MTA)



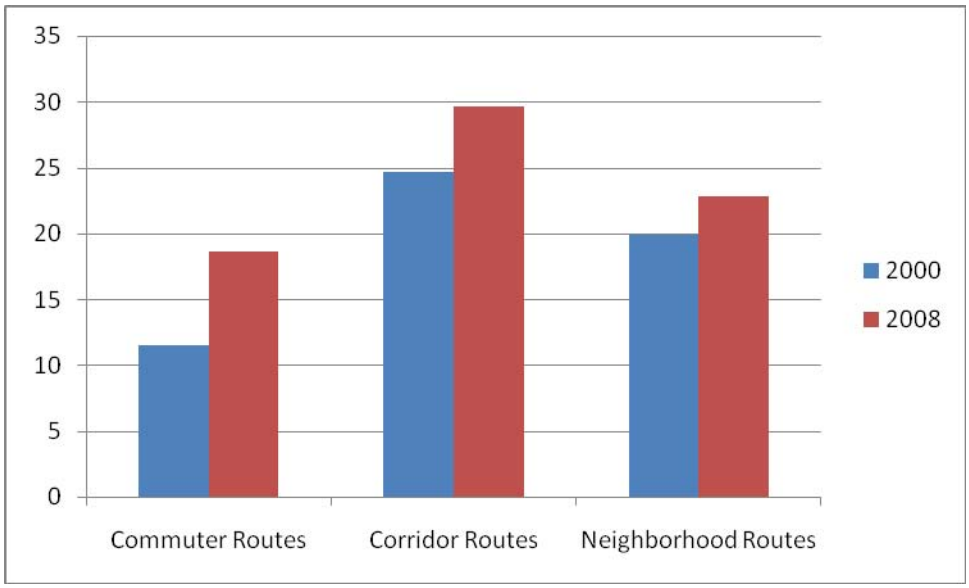
The MTA has also been improving service effectiveness as measured by the number of passengers carried per hour of service provided. Between FY 2003 and FY 2008 the number of riders per hour of service increased by 21 percent. Figure 3-3 shows that growth in service effectiveness.

Figure 3-3: Bus Service Riders per Revenue Hour (Source: MTA)




The improvement in service effectiveness has been across the board for the different types of MTA routes. Figure 3-4 shows a comparison between FY 2000 and FY 2008 for each of the three route types, including the commuter routes, corridor routes, and neighborhood routes.

Figure 3-4: Bus Service Riders per Revenue Hour by Route Type (Source: MTA)



## Transit Expenditure and Revenue Trends

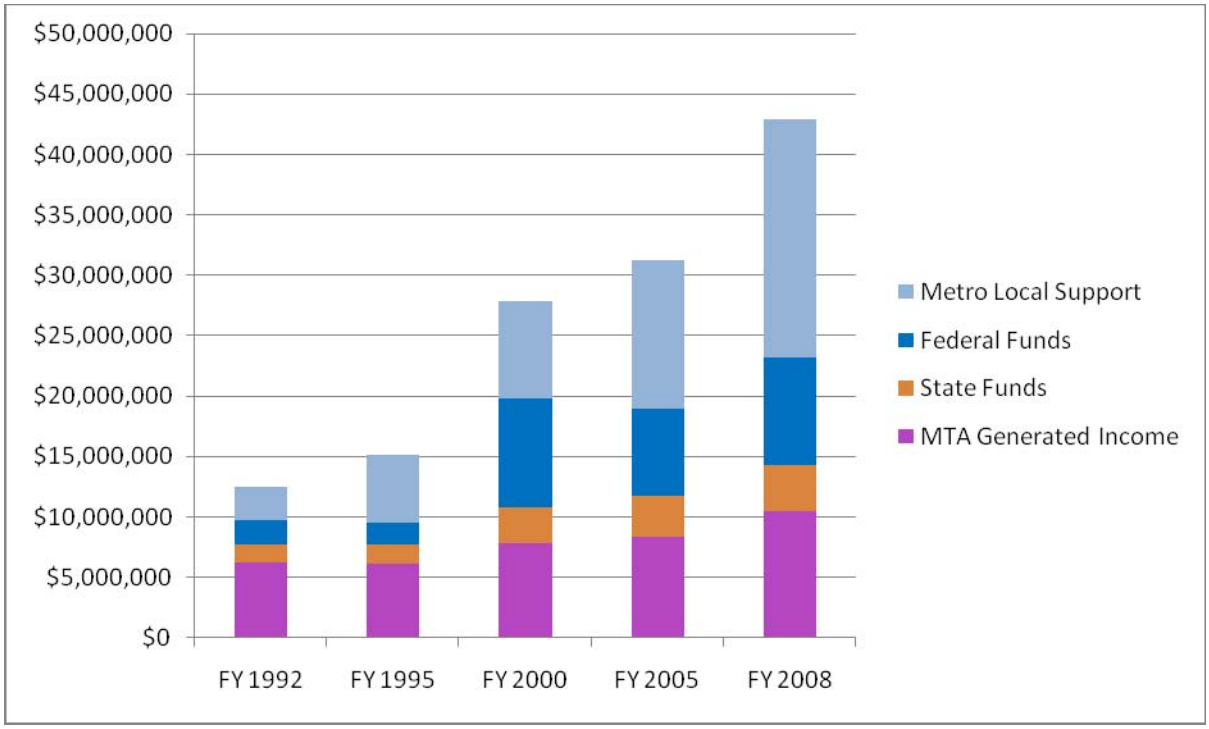
MTA costs have increased as more service is provided on the street. Table 3-2 shows operating expenditures by selected fiscal years between FY 1992 and FY 2008.

Table 3-2: MTA Operating Expenses by Fiscal Year (Source: MTA)

| Fiscal Year | Operating Expenses ($) |
|---|---|
| 1992 | 13,790,384 |
| 1995 | 11,933,861 |
| 2000 | 19,476,145 |
| 2005 | 31,129,244 |
| 2008 | 42,857,162 |

Looking just at operating expenses, MTA pays for these through grants from the state and federal government, with support from the Metropolitan Government of Nashville and Davidson County (Metro) and with self generated income. The self generated income comes from fares, advertising revenue, and revenues from contracts and special events. Fortunately, these sources of revenue have been growing to meet the needs of the MTA. In particular, Metro has been increasing its support for public transportation. Figure 3-5 shows how overall support has been growing and how that support divides between the various sources.

Figure 3-5: Sources of MTA Revenues (Source: MTA)



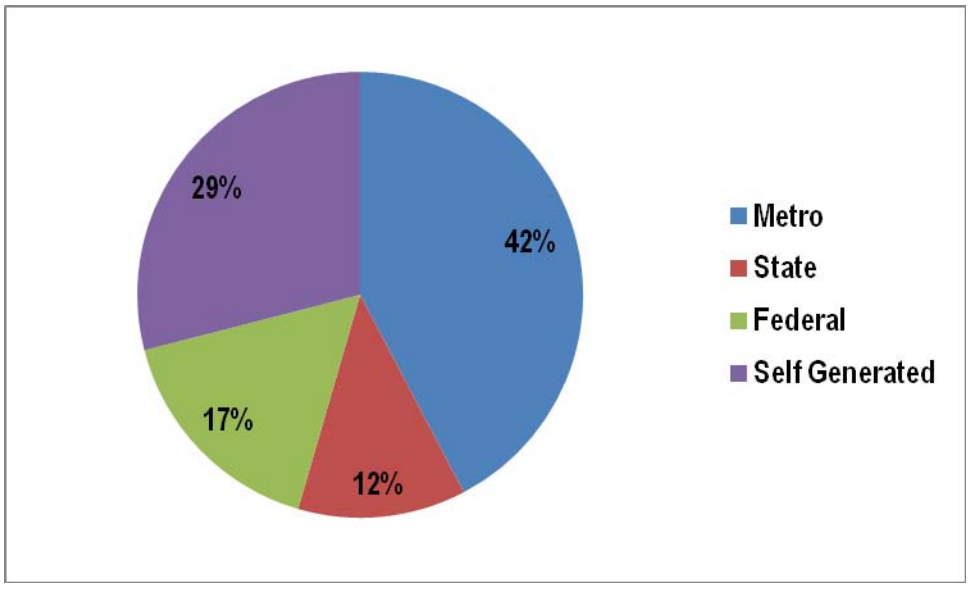
Over the past two decades, Metro support has grown to be the single most important source of operating revenue for the MTA, making up 46 percent of the total in FY 2008. MTA generated revenue, primarily fares, made up the second largest source, or 24 percent of the total. Table 3-3 shows the amounts of revenue by source.

Future growth in each revenue source is difficult to predict as it depends upon public policy at each level of government and also on the economy. Although Metro Government support had been increasing over the past decade, the recent economic downtown is likely to impact Metro's ability to continue this trend. In fact, the recent increase in fuel prices required MTA to reduce service and increase fares in July of 2008. Figure 3-6 shows that the FY 2009 budget calls for Metro to provide 42 percent of the support for the MTA, with self-generated income providing 29 percent of the support. As can be seen, even with a decline in the proportion of Metro support, Metro is still the most important contributor to the MTA service.

Table 3-3: Sources of MTA Revenues (Data from MTA)

| Fiscal Year | MTA Generated Revenue | State | Federal | Metro Local Support | Total |
|---|---|---|---|---|---|
| 1992 | $6,287,709 | $1,441,038 | $1,992,916 | $2,749,512 | $12,471,175 |
| 1995 | $6,156,793 | $1,584,587 | $1,772,647 | $5,595,375 | $15,109,402 |
| 2000 | $7,850,994 | $2,987,328 | $8,945,684 | $8,084,700 | $27,868,706 |
| 2005 | $8,333,363 | $3,424,530 | $7,158,439 | $12,320,400 | $31,236,732 |
| 2008 | $10,497,354 | $3,787,174 | $8,907,610 | $19,665,100 | $42,857,238 |

Figure 3-6: Support for MTA Operating Expenses by Source for FY 2009



## Summary

After a long period of ridership declines, the Nashville MTA experienced considerable ridership growth in the six years between 2002 and 2008. It expanded service during this period—requiring additional funding from the various sources that support operations. Service has been provided effectively, as all three types of MTA bus service have increased the number of passengers served per hour of service provided. The recent downturn in the economy and increases in fuel expenses required MTA to reduce service and increase fares in FY 2008. Metro government remains the largest source of operating support for MTA service and for further expansion of service additional funding will be required. A dedicated regional funding source could provide the necessary means by which MTA could expand and improve services.

# Chapter 4 Comparison of Nashville MTA with Peers

In order to examine how Nashville MTA performs in a national context, a peer review was undertaken. This involved several steps:

1. Selection of peers based on MTA suggestions, TranSystems recommendations and use of a list of top transit cities from the National Transit Database (NTD)
2. Peer comparison in service performance
3. Peer comparison in funding

Following is a presentation of the findings.

## Selection of Peers

The selection of peers included several different peer sets. These included transit agencies in the state of Tennessee, transit agencies serving state capital cities with their attendant workforces of state employees, transit agencies serving metropolitan areas in the southeast or south-central area of similar size, and transit agencies located throughout the United States serving cities of similar size and/or density.

One list used to generate peers was the 2006 NTD list of top 100 transit cities by passengers served per capita. In this list, Nashville's urbanized area (UZA) ranks 48$^{th}$ in population—so right in the middle of this list. In terms of density, Nashville/Davidson County ranks as 85 out of 100 and 74 out of 100 in terms of passengers served per capita, or just above the last quartile. Peers were selected from this list of "Top 100 Transit Cities" that had similar populations or service areas.

The difficulty with selecting peers is that each community or region is unique. As will be seen in the comparisons, Nashville is less dense than many communities of similar size or with similar transit systems. However, as long as care is used in interpreting peer results, such analyses can be helpful in providing insight into the challenges and successes of transit provision in the Nashville/Davidson area.

Table 4-1 provides some background information on the peers selected for comparison with MTA. The data come from the NTD in 2006. Note that population in Table 4-1 is defined as the population in the area served by the transit agency, and is usually not the same as the census definition of the UZA.

Table 4-1: Characteristics of Nashville and Selected Peer Agencies (from NTD 2006)

| Agency Name | Location | Service Area Population | Vehicle Hours (Fixed Route) | Peak Vehicles | Passengers | Persons per Square Mile |
|---|---|---|---|---|---|---|
| *Nashville Metropolitan Transit Authority* | *Nashville* | *573,294* | *324,303* | *114* | *7,708,840* | *1,184* |
| Memphis Area Transit Authority (MATA) | Memphis | 888,627 | 470,978 | 144 | 10,519,005 | 3,086 |
| Chattanooga Area Regional Transportation Authority (CARTA) | Chattanooga | 155,554 | 153,185 | 49 | 2,580,793 | 538 |
| Knoxville Area Transit | Knoxville | 180,130 | 233,750 | 67 | 3,388,099 | 1,749 |
| Transit Authority of River City (Louisville) | Louisville | 754,756 | 639,857 | 199 | 14,669,924 | 2,667 |
| Greater Richmond Transit Company | Richmond | 449,572 | 470,171 | 138 | 13,449,342 | 1,980 |
| **Charlotte Area Transit System*** | Charlotte | 681,310 | 859,835 | 263 | 20,407,190 | 1,531 |
| **Capital Metropolitan Transportation Authority (Austin)*** | Austin | 988,671 | 1,128,475 | 337 | 34,464,085 | 1,772 |
| Hillsborough Area Regional Transit Authority (Tampa) | Tampa | 578,252 | 608,430 | 165 | 11,914,287 | 2,277 |
| Indianapolis and Marion County Public Transportation (IndyGo) | Indianapolis | 791,926 | 464,068 | 122 | 9,694,417 | 2,123 |
| Niagara Frontier Transportation Authority (Buffalo) | Buffalo | 1,182,165 | 841,561 | 280 | 18,042,628 | 751 |
| Southwest Ohio Regional Transit Authority (Cincinnati) | Cincinnati | 845,303 | 911,536 | 325 | 25,294,117 | 3,226 |
| **Greater Dayton Regional Transit Authority*** | Dayton | 559,062 | 404,694 | 131 | 7,857,361 | 2,040 |
| Connecticut Transit - Hartford Division | Hartford | 851,535 | 530,671 | 189 | 12,974,403 | 1,282 |
| Jacksonville Transportation Authority | Jacksonville | 827,453 | 637,053 | 179 | 10,489,396 | 3,419 |
| Central Oklahoma Transportation and Parking Authority (Oklahoma City) | Oklahoma City | 650,221 | 195,993 | 59 | 2,841,449 | 2,665 |
| Capital Area Transit (Raleigh) | Raleigh | 347,729 | 176,855 | 48 | 3,937,310 | 2,782 |
| Pioneer Valley Transit Authority (Springfield MA) | Springfield | 551,543 | 329,514 | 129 | 9,552,233 | 1,826 |
| Peer Average | | 663,753 | 532,743 | 166 | 14,947,626 | 1,734 |

* Bolded Systems have dedicated funding

In terms of population served, Nashville/Davidson County is smaller than the average of the peers in Table 4-1. In population ranking, it is 12th out of the 18 transit agencies in Table 4-1. In terms of population density, Nashville is 16th out of the 18 agencies shown. It's population density is 68 percent of the average for the peers.

## Peer Performance Comparisons

Public transportation is a public service and is not a profit making organization. Thus, the performance of a transit agency is not based on profit measures but rather on measures of its level of service and cost to the community. There are three different categories of performance measures normally considered in the industry—service effectiveness, cost effectiveness and cost efficiency.[i] These measures are computed as ratios to allow comparisons between agencies of different sizes.

Following are the three performance measures and the methods for computation of the measures.

- *Service effectiveness*: service effectiveness is a measure of the end result of the provision of transit—the rides provided to transit customers. A good measure of service effectiveness is:
    - *Passengers per vehicle hour* . This measure divides ridership over a fixed period of time by the total number of hours of service provided. This number includes all hours that bus drivers work, including time to pull buses in and out of the garage and layover time at the beginning and end of a route. Layover time is time allowed at the end of a route for buses to get back on schedule when they are running behind due to traffic, heavy ridership or other reasons. In comparing systems, a higher value of passengers per hour is preferable to a lower value, and indicates that service is being placed where it is well used. However, caution has to be exercised in comparing one route versus another since this value will drop when service is added, say, to correct overcrowding. Whenever there is a service change, time should be allowed for ridership to adjust before evaluating the service effectiveness. Passengers per vehicle mile is another common measure of service effectiveness.

- *Cost effectiveness: Cost effectiveness is a measure of how much it costs a transit agency to provide rides to* its customers. It can be measured by:
    - *Cost per passenger* . This measure is the cost of the MTA service for a period of time divided by the number of rides provided for that same period of time. For example, the NTD data provide summaries of cost per passenger per year. Generally, the smaller the cost per passenger, the better. Cost per passenger can be computed for different types of transit service by allocating costs between different types of service. This analysis focuses on costs for the fixed route service.
    - *Net cost per passenger*. This measure is the cost of the MTA service for a period of time less the fare revenues divided by the passengers carried. This is the cost that must be paid by other funding sources, such as local, state and federal sources.

- *Cost efficiency*: Cost efficiency is a measure of the cost of the resources provided by a transit agency (i.e. hours or miles of service). Cost efficiency is measured by:
    - *Cost per vehicle hour*. This is a simple measure of the cost to provide service divided by the hours of service provided measured over a period of time. The NTD provides yearly summaries of cost per hour. Cost per hour is a key measure of transit agency efficiency because most service costs are labor costs. Generally, the smaller the cost per vehicle hour, the better. Another common measure of cost efficiency is cost per mile.

There are other important measure which don't fit into the above categories including measures of cost recovery and per capita measures of service.

- Other measures
    - *Fare recovery ratio* (fare revenues/cost of service). This is the total sum of fares collected over a fixed period of time divided by the cost of the service provided over that same period of time. The higher the fare recovery ratio, the lower the net cost of service.
    - *Passenger trips per capita*. This is computed as the total ridership in a fixed period (usually a year) divided by the number of people living in the service area.
    - *Vehicle hours per capita*. This is computed as the total number of vehicle hours provided in a fixed period (usually a year) divided by the number of people living in the service area. This measure indicates the quantity of transit service provided to the service area.

Performance comparisons are helpful in providing clues to where a transit agency is doing well and where it might look to improve. A few states (North Carolina and New York, for example) use performance measures as part of a funding formula—so that better performing systems are rewarded. There are tradeoffs between some of these measures. For example, it is possible to be very cost efficient in the short-run by employing low paid workers, foregoing maintenance and so forth. But this is likely to reduce ridership and thus reduce passengers per capita over time. Also a transit agency should generally try to maximize ridership, but shouldn't provide service beyond what it can afford.

Table 4-2 shows how Nashville ranks among peer agencies on the selected performance measures for fixed route service as well as how its measure compares with the average. In Table 4-2, the ranking goes from 1 (best score) to 18 (worst score).

Table 4-2: Nashville Rank for Performance Measures (from 2006 NTD)

| Performance Measure | MTA Rank out of 18 (1 is best) | Nashville MTA Value | Peer Average |
|---|---|---|---|
| Passengers per vehicle hour | 6 | *23.8* | *22.3* |
| Cost per passenger | 10 | $3.58 | $3.38 |
| Net cost per passenger | 5 | $2.48 | $2.80 |
| Cost per vehicle hour | 16 | $85.07 | $73.78 |
| Fare recovery ratio | 4 | 28% | 18% |
| Passenger trips per capita | 13 | 13.4 | 17.1 |
| Service hours per capita | 15 | 0.5 | 0.7 |

A summary of all of the service performance measures for Nashville and the peer agencies is shown in Table 4-3.

Table 4-3: Service Performance Measures for Nashville and Peer Agencies (from NTD 2006)

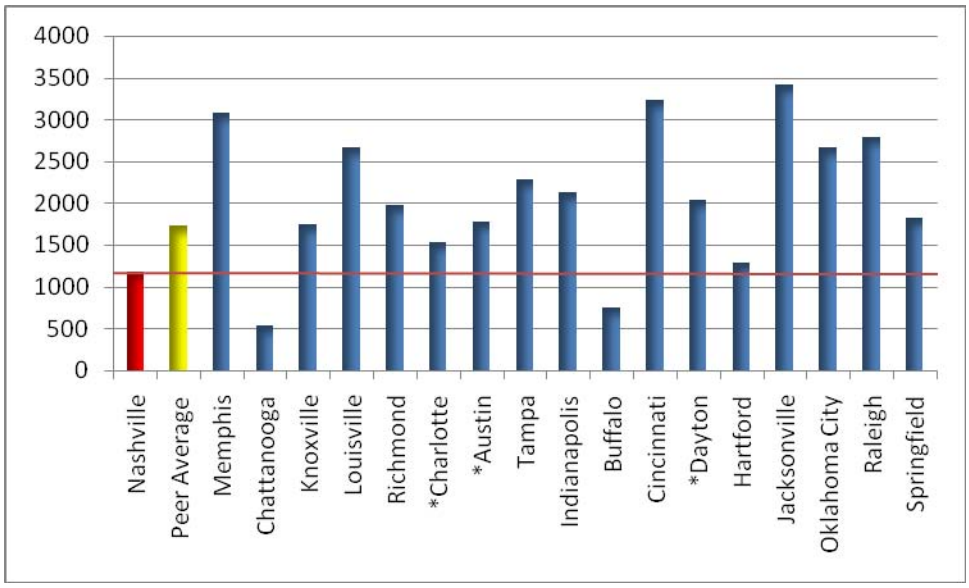
| Agency Name | Passengers per Vehicle Hour | Cost per Passenger | Cost per Vehicle Hour | Fare Recovery Ratio | Passengers per Capita | Service Hours per Capita |
|---|---|---|---|---|---|---|
| *Nashville Metropolitan Transit Authority* | *23.8* | *$3.58* | *$85.07* | *28.0%* | *13.4* | *0.5* |
| Memphis Area Transit Authority (MATA) | 22.3 | $3.58 | $79.95 | 20.9% | 11.8 | 0.5 |
| Chattanooga Area Regional Transportation Authority (CARTA) | 16.8 | $4.17 | $70.33 | 14.2% | 16.6 | 0.8 |
| Knoxville Area Transit | 14.5 | $3.82 | $55.37 | 7.7% | 18.8 | 1.2 |
| Transit Authority of River City (Louisville) | 22.9 | $3.34 | $76.68 | 13.3% | 19.4 | 0.8 |
| Greater Richmond Transit Company | 28.6 | $2.28 | $65.32 | 28.4% | 29.9 | 1.0 |
| **Charlotte Area Transit System*** | 23.7 | $3.26 | $77.33 | 17.0% | 30.0 | 1.2 |
| **Capital Metropolitan Transportation Authority (Austin)*** | 30.5 | $2.97 | $90.83 | 4.8% | 34.9 | 1.1 |
| Hillsborough Area Regional Transit Authority (Tampa) | 19.6 | $3.91 | $76.55 | 20.6% | 20.6 | 1.0 |
| Indianapolis and Marion County Public Transportation (IndyGo) | 20.9 | $3.47 | $72.57 | 22.9% | 12.2 | 0.5 |
| Niagara Frontier Transportation Authority (Buffalo) | 21.4 | $4.18 | $89.58 | 25.9% | 15.3 | 0.6 |
| Southwest Ohio Regional Transit Authority (Cincinnati) | 27.7 | $2.88 | $79.93 | 33.0% | 29.9 | 1.0 |
| **Greater Dayton Regional Transit Authority*** | 19.4 | $4.13 | $80.26 | 18.2% | 14.1 | 0.7 |
| Connecticut Transit - Hartford Division | 24.4 | $3.20 | $78.23 | 28.5% | 15.2 | 0.6 |
| Jacksonville Transportation Authority | 16.5 | $5.14 | $84.59 | 13.6% | 12.7 | 0.7 |
| Central Oklahoma Transportation and Parking Authority (Oklahoma City) | 14.5 | $5.25 | $76.10 | 14.8% | 4.4 | 0.3 |
| Capital Area Transit (Raleigh) | 22.3 | $3.08 | $68.59 | 16.0% | 11.3 | 0.5 |
| Pioneer Valley Transit Authority (Springfield MA) | 29.0 | $2.41 | $69.94 | 20.9% | 17.3 | 0.6 |
| Peer Average | 23.4 | $3.38 | $79.13 | 19.1% | 18.8 | 0.7 |

* Bolded Systems have dedicated funding

A clearer picture of the peer comparisons can be seen with a graphical presentation. The following graphs show how Nashville MTA compares to the peer group in terms of population density as well as the six performance measures. In each of the graphs, Nashville's measure is shown in red, and the peer average is shown in yellow. A red horizontal line shows Nashville's measure for easy comparison with each of the peers. Transit systems with dedicated funding are indicated with an asterisk.

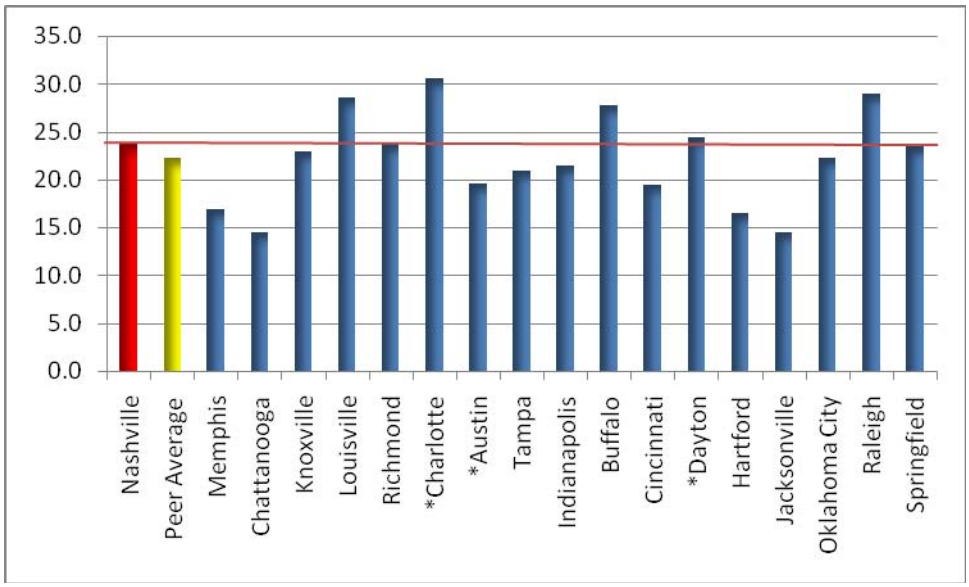
As can be seen in Figure 4-1, and as discussed previously, Nashville is among the least dense of the peer systems. Systems coming close to Nashville in density include Hartford (CT) and Charlotte (NC). Only Buffalo (NY) and Chattanooga (TN) are less dense within their service areas than Nashville. Density is important for transit because higher density of population means that more people can be within walking distance of transit service. Nashville MTA is thus more challenged than most of the peers due to the lack of density.

Figure 4-1: Population Density Comparison (persons/square mile)



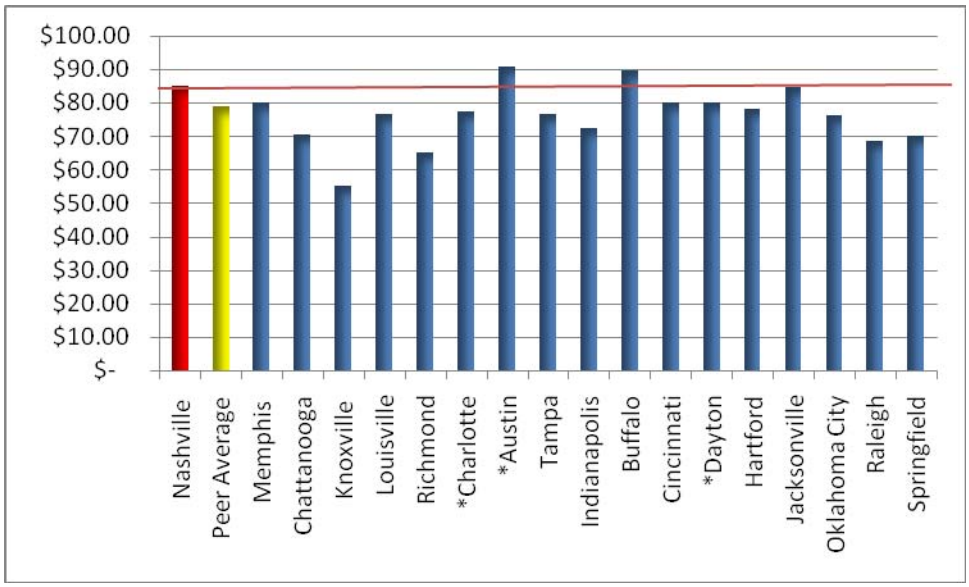
The Nashville MTA has been effective in putting service where there is demand for it as shown in Figure 4-2, which shows passengers per vehicle hour. This chart shows that Nashville has a higher level of service effectiveness than many systems that serve denser communities. For example, Nashville has a higher level of utilization than systems with much denser service areas such as Memphis (TN), Austin (TX), Tampa (FL), Indianapolis (IN), Cincinnati (OH) and Jacksonville (FL).

Figure 4-2: Passengers per Vehicle Hour




The MTA's cost per vehicle hour is among the highest of the peers (16 out of 18). This may be the cost of quality employees that help to bring about ridership growth and service effectiveness. Figure 4-3 shows the cost per vehicle hour comparison.

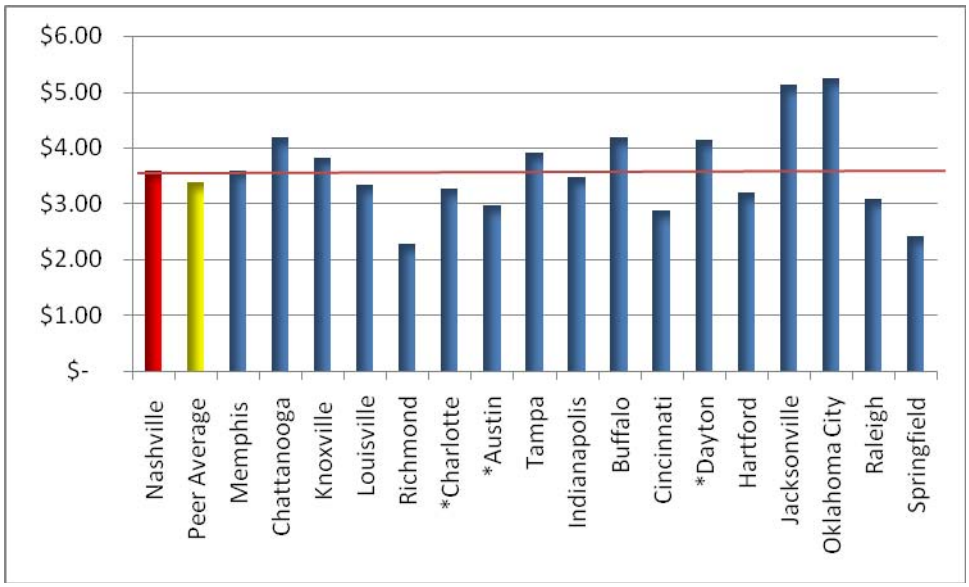
Figure 4-3: Cost per Vehicle Hour




The combined result of better than average service effectiveness (measured by passengers per vehicle hour) and higher than average costs per vehicle hour is a slightly higher average cost per passenger. The MTA average cost

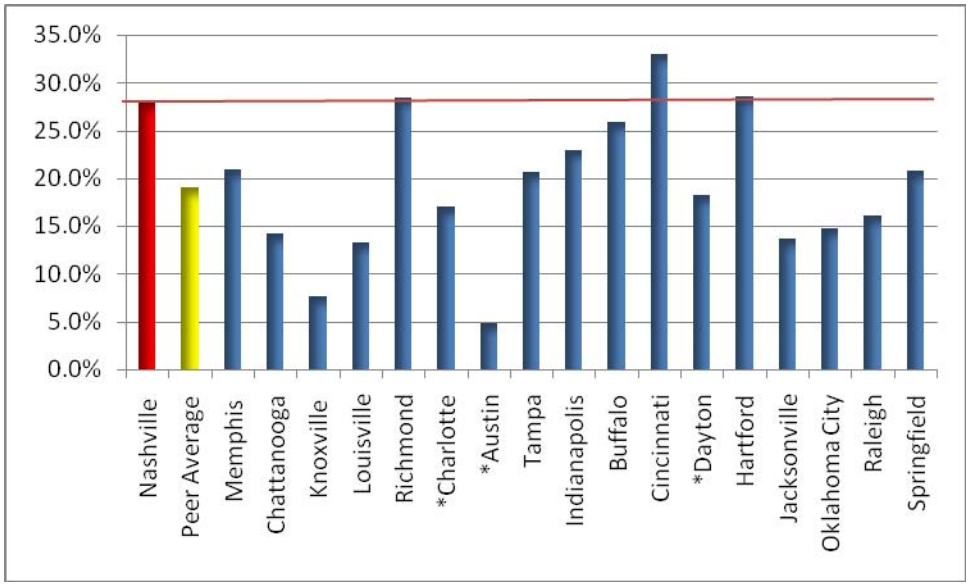
per passenger is around 6 percent above its peers. Referring back to Table 4-2, it comes close to the in the middle of the ranking (10 out of 18). Figure 4-4 shows this graphically.

Figure 4-4: Cost per Passenger



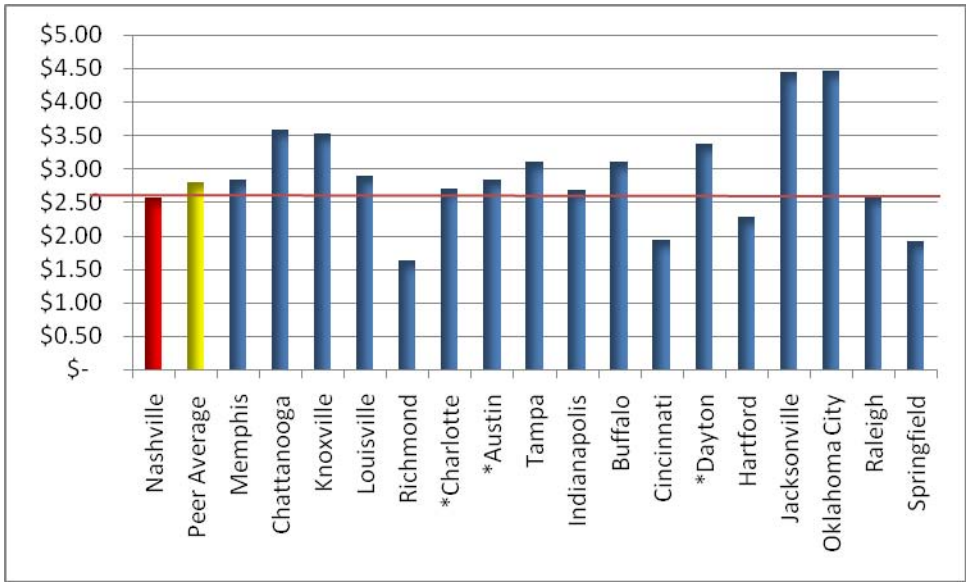

The MTA collects a higher percent of its cost of service in fares from passengers than its peers. On average it collected 28 percent of the cost of service in 2006 in fares versus 18 percent for its peers. Figure 4-5 shows this fare recovery ratio comparison.

Figure 4-5: Fare Recovery Ratio



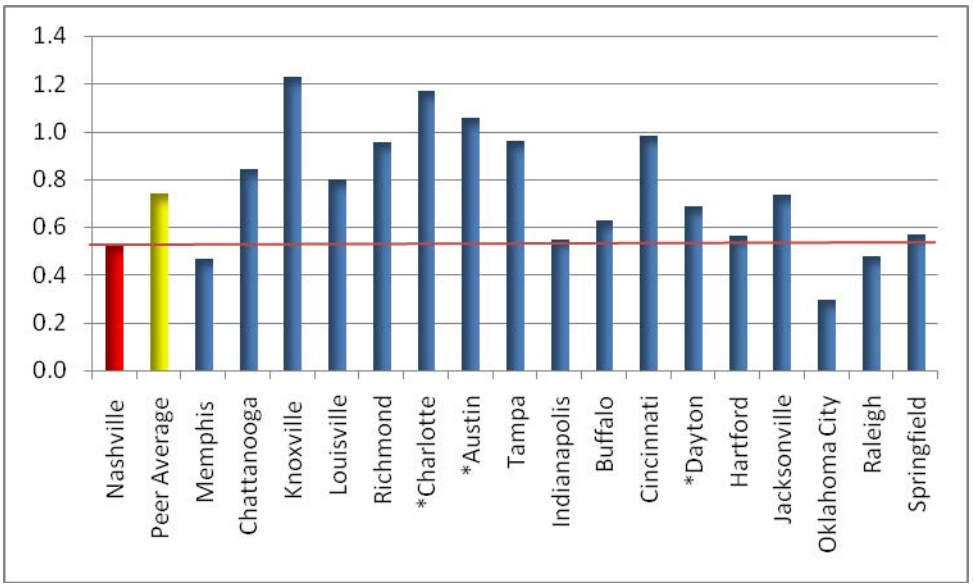
The result of the higher fare recovery ratio means that the MTA's net cost per passenger is lower than the majority of its peers (ranked 5 out of 18). This means that the proportion of the cost of service that has to be subsidized by taxpayers is less in Nashville/Davidson County than in peer areas. Figure 4-6 shows the net cost of service per passenger comparison.

Figure 4-6: Net Cost per Passenger



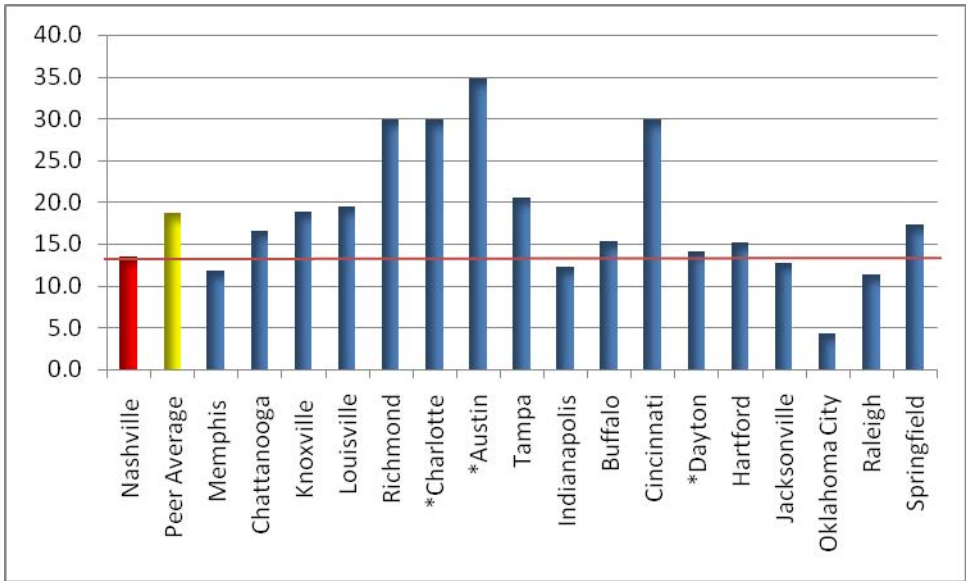

While the MTA does a good job with the service it does provide, its offerings are limited by budgetary considerations. Compared to peer areas, the MTA ranks only 15 out of 18 in terms of hours of service provided per person in the service area. Its peers on average provide 40 percent more hours of service per person than the MTA. Figure 4-7 shows this comparison.

Figure 4-7: Service Hours per Capita



Because the MTA puts service where it is best utilized, it's ranking in passenger trips per capita is higher than its ranking in service hours per capita. It ranks 13 out of 18 in passenger trips per capita. It's peers provide around 28 percent more rides per person in the service area than does the MTA. Figure 4-8 shows this comparison.

Figure 4-8: Passenger Trips per Capita



## Peer Funding Comparisons

The NTD can also be used to compare funding of transit in different areas around the United States. The data provide detail on funding coming from various sources as well as the fare revenues. Table 4-4 shows the funding amounts by source for Nashville and its peer agencies. By normalizing the information by the number of people in the service area, the tax burden of local funding sources can be seen. At the same time, these graphs show the tax benefit coming to the area for public transportation from state and federal sources. Note that the funding information is for all services provided including both fixed route and paratransit services. Note that in Table 4-4 and Figure 4-9 Charlotte shows no federal funding for operations as it is using all of its federal funding for capital investment. Also note that the sum of fares, local, state and federal sources do not necessarily equal the total cost of operations. In addition to these sources there are other sources of funds, and there may be operating surpluses or deficits.

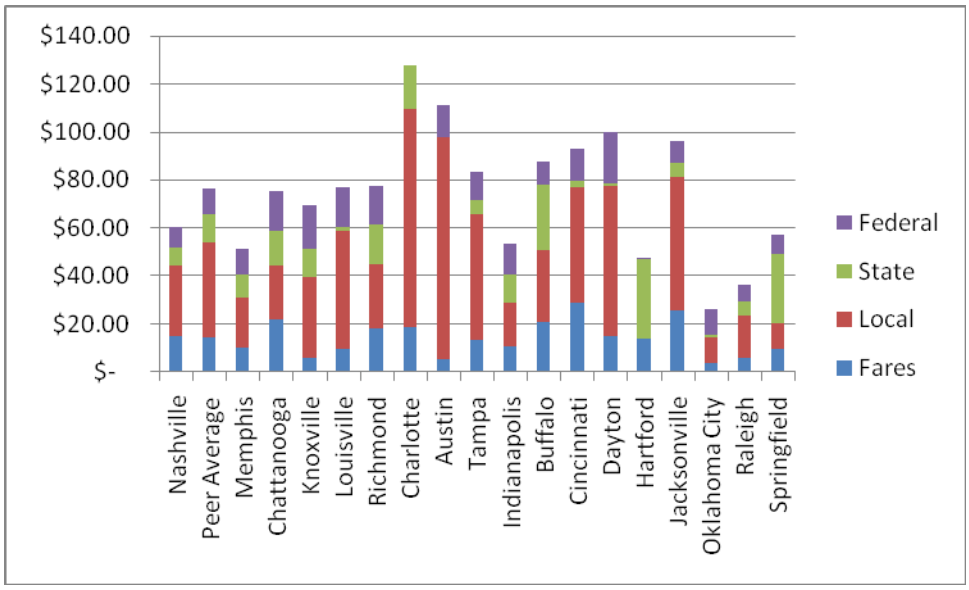
Table 4-4: Funding for Operations by Source for Nashville and Peer Agencies on a Per Capita Basis

| Agency Name | Fares per Capita | Local Funding per Capita | State Funding per Capita | Federal Funding per Capita | Total Operating Cost Per Capita |
|---|---|---|---|---|---|
| *Nashville Metropolitan Transit Authority* | $14.75 | $29.83 | $7.18 | $8.71 | $62.56 |
| Memphis Area Transit Authority (MATA) | $10.24 | $20.67 | $9.72 | $10.50 | $51.71 |
| Chattanooga Area Regional Transportation Authority (CARTA) | $21.80 | $22.58 | $14.40 | $16.65 | $82.27 |
| Knoxville Area Transit | $6.03 | $33.50 | $11.71 | $18.09 | $79.82 |
| Transit Authority of River City (Louisville) | $9.53 | $49.48 | $1.27 | $16.49 | $78.70 |
| Greater Richmond Transit Company | $18.19 | $26.64 | $16.83 | $15.81 | $79.94 |
| **Charlotte Area Transit System*** | $18.52 | $90.93 | $18.41 | $0.00 | $145.07 |
| **Capital Metropolitan Transportation Authority (Austin)*** | $5.60 | $92.23 | $0.00 | $13.40 | $130.64 |
| Hillsborough Area Regional Transit Authority (Tampa) | $13.52 | $52.16 | $5.97 | $11.91 | $89.07 |
| Indianapolis and Marion County Public Transportation (IndyGo) | $10.53 | $18.44 | $11.54 | $13.01 | $55.77 |
| Niagara Frontier Transportation Authority (Buffalo) | $20.72 | $30.19 | $27.23 | $9.55 | $88.46 |
| Southwest Ohio Regional Transit Authority (Cincinnati) | $29.00 | $48.15 | $2.70 | $13.07 | $96.33 |
| **Greater Dayton Regional Transit Authority*** | $15.19 | $62.06 | $1.15 | $21.30 | $103.50 |
| Connecticut Transit - Hartford Division | $13.91 | $0.00 | $33.23 | $0.66 | $48.75 |
| Jacksonville Transportation Authority | $25.52 | $55.47 | $5.90 | $9.14 | $98.79 |
| Central Oklahoma Transportation and Parking Authority (Oklahoma City) | $3.76 | $10.80 | $0.95 | $10.64 | $26.28 |
| Capital Area Transit (Raleigh) | $5.67 | $17.59 | $6.10 | $6.79 | $36.70 |
| Pioneer Valley Transit Authority (Springfield MA) | $9.69 | $10.71 | $28.53 | $8.34 | $56.35 |
| Peer Average | $14.50 | $39.49 | $11.60 | $10.66 | $80.63 |

* Bolded Systems have dedicated funding

Figure 4-9 provides a picture of the funding per capita by source for the Nashville MTA and the peers on average, as well as for each of the peers. Figure 4-9 makes clear the advantage of having a dedicated source of local funding. The top three agencies in terms of total funding per capita and local funding per capita have a dedicated local sales tax. Austin (TX) has a dedicated 1 cent sales tax; Charlotte (NC) has a ½ cent sales tax; and Dayton (OH) has a ½ cent sales tax. The MTA's peers have around a third more local funding per capita than the MTA.

Figure 4-9: Funding per Capita by Source




## Summary of Findings

The peer analysis provides insight into the performance challenges and successes of MTA. Nashville MTA is challenged due to the lower density of population in our service area compared to many of ithe 17 peer agencies and compared to many of the top 100 transit agencies in the United States. MTA is also challenged due to the lower level of funding per capita compared to many of our peers. This lower funding level means that MTA provides less service (as measured by service hours per capita) than peer agencies taken together.

On the other hand, MTA has done a good job of putting service where it can be best used. The result is that MTA provides a higher level of service effectiveness than the peer average as measured by passengers per vehicle hour. Passengers have also been paying a higher percentage of the cost of service in Nashville/Davidson County than those in peer regions. The cost per hour of MTA service is higher than the peers, but since MTA carries a higher number of passengers per hour and those passengers pay a higher fare on average, the subsidy cost per passenger is less than the average for the peers.

Overall, the peer comparison shows that Nashville MTA is effectively using available resources, but that there is much more room to grow service overall. Nashville is a growing metropolitan area and our transit system will need to grow significantly in order to provide a better level of service (and alternative to the automobile) for the citizens of Nashville/Davidson County and the larger region.

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[i] Based on a conceptual model developed by Fielding, G. J., R. Glauthier and C Lowe, "Performance Indicators for Transit Management," Transportation, 1978, Vol. 7. No 4, pp. 365-378.

# Chapter 5 Service Delivery Policy and Implications

One of the critical steps in the preparation of a *Strategic Transit Master Plan* is the articulation of the objectives to be served by the transit system, together with the identification of supporting standards that can be used to measure the extent to which the objectives are attained. The objectives and standards provide the basis for assessing the performance of the existing transit service, identifying unmet transit service needs, designing and evaluating alternative transit system plans, and recommending service changes and improvements. A *Service Delivery Policy* which articulates MTA objectives and standards is provided in Appendix C.

In the application of the *Service Delivery Policy*, several overriding considerations must be recognized. First, an overall evaluation of the MTA services must be made with consideration of the cost of service and available funding. Second, it must be recognized that the MTA is unlikely to fully meet all the standards. Third, it must be recognized that certain intangible factors may need to be considered such as the value of maintaining certain services regardless of performance or cost. The*Service Delivery Policy* is thus a guide to good practice, but can't be used to cover all circumstances.

The *Service Delivery Policy* defines MTA routes into 6 categories:

- *Most Frequent* – mostly corridor routes but some neighborhoods
- *Frequent* – mostly neighborhood routes
- *Commuter* or *Limited*
- *BRT* – a new category for Bus Rapid Transit
- *Downtown Circulator*
- *Flexible Route Services:* Service aimed at lower density neighborhoods that provides neighborhood circulation and connection to other MTA services. The service may have no fixed route, but may have fixed time-points.

The following sections discuss the implications of applying the *Service Delivery Policy* to the current MTA service in terms of temporal availability, geographic availability, and cost and service effectiveness standards.

## Temporal Availability

Table 5-1 on the next page shows the goals and standards for temporal availability from the *Service Delivery Policy*.

Table 5-1: Proposed Span of Service and Service Frequency by Service Class

| Service Class | Span of Service | Minimum Frequency | Goal Frequency | Goal for Hours of Service Provided |
|---|---|---|---|---|
| **Most Frequent** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 30 minutes | 15 minutes | 18 Hours |
| | Midday (9am – 3pm) | 30 minutes | 20 minutes | |
| | Evening | 60 minutes | 30 minutes | |
| | Saturday | 60 minutes | 30 minutes | 18 hours |
| | Sunday | 60 minutes | 30 minutes | 12 hours |
| **Frequent** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 60 minutes | 30 minutes | 17 Hours |
| | Midday (9am – 3pm) | 60 minutes | 45 minutes | |
| | Evening | 60 minutes (if service is provided) | 30 minutes | |
| | Weekends | 60 minutes (If service is provided) | 30 minutes | 17 Hours Saturday, 10 hours Sunday |
| **Commuter** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 30 minutes | 30 minutes | 6 Hours |
| **Circulator** | Daytime (Monday-Friday 6:30am--8pm) | 10 minutes | 10 minutes | 17 Hours |
| | Evenings (8pm to 11:30pm) | 15 minutes | 10 minutes | |
| | Saturday and Sunday | 15 minutes | 10 minutes | 8 Hours |
| **BRT** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 10-15 minutes | 10-12 minutes | 18 Hours |
| | Midday (9am – 3pm) | 15-30 minutes | 10-15 minutes | |
| | Saturday | 15-20 minutes | 10-15 minutes | 13 Hours |
| | Sunday | 30 minutes | 15 minutes | 13 Hours |
| **Flexible Route Services** | Weekdays (Monday-Friday 6am--8pm) | N/A | N/A | 14 Hours |
| | Saturday (10am – 8 pm) | N/A | N/A | 10 hours |

Table 5-2 following shows the analysis of current service versus the standards. Table 5-2 shows routes which would require service improvements to achieve the standards and the service period where these improvements would be needed. Note that many of the changes for improving service are in the off-peak as well as evening and on weekends. While these periods may seem less critical than peak hour service, they are an important part of making the MTA a viable alternative in Davidson County.

Table 5-2: Routes Needing Frequency Improvements to Meet Standards

| Route No. | Route Name | Proposed Service Class | Span of Service Needing Improvement | Current Frequency (in minutes) | Proposed Frequency (in minutes) |
|---|---|---|---|---|---|
| 2 | Belmont | Frequent | Weekday Midday | 70 | 60 |
| | | | Weekday Evening | 70 | 60 |
| 6 | Lebanon Road | Frequent | Weekday Midday | 90 | 60 |
| | | | Weekday Evening | 70 | 60 |
| 8 | 8th Avenue South | Frequent | Saturday | 60-120 | 60 |
| | | | Sunday | 60-120 | 60 |
| 18 | Airport/Elm Hill Pike | Frequent | Weekday Peak | 60-70 | 60 |
| | | | Weekday Midday | 65-75 | 60 |
| 23 | Dickerson Road | Most Frequent | Weekday Midday | 35 | 30 |
| 24X | Bellevue Express | Commuter | Weekday Peak | 20-45 | 30 |
| 28 | Meridian | Most Frequent | Weekday Midday | 50 | 30 |
| 33X | Hickory Hollow - Hickory Plaza Express | Commuter | Weekday Peak | 30-60 | 30 |
| 34X | Opry Mills Express | Frequent | All Hours | 80 | 60 |
| 35X | Rivergate Express | Commuter | Weekday Peak | 10-40 | 30 |
| 37X | Tusculum Express | Commuter | Weekday Peak | 90 | 30 |
| 38X | Antioch Express | Commuter | Weekday Peak | 25-60 | 30 |
| 41 | Golden Valley | Commuter | Weekday Peak | 60 | 30 |

## Geographic Availability

In evaluating the coverage provided by the Nashville MTA, the *Service Delivery Policy* is used as a guide. Below is an excerpt from the proposed standards on geographic availability. The following analysis examines the current geographical coverage as compared to the standards.

> The MTA will strive to serve as much of Davidson County as possible as long as the service meets cost and service effectiveness standards. This part of the service policy is characterized as guidelines rather than standards because uniform geographic coverage cannot always be achieved due to constraints such as topographical and street network restrictions. In addition, coverage in some areas may not be possible due to the infeasibility of modifying existing routes without negatively affecting their performance.
>
> *Geographic Availability* will have several parts:
>
> - *Distance to transit* – the area within a decent walking distance to the bus stop. Many cities define this as ¼ mile of a bus stop while others like Chicago use ¼ mile for high density and ½ mile for low density. Since the MTA service area has a low density (when compared to its peers and overall) the ½ mile standard will be used. Another industry standard is that a population density of around 3 dwelling units per acre is needed to justify fixed route transit, which translates to around 5000 people per square mile. The MTA will strive to provide transit service within a ½ mile to residents of areas with a population density of over 5000 persons per square mile. In determining whether such service can be offered, the MTA will consider other factors such as the likely performance of the service that might be provided. Request for service from such areas can be another indication of whether such service is needed.
> - *Pedestrian Access* – the ability of customers on foot to access transit. The pedestrian environment is an important component of the availability of transit since in most bus systems, 75%-80% of riders walk to transit. Lack of pedestrian access lowers the area of service coverage and potential ridership. Excellent pedestrian environment means available sidewalks, protection from traffic, safe crossings for roadways and a pleasant walking environment. Because an excellent pedestrian environment will encourage transit ridership, the 5000 persons per square mile standard cited above could be relaxed in areas with an excellent pedestrian environment. The MTA will strive to provide service within a ½ mile to residents of areas with an excellent pedestrian environment with a population density as low as 2500 persons per square mile. Service may be flexibly routed or fixed bus service.
> - *Transit Supportive Areas* – areas with densities and usage that support and encourage transit use, such as: universities, colleges, shopping centers, major employers, major destinations. The MTA will strive to provide transit service within ¼ mile to all universities, medical centers, major malls and employers with over 1000 employees. Service will be provided directly to the doors of these institutions whenever possible.
> - *Park and Ride Access* – Ridership for routes in areas of low density is driven by access to parking. The *Transit Capacity Manual* notes that park and ride facilities are most successful when they are at least five miles from the major destination. The MTA will strive to provide park and ride lots every 5 miles outside the Briley Parkway/I-40/I-440 where MTA has *Commuter* service.

*Residential Distance to Transit*

Figure 5-1 provides a picture of the population density of the MTA service area, but also shows the ½ mile buffers around the MTA routes. The darker beige block groups are those where the density of population was over 5000 persons per square mile in 2007. The pink block groups are those with population densities of between 2500 and 5000 persons per square mile.

The proposed geographic availability standard suggests that the MTA try to provide service within ½ mile for those areas with over 5000 persons per square mile. Examining Figure 5-1 for areas of population density greater than 5000, most such areas are covered by the MTA service. There are a few areas not completely within ½ mile of the service area, which are discussed below.

Two such areas are to the east of Gallatin Pike and just north of the new Madison Bus Link area. One is a reasonably dense residential area of mostly single family homes south of Anderson Lane and north of N. Dupont Avenue (#1 in Figure 5-1). The second is a multifamily home area north of Burwood Ave/E. Old Hickory Blvd. and to the East of Archwood Drive (#2).

There are several places where part of a block group of greater than 5000 persons per square mile falls outside the ½ mile buffer around MTA routes. In the most of these cases, however, the denser part of the block group appears to fall within the ½ mile buffer and/or it would not be feasible to move the route to serve the portion of the block group outside the buffer. (Not feasible means that it may not make sense to divert a route serving many people to ensure complete coverage given the ½ mile rule, or that there is not an appropriate street on which to provide service, or that it is likely that such a diversion would cause problems with productivity measures for the service.) One of these is east of Gallatin Pike in the vicinity of East Palestine Avenue(#3), where it appears that the denser area of the block group is actually inside the ½ mile buffer served Route 26 Gallatin Road. The Bellevue neighborhood is another where the southeast portion of one of the denser block groups is outside the ½ mile buffer for Route 3 West End (#4).

Another dense area falling outside the ½ mile buffer is an area between Routes 3 West End and 7 Hillsboro, part of the Hillsboro-West End area (#5).

There is also part of the block group south of Huntington on Route 37X Tusculum/McMurray Express which falls outside the service area for Route 37X Tusculum/McMurray Express in the area of the Villages of Brentwood (#6). Also, there is an area of greater than 5000 persons per square mile along Bell Road just north of J. Percy Priest Lake (#7). This area is quite some distance from the MTA service area may be infeasible to serve in a cost/effective manner.

A larger area of density greater than 5000 persons per square mile is south of I-440 between MTA Route 12 Nolensville Road and I-24. As of April 2009, some of this area receives service from MTA Route 72, Edmondson Pike Connector.

With these exceptions, there is good coverage by the MTA of these denser block groups, at least in the peak periods of the day.

Figure 5-1: Nashville MTA ½ Mile Route Buffers and 2007 Population Density (by Census Block Group)

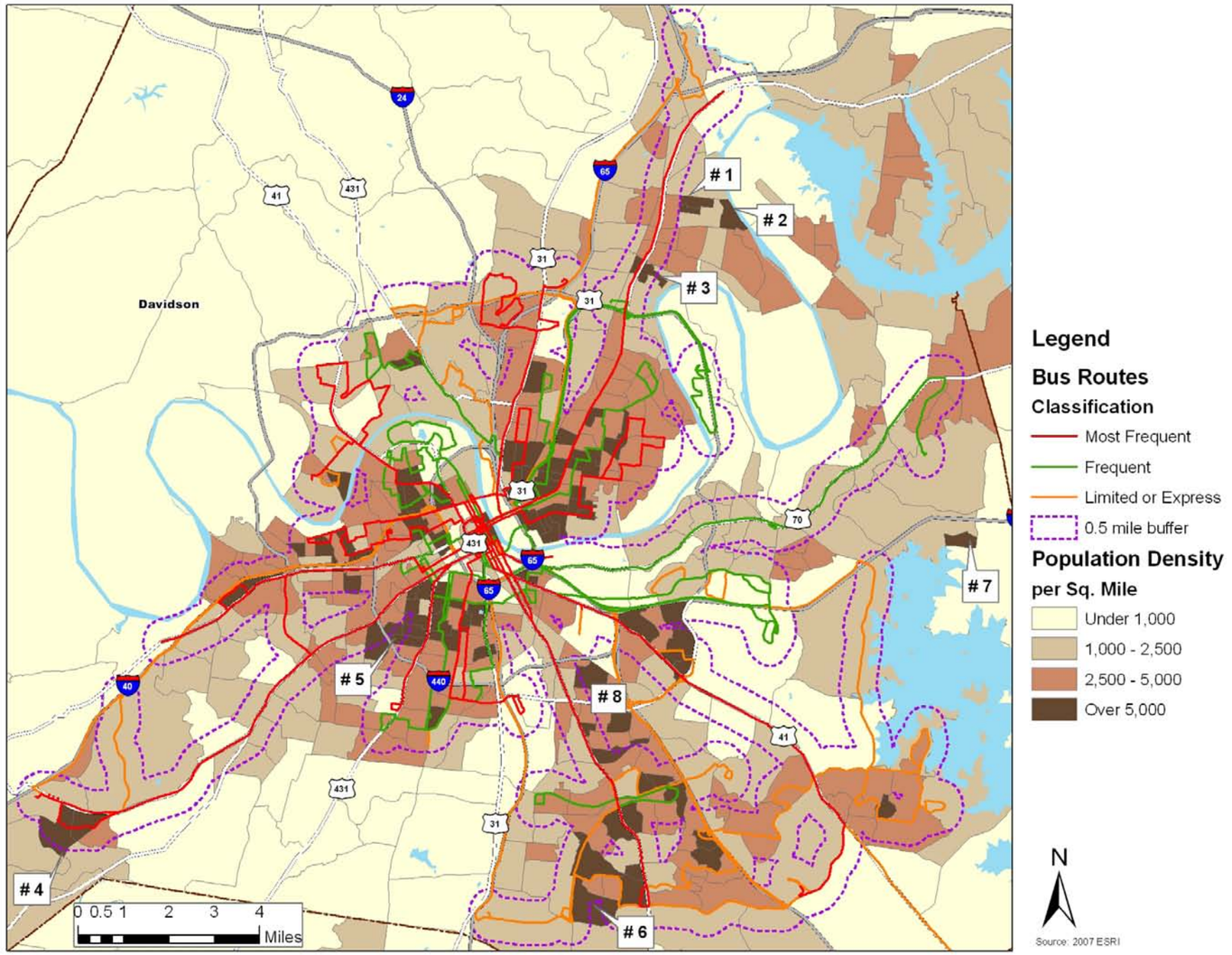
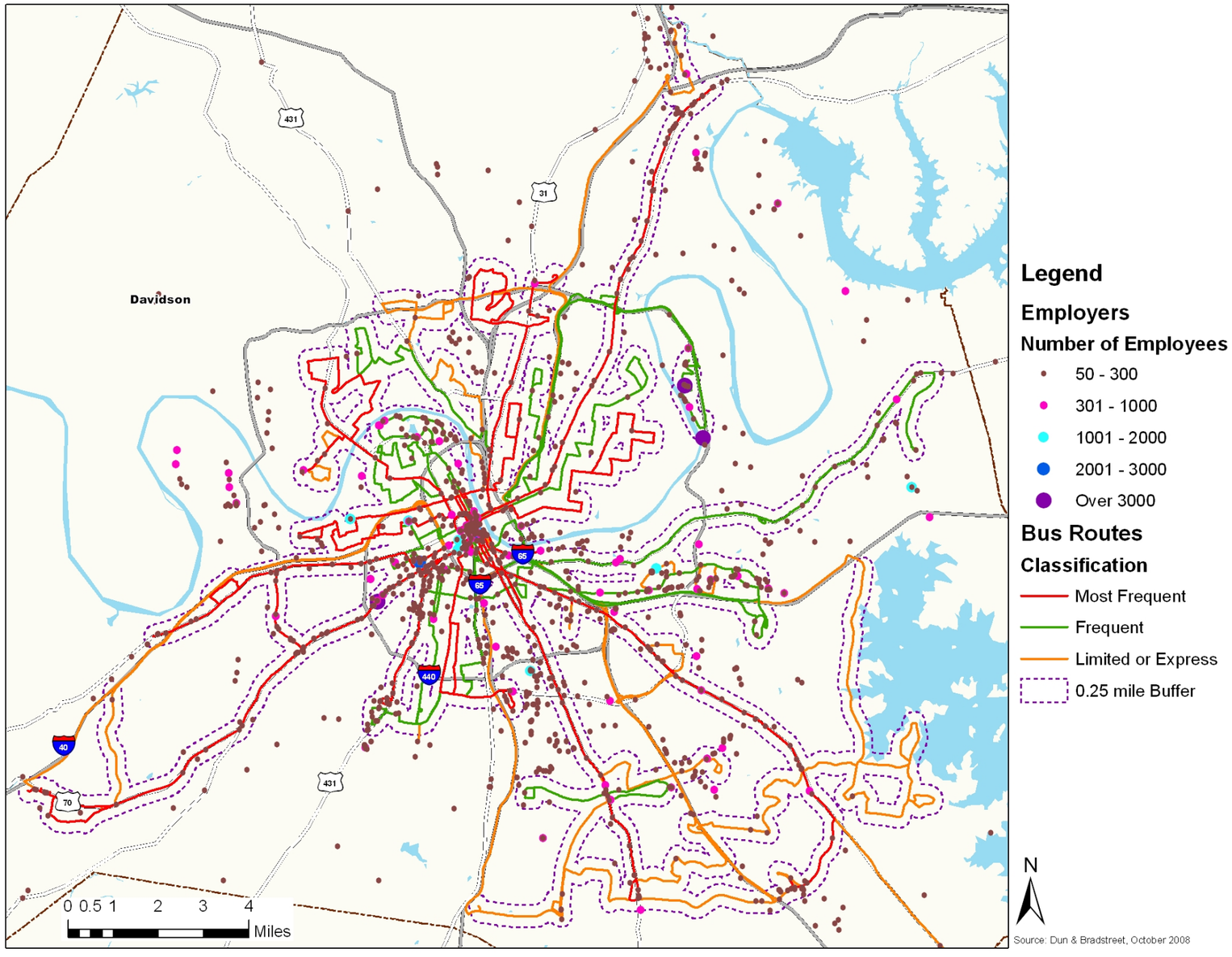


Figure 5-2: Nashville Employers and ¼ Mile Buffers for MTA Service




*Pedestrian Access*

MTA provides service to many areas with density of less than 5000 persons per square mile—and is doing so successfully. The criteria for guiding service expansion in such areas is to examine them for their pedestrian friendliness. That is, people are likely to walk further to reach MTA bus stops if there are good sidewalks and the route appears safe with regard to traffic conditions as well as general safety. The service guidelines say that if the MTA receives service requests from areas of less than 5000 and more than 2500 in density, it would be reasonable to examine walking conditions to determine whether service to such areas would be feasible.

*Transit Supportive Areas*

The *Service Delivery Policy* calls for serving those areas with densities and usage that support and encourage transit use, such as: universities, colleges, shopping centers, major employers, major destinations. It states that the MTA will strive to provide transit service within ¼ mile to all universities, medical centers, major malls and employers with over 1000 employees. Service will be provided directly to the doors of these institutions whenever possible. As will be seen, the MTA does an excellent job of reaching most all of these destinations.

Figure 5-2 provides a picture of all employer sites that have more than 50 employees and a quarter mile buffer around the MTA routes. Because these large employers also include universities, hospitals and retail areas, this map helps to locate these destinations as well as other employers. Figure 5-3 (from Metro planning data) shows particular destinations including colleges and universities, libraries and public schools.

As seen previously in Chapter 2, the MTA does a good job of serving employers in the region. Looking at ¼ mile boundaries around MTA routes, there appear to be only two employers who employ more than 1000 employees which are not within ¼ mile of the system. One such employer is the Summit Medical Center which is located in an otherwise low density area, therefore under current development conditions it would not be cost effective to provide service there. The other employer, formerly National Nephrology Associates,[1] is located south of I-440 to the west of Nolensville Pike. Since this location is within ½ mile of MTA Route 12 Nolensville Road (a *Most Frequent* route), serving it with a route diversion would most likely inconvenience more passengers than would be gained.

[1] National Nephrology Associates was purchased in 2004 by Renal Care Group which was itself purchased by Fresenius Medical Care in 2006.

Figure 5-3: Nashville Points of Interest and ¼ Mile Buffers for MTA Service

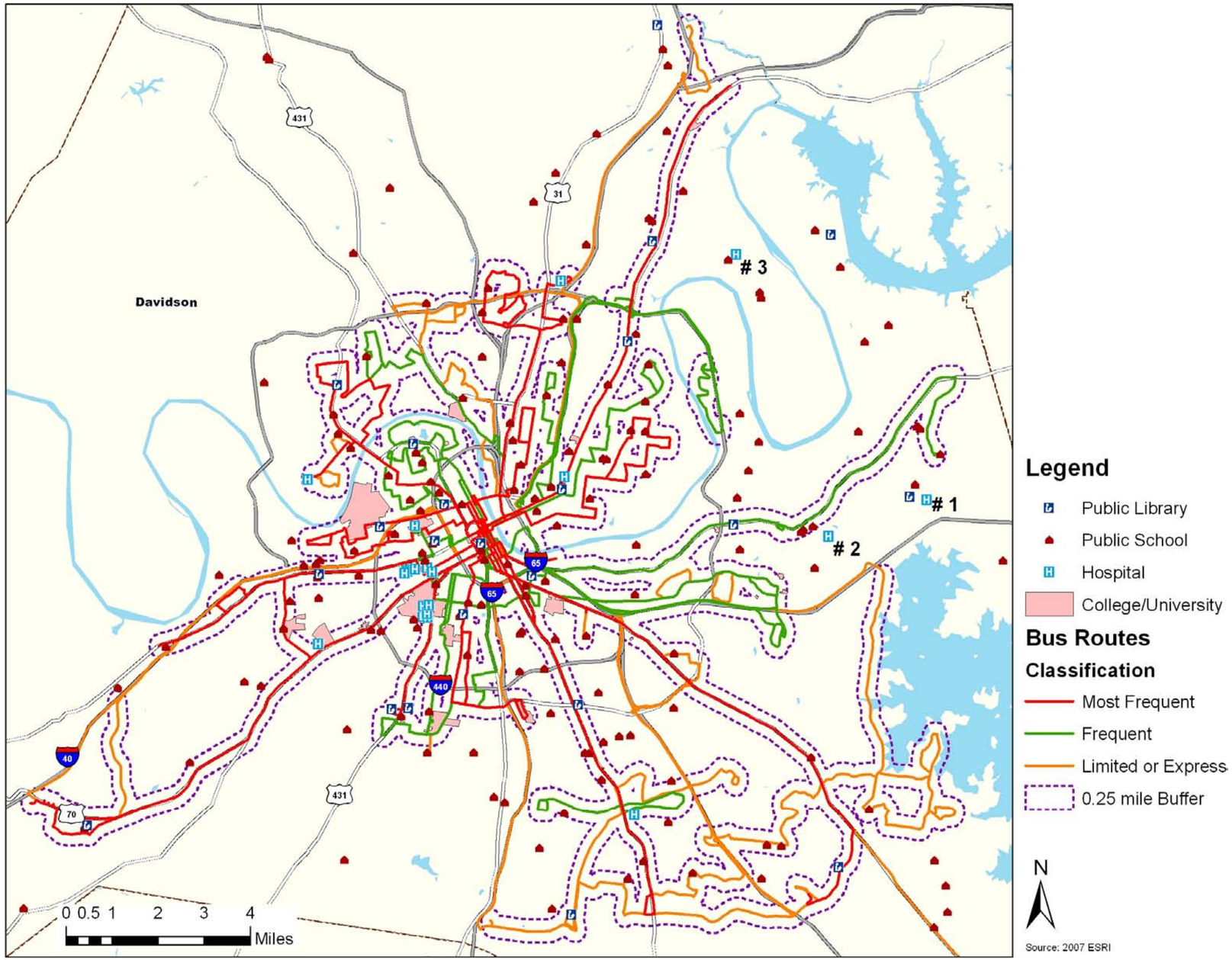



Figure 5-3 provides a picture of many of the specific destinations that will support transit use. Pink in Figure 5-3 indicates colleges or Universities. Most of these have MTA routes within ½ mile.

Hospitals are indicated on Figure 5-3 with a blue square and white H. Most hospitals are located on bus routes with the exception of three. Two of these are located south of Route 6 Lebanon Road. One is Summit Medical Center (#1 in Figure 5-3) off Frist Blvd. This is in an area of low residential density making it difficult for the MTA to serve and meet productivity standards. The second is the Middle Tennessee Middle Health Institute (#2). This is located near the Hickory Bend neighborhood with density between 2500 and 5000 persons per square mile.

A third hospital is Skyline Medical Center (#3) which is located over a mile east of MTA Route 26 Gallatin Road. The new Madison BusLink service connects Skyline Medical with MTA Route 26 Gallatin Road.

MTA also does a good job in serving retail areas in Davidson County. In fact, many routes end at retail stores and shopping malls, indicating that MTA has tried hard to reach these locations.

*Park and Ride*

The MTA has a set of 19 park and ride lots serving MTA *Commuter* routes and other routes in Davidson County. These are well spaced and generally follow the recommendation for lots approximately five miles outside the Briley Parkway. Most of the lots are not at capacity. Table 5-3 shows the utilization of the MTA park and ride lots.

Table 5-3: MTA Park and Ride Lot Utilization

| Route No. | Spaces Available | Spaces Occupied | % Full | Comments |
|---|---|---|---|---|
| Rivergate Mall | 100 | 60 | 60% | Served by 35X and could walk to 26 |
| Long Hollow Pike - K-Mart | 100 | 90 | 90% | Served by 35X only. |
| Bellevue Plaza | 40 | 22 | 55% | |
| Dollar General - Hickory Plaza | 40 | 10 | 25% | |
| Music City Star - Hermitage Station | 250 | 119 | 48% | Parkers at this lot could be riding either the train or the bus |
| Music City Star - Donelson Station | 200 | 73 | 37% | Parkers at this lot could be riding either the train or the bus |
| M.T.A. Bellevue Park-N-Ride | 75 | 60 | 80% | Served by Route 3 West End and 24X Bellevue Express |
| Hickory Hollow Mall | 100 | 60 | 60% | Served by Route 15 Murfreesboro Road and 33X Hickory Hollow Mall/Old Hickory Express |
| Hillwood Plaza | 30 | 12 | 40% | |
| Holiday Inn - Brentwood | 6 | 1 | 17% | |
| K-Mart - Madison | 100 | 34 | 34% | |
| Madison Square Shopping Center | 75 | 20 | 27% | |
| Smith Springs Church of Christ | 60 | 7 | 12% | |
| Southminster Presbyterian Church | 20 | 3 | 15% | |
| Staples - Bellevue - Park-N-Ride | 60 | 43 | 72% | Served by Route 3 West End and 24X Bellevue Express |
| Una Church of Christ | 80 | 6 | 8% | |
| Temple Church - Kings Lane | 80 | 0 | 0% | |
| Crieve Hall Church of Christ | 30 | 4 | 13% | |

At 90 percent utilization, the Goodlettsville lot is closest to capacity.

*The MTA Service Analyzer Software*

The coverage of the MTA service as described above is quite good, with only a few areas or destinations falling outside the guidelines of the proposed Service Delivery Policy. One of the products of the Nashville Strategic Master Plan is a ridership analysis software tool called the MTA Service Analyzer that can examine coverage of MTA service based on consideration of multiple variables including service frequency, travel patterns, and geographic location of population, employment and other attractors.

The MTA Service Analyzer provides MTA with the capacity to evaluate the service offered more critically than most other transit agencies are able to do. For example, it can look at a particular Traffic Analysis Zones (TAZ) within Davidson County and compare MTA service with auto travel to that TAZ for all forecasted trips from around the county. This comparison takes into account the MTA service frequency as well as transfer time. While the current model is set up to look at peak period service on weekdays for 2006, it could make the same comparison in off-peak, on weekends, or for future years when the 2035 travel forecasts are available. The MTA Service Analyzer can also look at income in doing this analysis, so that it can highlight when lower income groups are being served well or poorly.

*Summary of Geographic Analysis*

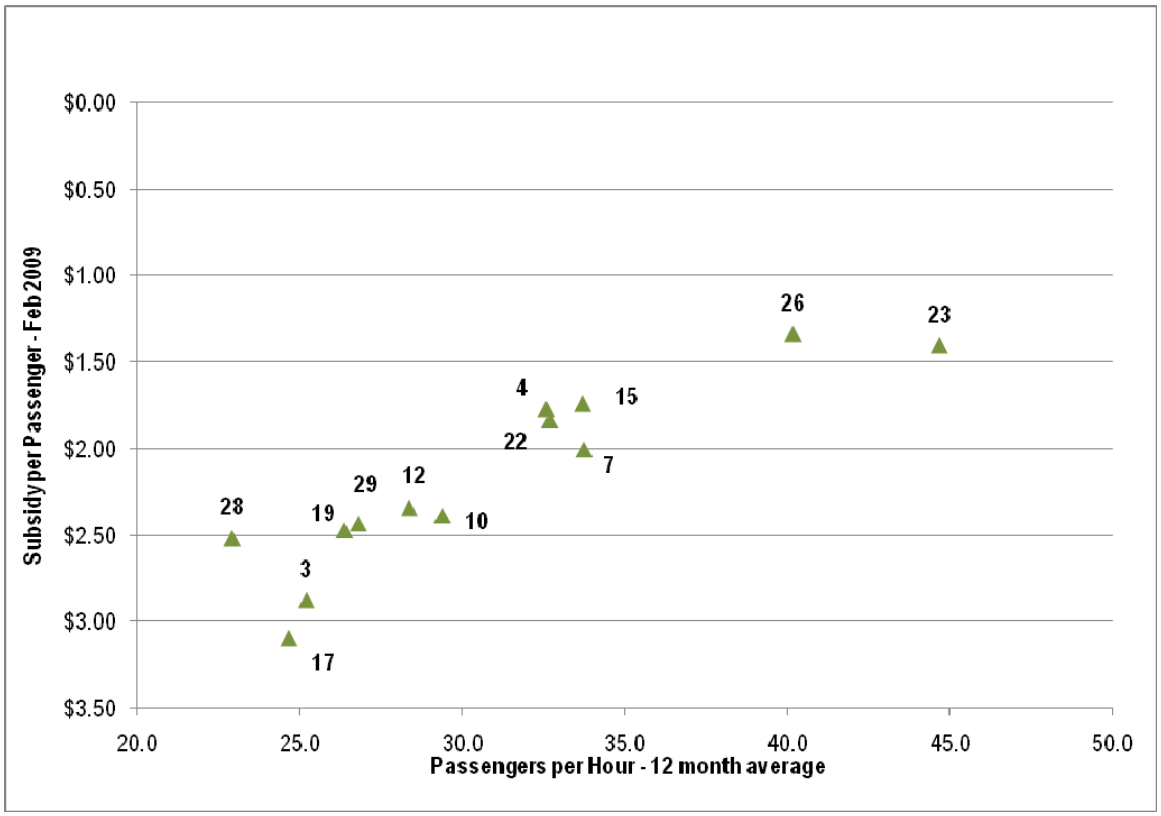
The data on population and employment in Nashville/Davidson County indicate an area that has been growing for several decades and that is expected to continue to grow through 2030. An analysis of population from 2007 ESRI data, employment from 2008 Dun and Bradstreet and land-use data from Metro planning show that the MTA routes do a good job of providing service for the areas of highest population density, lower median incomes, lower auto ownership levels, larger employers, and key destinations such as hospitals and universities.

However, as Nashville Davidson County continues to grow, and particularly as the population density increases in outer areas, the MTA will continue to consider route extensions or new commuter routes with park and ride lots to meet the transit needs of the county.

## Cost Effectiveness and Service Effectiveness Standards

The cost effectiveness and service effectiveness standards are important for showing how well MTA service has been tailored to fit the demand for service in Davidson County. Following are graphs showing the service and cost effectiveness of the different routes by route class. Figure 5-4 shows the measures for the *Most Frequent* routes.

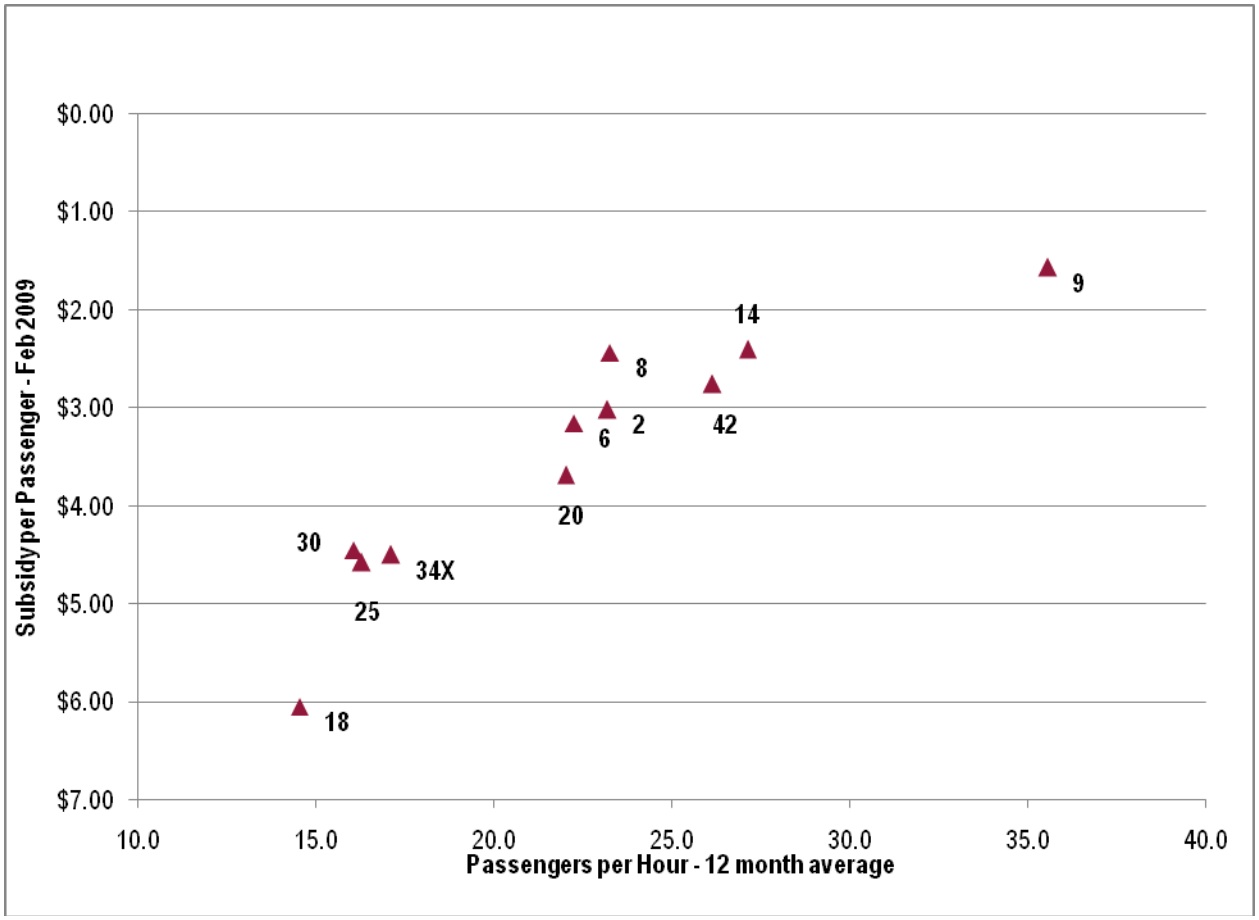
Figure 5-4: Cost and Service Effectiveness of the Most Frequent Routes (Numbers Indicate Route)




The further to the right and to the top of Figure 5-4, the more effectively the route is performing. As can be seen, best performing *Most Frequent* routes are Route 26 Gallatin Road, with the lowest subsidy per passenger, and Route 23 Dickerson Road, with the highest passengers per hour. The poorest performing *Most Frequent* route in terms of passengers per hour was Route 28 Meridian. The route with the highest subsidy per passenger is Route 17 12th Avenue South.

Figure 5-5 shows service effectiveness for the *Frequent* routes and Figure 5-7 for the *Limited* or *Commuter* routes. Note that the measure used for the *Commuter* routes is a cost per trip.

Figure 5-5: Cost and Service Effectiveness of the Frequent Routes




As can be seen in Figure 5-5, the *Frequent* route with the highest passengers per hour and the lowest subsidy per passenger is Route 9 MetroCenter. The service effectiveness analysis would indicate that Route 9 MetroCenter could be made a *Most Frequent Route* as it would score in the middle of the pack in the *Most Frequent* category.

The route with the lowest passengers per hour and the highest subsidy per passenger is Route 18 Airport/Elm Hill Pike. This route could play an important role in connecting the airport to downtown Nashville. Hourly service is probably not attractive enough for airport travelers and Route 18 Airport/Elm Hill Pike is not quite hourly. Remedial steps are needed for this route following the *Service Delivery Policy* process.

Figures 5-6 and 5-7 show service and cost effectiveness for *Commuter* routes. As can be seen, these two charts show similar results. The *Commuter* route with the highest number of riders per trip is the 38X Antioch Express and the route with the highest passengers per hour and lowest subsidy per passenger is the 35X Rivergate Express. Several more of MTA's *Commuter* routes are impressive because they have high levels of passengers per trip even with traveling somewhat circuitous routes to pick up passengers.

Figure 5-6: Cost and Service Effectiveness of the Commuter Routes (Passengers per Hour)

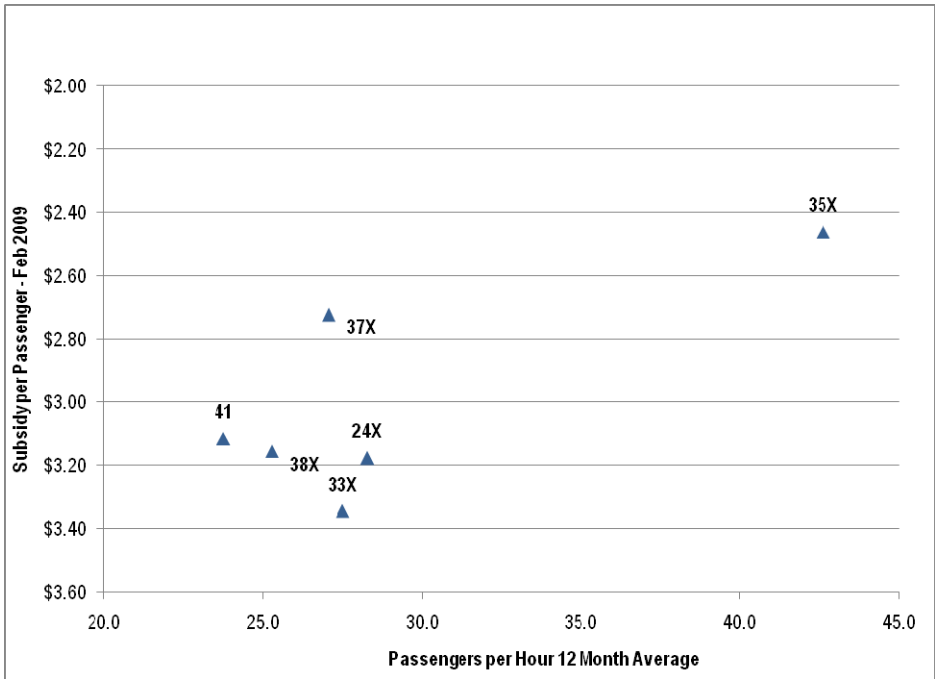
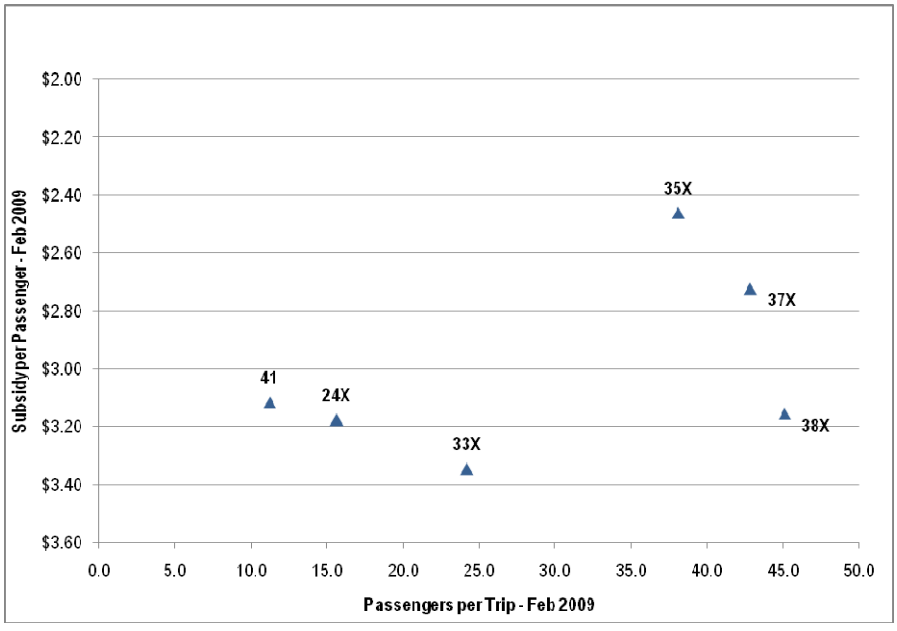



Figure 5-7: Cost and Service Effectiveness of the Commuter Routes (Passengers per Trip)




The route with the highest subsidy per passenger is 33X Hickory Hollow Mall/Old Hickory Express, which is probably due to a combination of long deadhead travel time and moderate loadings. The lowest number of passengers per trip

is Route 41 Golden Valley. Route 41 Golden Valley might benefit from a park and ride lot to help collect passengers as well as measures to increase the speed of service.

When all of the routes are compared in terms of passengers per hour and subsidy per passenger, the top and bottom 10 percent are shown in Table 5-4 for each effectiveness measure. Those routes that should be the focus of an effort to improve effectiveness include Route18 Airport/Elm Hill Pike, Route 25 Midtown, Route 30 McFerrin and Route 34X Opry Mills Express. This would start with getting detailed counts by time of day to determine the usage patterns, and seeking input from the customer surveys and drivers. It might also include the distribution of flyers to homes near the routes and/or free ride tickets to boost awareness of the routes.

Routes that should be examined for frequency and speed improvements include Route 26 Gallatin Road, Route 23 Dickerson Road, Route 35X Rivergate Express, and Route 9 MetroCenter.

Table 5-4: Service and Cost Effectiveness for Top and Bottom MTA Routes

| Top Routes for Highest Passengers per Hour | Top Routes for Lowest Subsidy per Passenger |
|---|---|
| 23 Dickerson Road | 26 Gallatin Road |
| 35X Rivergate Express | 23 Dickerson Road |
| 26 Gallatin Road | 9 MetroCenter |

| Lowest Routes for Passengers per Hour | Lowest Scoring Routes for Subsidy per Passenger |
|---|---|
| 18 Airport/Elm Hill Pike | 18 Airport/Elm Hill Pike |
| 30 McFerrin | 25 Midtown |
| 25 Midtown | 34X Opry Mills Express |

## Summary

Chapter 5 showed the analyses that results from using the *Service Delivery Policy* as a guide to find ways to improve MTA service. The recommendations coming from this analysis are based mostly on making frequency improvements as well as finding ways to improve service and cost effectiveness for some routes.

In the case of Route 18 Airport/Elm Hill Pike and Route 34X Opry Mills Express, the temporal standards are in conflict with the effectiveness standards—that is the temporal standards would say to increase service on these routes while the effectiveness standards might say there is too much service. Route 18 Airport/Elm Hill Pike is one that would need to be restructured to make 60 minute headways—but even that improvement may not be attractive enough for airport visitors. Route 34X Opry Mills Express also should be looked at closely to determine if there are ways to improve the service to attract more riders, prior to making frequency improvements.

The advantage of applying the *Service Delivery Policy* is that it results in a constant process of service improvement. Each period, the lowest performing routes for both service and cost effectiveness are reviewed to determine possible ways to improve performance The use of MTA's existing procedures for collecting customer information combined with new information from the Automatic Passenger Counters and the MTA Service Analyzer can help bring more creative solutions to improve service.

# Chapter 6 Regional and MTA Goals and Priorities

The *Strategic Master Plan* provides a long range guide to MTA for investment in resources which take time to accumulate including infrastructure, customer loyalty, a good public image and excellent employees. In concert with the Metropolitan Government of Nashville-Davidson County (Metro), the Nashville Area Metropolitan Planning Organization (MPO), Cumberland Region Tomorrow (CRT), the Nashville Regional Transit Authority (RTA), the Mid Cumberland Human Resource Agency (MCHRA) and other organizations concerned with regional transportation, the MTA will strive to serve and encourage corridors of transit friendly land use—higher density residential and employment areas, pedestrian friendly environments and a mix of destinations. In addition, with the passage of the Enabling Legislation for Dedicated Funding, MTA will work with in concert with these entities towards establishing a dedicated funding stream in order to expand and improve services. The *Strategic Master Plan* lays out the short, mid-term and long-term programs and projects that help to reach the regional longer term goals.

This chapter addresses both the MTA goals as well as the transportation goals of the region, of which MTA is a significant player. Through the public outreach in this project, many comments were received about the desire to get to places outside of Metro/Davidson County. This indicates the nature of travel in regions – while it may start in one defined service area, the destination may be on the other side of a geographic boundary that is not served. Important economic hubs like Franklin/Cool Springs, Smyrna/Murfreesboro/MTSU, and Hendersonville/Gallatin require mobility connections to Metro. For the most part, these connections cannot be made today. They are not expressly the concern of MTA today given the geographic boundaries of the service area, but the ability to connect throughout the region is increasingly an issue. As the region wrestles with potential solutions to regional mobility and funding transit service, MTA should be an active participant in the dialog. The future of transit in the Nashville metropolitan region is bright. There is active discussion and political leaders are coalescing in support of regional transit funding and service.

## Regional Transportation Goals from the Long Range Transportation Plan and Corridor Studies

In this section, the goals of the Regional 2030 Long Range Transportation Plan are reviewed for their relationship to the long range direction of the MTA. This section also reviews the many corridor studies that the region has been involved in. These all will have some impact on MTA, from the potential to share right-of-way or provide higher capacity services in a corridor to the potential need to interface with suburban services.

Although MTA serves Nashville/Davidson County, it plays a role in the larger region. It does this by providing services that go beyond Davidson County such as Route 96 to Murfreesboro, and by overseeing the service of the Regional Transit Authority including the Music City Star, the region's initial foray into regional rail transportation. Given that Nashville is the center of the region, and that the need for transit service does not stop at the Davidson County line, there is potential for MTA to be a part of a greater regional system or for the MTA to play a larger, more regional role, in the future.

The Nashville Area Metropolitan Planning Organization (MPO) has taken a lead in looking at a future vision that emphasizes alternative modes like public transportation, and it is sponsoring studies that look out into the future. Following is a discussion of regional goals and corridor studies sponsored by the MPO.

### *The Regional Vision*

The region has endorsed goals for the future that aim towards more focused development that would be transit friendly:[i] As the MPO develops updated versions of the Long Range Transportation Plan, MTA should remain engaged in the process. As is appropriate for regional goals, the MPO Long Range Plan goals are very general and should be relatively easy for the MTA to work within. The more that local and regional goals align, the easier coordination is to accomplish.

The text boxes below and on the next page state the goals and objectives from the Long Range Transportation Plan which support public transportation and transit supportive land use and development.

Goal 1: Link Land Use & Transportation

*Encourage local governments to develop land use policies and plans that enhance the quality of life and that recognize the relationship between land use and the transportation system.*

- Enhance the residential and economic environment and reduce travel demand by clustering development, encouraging mixed-use development, and ***providing alternatives to the automobile for short trips***.
- Maximize the use of existing roadways and minimize the need for new roadways through measures such as ridesharing, ***transit service***, and HOV lanes.

Goal 2: Regional Mobility through a Multi-modal System

*Achieve enhanced mobility by providing an intermodal and multimodal transportation system that supports safe, efficient and convenient travel options for the movement of people and goods.*

- Acknowledge and address the wide range of trip needs by the public and offer a reasonable ***choice of transportation alternatives*** to the low occupancy vehicle to satisfy these needs:
    - Provide pedestrian walkways and bikeways and integrate them into the region's transportation system;
    - Devise ways to accommodate frequent short trips, such as ***shuttles*** and pedestrian walkways, in high density activity centers such as the central business district and suburban residential, retail, and office centers.

Goal 2: Regional Mobility through a Multi-modal System (continued)

- Enhance and encourage intermodal travel by:
    - integrating ***local public ground transportation*** with intercity travel facilities such as airports and bus terminals;
    - ***Improving the operation of transportation modes*** competing with low occupancy automobiles through traffic management techniques such as queue bypass lanes for buses, HOV lanes and priority parking for high occupancy vehicles.
- ***Promote the development of an effective transit system in the five-county region*** by:
    - ***Determining the appropriate transit technology and support facilities to meet the mobility needs of the public throughout the five-county region***;
    - ***Examining the financial feasibility of establishing and/or expanding transit service in various travel corridors and encouraging the adoption of a dedicated funding source to achieve long term service goals.***

Goal 3: Reduce Congestion

*Address traffic congestion through strategies that seek first to reduce vehicle-trip demand and second, to increase the operating capacity of the existing and planned transportation system.*

- Encourage measures that reduce the number of vehicle trips and miles traveled, such as: ***transit***, high-occupancy vehicle facilities, mixed land use patterns, telecommuting, parking management, and trip reduction ordinances.

Goal 4: Relationship between Transportation, Air Quality & Energy Conservation

*Maintain and improve the quality of the natural environment through the implementation of transportation policies and programs that reduce vehicle emissions and energy demand.*

- Increase person-trip capacity in deficient travel corridors with improvements that carry greater numbers of persons, such as ***mass transit***, park and ride lots, and HOV lanes.
- In cooperation with managers of publicly and privately operated fleets of vehicles, ***encourage the use of clean, alternatively fueled motor vehicles***.

Goal 5: Manage Financial Resources Efficiently

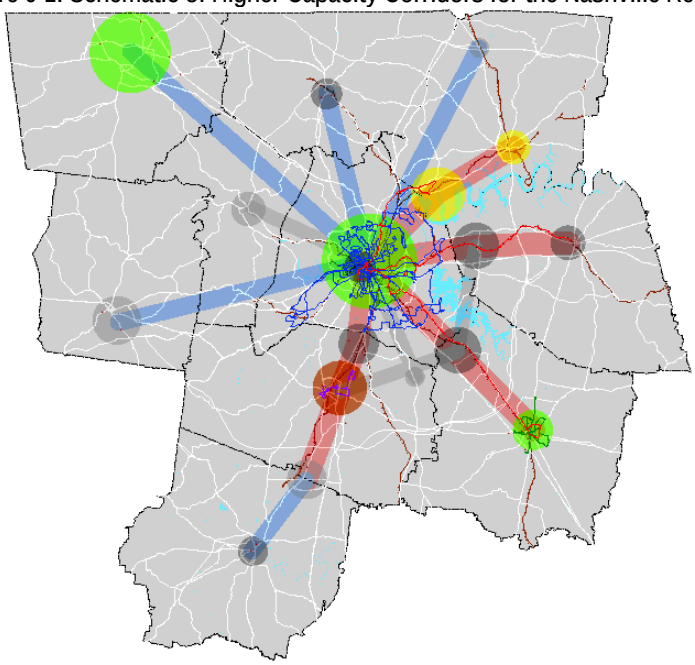
*The regional transportation plan and the implementation of the Transportation Improvement Program (TIP) must be based on an effective evaluation and screening process that considers cost (capital, operating and maintenance) constraints in selecting the highest priority short and long-range improvements and programs.*

- Reduce transportation costs by supporting use of ***energy-efficient transportation modes*** and developing intermodal transportation facilities which promote the easy transfer of people and goods between modes.

*Corridor Studies and Increased Transit Capacity*

The MPO in cooperation with Metro and the MTA have been pursuing the 2nd Goal of the Regional 2030 Long Range Transportation Plan in a set of corridor studies looking to develop improved higher capacity transit service. The regional transportation concept reflects a series of higher capacity services from outlying areas coming into downtown Nashville as well as some cross-town connections. Figure 6-1 shows a schematic of higher capacity corridors radiating from downtown Nashville, with satellite nodes outside of downtown Nashville. [ii] However, the way in which the high capacity corridors are defined and the specific technology to be used has not yet been determined except in the east corridor. Following is a discussion of progress being made towards implementing high capacity transit service.

Figure 6-1: Schematic of Higher Capacity Corridors for the Nashville Region



East Corridor Commuter Rail

The East Corridor Commuter Rail Music City Star is an early implementation of a higher capacity transit alternative that Metro Government of Nashville-Davidson county has played a critical role in supporting. The MTA also was a vital partner in this effort in the beginning and is playing an increasing support role currently. The East Corridor Commuter Rail implementation occurred ahead of concentrated development and its ridership has been developing more slowly than hoped. Development of higher quality transportation alternatives in other corridors is likely, therefore, to be more cautious.

The SE Corridor Study

This study was completed in 2007 and covered a corridor stretching from Downtown Nashville and the Vanderbilt – West End area to Murfreesboro. This is a promising corridor for transit due to the fact that densities along the corridor are higher than other Nashville corridors. Murfreesboro is the largest city outside of Nashville in the MPO area. It includes the region's largest employment destinations: downtown Nashville, the Vanderbilt-West End area adjacent to downtown Nashville, and downtown Murfreesboro. Other destinations within the corridor include Nashville Airport, Dell, Interchange City, Starwood Amphitheater, Nissan plant, Treveca Nazarene University, Middle Tennessee State

University, and the downtowns of LaVergne and Smyrna. Ridership on the MTA bus routes (12 Nolensville Road and 15 Murfreesboro Road) in this corridor puts them in the top 4 routes of the MTA.

Nonetheless, the recommendations of the SE Corridor Study were for a Locally Preferred Alternative (LPA) that did not include much capital investment in higher capacity transit. The LPA was "a combination of phased bus service enhancements, including development of express bus and skip-stop bus services on I-24 and Murfreesboro Road (US 41/70S), and extended local bus service on Murfreesboro Road. Other improvements include bus "stations" at key locations, queue jump and signal improvements at intersections and interchanges to allow buses to bypass congested traffic conditions, and ultimately short sections of busway to further enhance the speed of bus travel in the corridor."

#### The NE Corridor Study

The Northeast Corridor Study is looking to identify high capacity transit service and corresponding land use plans for the corridor between downtown Nashville, Rivergate, Hendersonville and Gallatin. While this study is not far enough along to draw conclusions, a very limited access service seems to be what is being considered. From the MTA's perspective, this corridor has the top performing bus routes in the system. Route 26 Gallatin Road carries the greatest ridership and Route 23 Dickerson Road has the highest passengers per hour. The MTA is working on a BRT implementation in this corridor between downtown Nashville and the Rivergate area. As will be discussed in Chapter 7 of this plan, some of the recommended BRT stops in the NE Corridor Study are the same as those recommended for the MTA's Gallatin Road BRT.

#### Conclusions from the East Corridor Music City Star and Corridor Studies

The greater Nashville area has the local leadership and momentum to move transit up to the next level. Since 2009 enactment of legislation enabling dedicated transit funding, the Mayor of Nashville has called for a caucus of Mayor's to examine how best to move forward with dedicated funding for transit. As this effort progresses, MTA can continue to build support for transit by making incremental transit improvements and illustrating the benefit to the public during this tough economic time. The existing transit services and the perception of the quality of service can help lay the foundation for future actions which are more far reaching.

## Other Regional Goals and Priorities

In addition to the Nashville MPO, the region has a number of other regional organizations which have worked to promote and/or provide alternative regional public transportation services. These organizations include Cumberland Region Tomorrow, the Mid-Cumberland Human Resource Agency, the Nashville Regional Transportation Authority and several others.

### *Cumberland Region Tomorrow*

Cumberland Region Tomorrow (CRT) is a private, non-profit, citizen-based regional organization working with many public and private sector partners, dedicated to planning for the future livability and economic vitality of the CRT 10-county region. CRT supports and encourages quality growth through improved planning, emphasizing land-use, transportation and preservation of the rural landscape and character of the region's communities.

CRT has developed principles to guide the region's future development to ensure that the 10 county region will grow in a quality way which also ensures long-term competitiveness. These principles include two that relate especially to public transportation. These are to:

- Link land use and transportation planning to promote an integrated framework to guide growth and development
- Think and act regionally to ensure our future livability and economic vitality

CRT along with the Nashville Area Metropolitan Planning Organization (MPO) and Tennessee Department of Transportation (TDOT) hosted the annual Convening the Region Summit in May 2009 that focused on "Regional Transit System Development." This summit provided case studies from other regions (Denver, Charlotte and Austin) which have been successful in greatly improving their transit systems and getting regional financial support in doing so. The Summit also included a call to action by Nashville Mayor Karl Dean and other Mayors from the region to come together and create a unique regional approach to transit planning, funding and implementation.

*Mid-Cumberland Human Resource Agency*

It is the mission of the Mid-Cumberland Human Resource Agency (MCHRA) to "help people help themselves by providing knowledge and resources to improve the quality of life." One of the key services provided by MCHRA is public transportation services—particularly services to bring people from outside of Davidson County to Nashville. MCHRA provides rural public transportation service to 12 counties.

### Nashville Regional Transportation Authority

Created in 1988, the Regional Transportation Authority (RTA) is an agency supported by member communities. It is the mission of the RTA to offer the citizens of Middle Tennessee choices and alternatives on how they commute to work each day and to coordinate local regional transportation services. RTA provides and/or manages regional commuter bus service, vanpools and carpools, and Music City Star commuter rail service. Currently the Nashville MTA has the responsibility of managing the RTA.

## The MTA's Mission

The current mission statement of the MTA is:

> *"The mission of MTA is to provide public transportation services to our community and its visitors so they can achieve greater mobility and experience a cleaner, healthier environment with less traffic congestion."*

This mission statement states first that the MTA is to serve the community and visitors and improve mobility. Improving mobility for the community implies providing convenient and efficient service that is accessible by all. Improving mobility for visitors implies transit solutions for tourists—particularly where there are concentrations of destinations.

The second part is that the MTA will contribute to a healthier environment and assist in reducing the impacts of traffic congestion. This part of the mission implies a need to attract sufficient patronage to remove automobiles from the roadways to reduce automobile pollution as well as congestion. The mission might also state a concern with reducing the energy consumption of transportation in the area and reducing the carbon footprint or carbon dioxide caused by transportation.

Another consideration for the Board is whether the mission statement should also be concerned with contributing to the economic development of the community. Since investment in higher capacity transit can spur economic development, this might also be a worthy part of the MTA mission.

A potential mission statement to consider might be:

> *"The mission of MTA is to provide public transportation services to our community and its visitors in order to improve mobility and provide an attractive transportation alternative which can reduce pollution, energy consumption, traffic congestion growth, and can contribute to efficient economic development.*

## MTA Priorities and Connections to the Regional Long Range Vision

MTA's Strategic Transit Master Plan needs to allow for a widely divergent set of futures, not unlike other transit agencies around the country. Currently there is activity that suggests the need for a transit system that serves Metro and the region (particularly with the efforts towards establishing dedicated regional funding for transit). The great growth in ridership that was seen and sustained from increased gas prices in 2008 provides a hint at the real mobility role that transit can play in the region. At the same time however, revenue sources have declined and due to tight budgets and fuel price increases, the MTA had to cut service in July of 2008.

While these competing pushes-and-pulls play out, the region is looking to MTA to provide improved service to help meet the need for better energy efficiency and lower cost alternative transportation. If the region moves forward with more ambitious plans for higher capacity transit services that cross county lines, the MTA may be called upon to play a leadership role in providing service for the larger region. An excellent organizational model for this is those locations where interlocal agreements provide the mechanism for a transit agency to serve outlying areas. Interlocal agreements are authorized and governed by the law of each state (e.g., TCA 12-9-101, et seq) but in general are designed to allow local government units to operate more efficiently by allowing them to cooperate in providing services and facilities. In the Charlotte, North Carolina area, Charlotte Area Transit (CATS) was established by an interlocal agreement between Charlotte, the surrounding Mecklinburg County, and the other municipalities in the County. This agreement established the mission, governance and funding of CATS, and also provided that it would be managed by Charlotte's Public Transit Department. CATS has also entered into interlocal agreements with four cities outside of Mecklinburg County. These agreements are contracts that specify what transit services will be provided (e.g., route maps and frequencies of service), for what period, and for what price. Other examples of interlocal agreements to provide transit service can be found in Florida, Washington State, Maine, and Utah.

At a minimum, the MTA will be expected to integrate existing services with new corridor services. If there is an expanded dedicated regional funding source for transit, service priorities that would be appropriate for Davidson County today would also be appropriate for the larger region in the future.

No clear path to the future currently exists for the MTA, but this plan provides a measured, systematic, and analysis driven direction for MTA to follow. The future currently has more potential 'up side' than it has in years, but the financial realities continue to press in on the short term actions. Because of the divergent set of potential futures that the MTA may face, it is increasingly important to be prepared for the growth, even if there are short term system shrinkages that need to occur.

As a result of the feedback from the public combined with research on transit and what is needed to make it grow, a multi-pronged set of priorities will be used to guide the longer term future of MTA services.

### *Priorities for Improving Service*

There are many demands on the MTA including providing better service frequency and longer hours of service on existing routes, providing circulator services for downtown tourists and businesses, providing service in unserved areas, and providing better information about the service. The public process for this project asked the question many times about what the future priorities should be, given there was sufficient budget to make improvements.

After listening to the many comments and looking at the results of questionnaires and other research, this planning process established five strategic service priorities for allocating funding for public transportation. These priorities are listed below:

- More buses more often (increase frequency of buses on key routes)
- Faster transit trips (fewer bus stops, traffic signal priority, avoid going downtown to transfer)
- Serve unserved areas (connect to areas that do not have service today)

- Make service easier to use (signage, better access to information, "How to Ride" training, simpler schedules, simple fare payment methods)
- Improve the image of transit (marketing, nicer buses, nicer shelters & benches at stops)

The suggested approach for using the five priority areas is for MTA to try to make progress in each of these whenever there is opportunity to make service improvements. Given that there is reasonably good transit coverage in Davidson County, the major part (60 to 80 percent) of new funding for operations and capital should be aimed at frequency improvements and speed improvements. Some funding, however, should be reserved to serve unserved areas, to make service simpler, and to improve the image of transit. The *Service Delivery Policy* provides more guidance for designing service in some of these priority areas.

### *A Longer Range Vision*

As part of the public process for the *Strategic Transit Master Plan*, an all day stakeholder meeting was held on December 16, 2008. Attending the event were over 30 participants, including two members of the MTA Board and representatives from the Mayor's Office, TDOT, Cumberland Region Tomorrow, Nashville Downtown Partnership, MTA/Walk/Bike Nashville, Fifty Forward, the Council on Aging, Nashville Area MPO, TACIR, Transit Now, HPI, ULI Infrastructure Committee, Gresham Smith and Partners, Littlejohn Engineering Associates, Metro Social Services, Metro Planning, Vanderbilt University, Center for Independent Living, Nashville Civic Design Center, Neighborhood Resources Center, Green Ribbon Mobility Committee, Butler's Run, several MTA staff members and TranSystems staff. At the end of the day participants divided into groups to consider what the long-term vision for public transportation should be. While the groups did not all come to the same set of recommendations, there were some common themes about the future including:

- There would be a regional approach to transit with a dedicated funding source.[iii]
- Smart growth and transit friendly development (also called transit oriented development or TOD) would be implemented, and the MTA would play a role in the planning process to encourage transit friendly design. There would be a density bonus to reward TOD concepts.
- The MTA would use vehicles powered with alternative energy/clean fuels.
- There would be an integrated multimodal system including bikes/sidewalks/transit and the MTA would help encourage these modes. Planning for these alternative modes would be coordinated.
- Transit would provide high-capacity regional connections with dedicated right of ways.
- MTA service would be the rival of its peers. Coverage would be expanded.
- Mini-hubs would be implemented to improve cross-town connections. The suburban fringe would be transformed into town centers, with MTA service linked to these.
- The downtown and inner neighborhoods would be connected with a downtown circulator or streetcars.

While the MTA doesn't have the authority to implement this vision in its entirety, it can encourage transit friendly development through participation in the planning process, and can work towards the types of service offerings anticipated in this longer range vision.

## Summary

Chapter 6 discussed regional long range planning, goals and objectives, and the MTA mission and proposed priorities for improving service. Despite the current economic challenges in the region, there appears to be a broad consensus around the importance of increased and improved public transportation service and funding for that service.

[i] 2030 Long Range Transportation Plan (Adopted Oct. 19, 2005 and Amended Nov 14, 2007), Nashville MPO, p. 83.

[ii] From a presentation on dedicated funding by the Nashville MPO at http://www.nashvillempo.org/docs/MPO_DedicatedFunding_110408.pdf page 12.

[iii] Progress was made in achieving a regional approach to public transportation with the recently enacted enabling legislation for public transportation

# Chapter 7 BRT for Gallatin Road

The MTA has done a significant amount of research regarding the potential for deployment of Bus Rapid Transit (BRT) technology in Nashville. The term BRT describes service provided with buses but with substantially upgraded quality of service. BRT is often seen as a more affordable alternative to light rail service. In fact, one of the alternatives being considered in the Northeast Corridor Mobility Study is a BRT route in the Gallatin Road right-of-way. BRT has the potential to influence land use development decisions by encouraging new development at stations along the route, and supporting higher density uses. There are many aspects of this increase in quality however, and these can be summed up as focusing on two main issues:

- Speed
- Image

There are a number of elements that can be incorporated in a BRT project as shown in Table 7-1. These contribute to the speed of the system or the image or both.

Table 7-1: BRT Elements

| | Speed | Image |
|---|---|---|
| Innovative Vehicles | | X |
| Dedicated Running Ways | X | |
| Signal Priority | X | |
| Real-time Passenger Info | | X |
| Improved Fare Collection | X | |
| Reduced Stops/Enhanced Stops (Stations) | X | X |
| Improved Service | X | X |
| Branding & Marketing | | X |

Not every BRT project will incorporate all of these elements. Rather, this is a menu from which an agency can select elements most appropriate for a particular corridor or for particular segments of the corridor. It is also possible to introduce some elements as part of an initial package and subsequently add elements as funding and time permits.

MTA has identified the Gallatin Road Corridor now served by Route 26 Gallatin Road, the agency's heaviest route with over 80,000 rides per month, as its first priority for BRT implementation. This chapter describes options for phasing the implementation of the elements of BRT into the corridor. While BRT elements can be introduced at different times, the greatest promotional "bang" will result if a number are introduced when the service starts. It is also essential for significant and targeted promotional/informational efforts to accompany startup.

Each of the potential elements of BRT service are discussed in this chapter, including the analysis conducted by MTA and the options to be implemented based on analysis provided through the *Strategic Transit Master Plan*.

## Background on Route 26 Gallatin Road

Route 26 Gallatin Road operates between the Sam's Club store on Gallatin Pike (beyond Rivergate) to the new Music City Central terminal. This is a 12.3 mile long route with scheduled running time of 45-50 minutes in each direction, depending on time of day. Typical weekday headways (frequencies) are 15 minutes in the peaks, 20 minutes in the midday, and 30 minutes in the evening. Saturday headways are 30 minutes during the day and hourly in the evening, and Sunday/Holiday headways are hourly. There are 49 weekday trips (requiring 8 buses in the peak), 30 Saturday trips (4 buses), and 17 Sunday/holiday trips (2 buses).

The route operates over Gallatin Pike/Gallatin Road/Main Street. This combination functions as an arterial roadway, generally with two travel lanes in each direction plus a continuous shared left turn lane. There are also generally fully paved shoulders, with no on-street parking, on the outer portion of the route. On the inner portion of the route there is a significant amount of on-street parking, some of it diagonal. There are 48 traffic signals over the length of route (an average spacing of 0.26 mile). Signal cycle times are long. Additional right turn lanes are not usually provided. The section of Main Street north of the I-24 interchange is frequently very congested during peak period, despite the use of a reversible center lane. Other parts of the route also seem to be congested, but only in peak periods. Congestion can take the form of tailbacks from traffic signals extending for multiple cycles. The MTA has identified six intersections as particularly congested. While posted speed limits are 35-45 mph, average bus scheduled bus speeds (including stops) are only about 15 mph. There are 104 posted stops in each direction, an average spacing of 625 feet. Almost all stops are located on the near side of intersections. Bus operators must, of course, be prepared to stop at each of these stops. Because it is a busy route, carrying both passengers to/from downtown Nashville and extensive local riding within the corridor, buses make many stops for passengers. Each stop takes a significant amount of time, this could due in part to MTA's policy of asking alighting passengers to remain seated until the bus stops, although not all passengers adhere to this request. Thus, slow bus speeds are a result of the combination of the pattern of congestion, frequent stops, and traffic signals. Route 26 Gallatin Road terminates at the newly constructed Music City Central station.

The following pages show photos of parts of the Gallatin corridor.

Figure 7-1: Typical Section of Outer Portion of Gallatin Pike with Route 26 Gallatin Road Buses


Figure 7-2 and Figure 7-3: Two Views of Bus Stop at Rivergate Mall


Figure 7-4: Bus Stop in Section with Diagonal Parking


Figure 7-5: Boarding at Music City Central Station

## Potential Application of Specific BRT Elements to Proposed Gallatin BRT Service

*BRT Vehicles (Image)*

MTA plans: Six BRT 60 foot long articulated BRT vehicles were delivered in early 2009. This is the same design as used by the Los Angeles MTA on its pioneering, fully-dedicated right-of-way Orange Line BRT. MTA has deployed the buses on Route 26 Gallatin Road to provide an increase in capacity and begin the preliminary phasing of BRT. MTA plans to operate BRT service on Gallatin Road between the Sam's Club at the end of the line and MCC.

Analysis: Based on preliminary schedules prepared by MTA staff, between 7 and 12 buses are required to implement BRT service (plus maintenance spares) depending on the service pattern selected (see the discussion of Improved Service). Thus more buses will be required to fill all trips with BRT buses.

Cost/Lead time: Cost of current order was about $850,000/bus. Bus delivery typically requires 12-18 months.

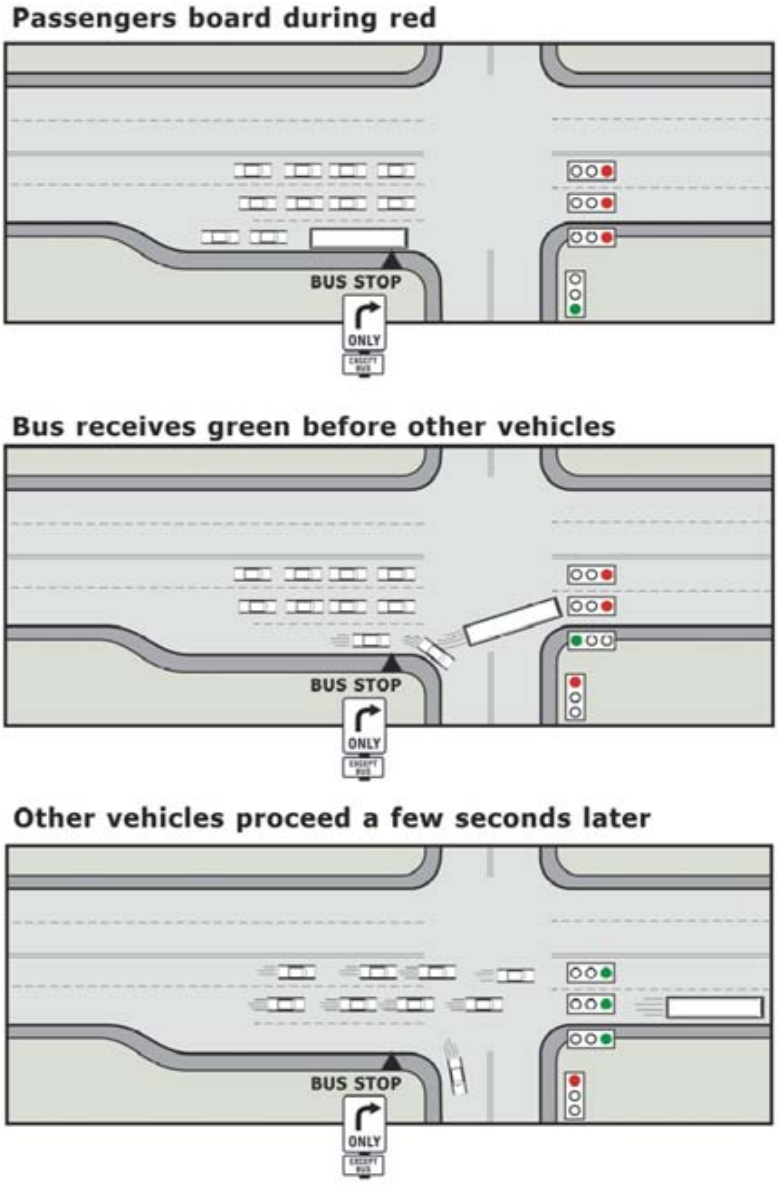
Action: Implmenetation of BRT will likely require an order of additional BRT buses to fully equip a route.

Figure 7-6: Future Nashville BRT Vehicle

*Dedicated (Bus-Only) Running Ways (Speed)*

Dedicated (Bus-Only) running ways provide one means of increasing the speed for BRT. These could consist of actual travel lanes dedicated to BRT operation or segments of "queue jump" lanes at intersections. Queue jump lanes provide the opportunity for buses to move in front of other traffic after stopping for red lights at intersections. Figure 7-7 below illustrates how a queue jump lane works.

Figure 7-7: Illustration of a Queue Jump Lane




Source: Kittleson Associates as illustrated in TCRP Report 118

MTA plans: MTA has identified six intersections with peak period congestion which it has suggested could be considered for construction of queue jump lanes.

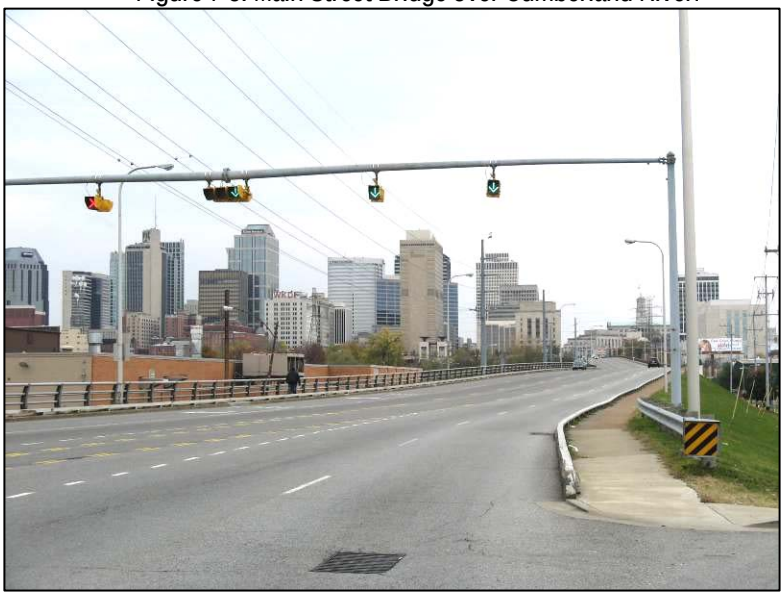
Analysis: Most intersections in the corridor do not have existing right turn lanes (which might be suitable for modification to also serve as queue jump lanes). Existing land use is often built to the lot line. Much of the benefit can

be obtained with the implementation of transit signal priority. It will be very expensive, and time-consuming to construct queue jump lanes. One segment of dedicated lane that can be considered for near term implementation is the designation of the curb lane of the portion of Main Street south of I-24 (essentially, the Victory Memorial Bridge) in peak periods as a bus and High Occupancy Vehicle (HOV) lane.

Cost/Lead time: Cost for construction of queue jump lanes might be on the order of $1 million or more per intersection (including both directions), depending particularly on the cost of right-of-way acquisition. More than two years might be required to complete studies and design, acquire ROW, and construct queue jump lanes. Implementation of an HOV/bus lane on the Victory Memorial Bridge might be accomplished in a matter of months, at very reasonable cost.

Action: Defer implementation of queue jump lanes to a second phase of BRT implementation. The potential for conversion of the curb lane on the Victory Memorial Bridge in the peak direction to a combination of bus/HOV lane will be studied in conjunction with TDOT and the Public Works Department.

Figure 7-8: Main Street Bridge over Cumberland River.

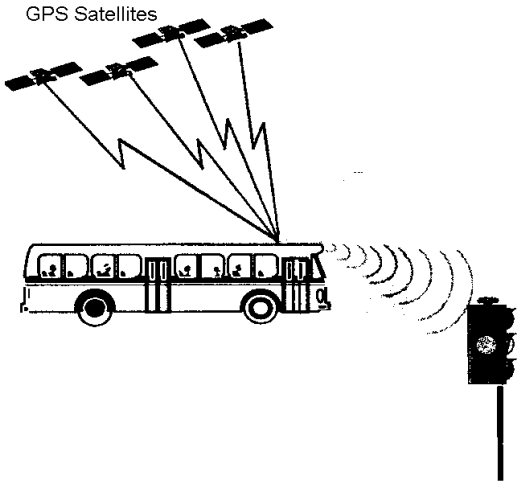


*(Note the existing reversible center lane. Dedication of the curb lane in peak periods in the peak direction as a bus and HOV lane could be considered)*

*Transit Signal Priority (Speed)*

MTA plans: MTA has identified Traffic Signal Priority (TSP) as an appropriate element for early implementation as part of a BRT implementation.

Analysis: There are several components that are common to all TSP systems.




- A device installed on the bus that requests priority which is typically controlled by the Computer Aided Dispatch (CAD) and Automatic Vehicle Location (AVL) onboard computer – the future Orbital/ACS computer in Nashville's case, so that priority is not requested when the bus is ahead of schedule, or under other locally-defined circumstances
- A sensor (or sensors), typically located at the wayside
- A priority server, normally installed in the same cabinet as the signal controller, that decodes and conditions the signal(s) from the bus
- The traffic signal controller (most modern controllers can be programmed to support TSP, to one degree or another)

Given the large number of traffic signals, bus operations in the Gallatin Corridor would benefit greatly from the installation of TSP, yet because of the relatively wide headways between buses, impact on other traffic would be expected to be very limited.

Cost/Lead time: MTA is currently coordinating with Public Works, the owner/operator of the traffic signal system, to acquire TSP technology for both the intersections and buses. It is convenient that the entire corridor is in a single jurisdiction. There are a number of technology choices for TSP and in cases of multiple jurisdictions, the technology selection can be difficult. Although there are open standards that have recently been defined for the interfaces between the TSP system components, to date, no system has been deployed based on those standards. Thus, all systems use interfaces that are essentially proprietary. Cost ranges will be on the order of $10-40,000 per intersection, depending particularly on whether or not the existing controllers have the capability to accommodate TSP. On-bus equipment cost should be on the order of $1000 per bus. Thus, total cost of TSP should be in the $500,000 to 1,000,000 range. Coordination between the agencies, design, and installation would take 9 -18 months.

Action: MTA is already working with Metro Public Works to define the equipment needs, quantities, and costs and should begin installation for implementation summer/fall 2009.

*Real-Time Passenger Information - (Image)*

Research has consistently shown that passenger satisfaction is greatly enhanced when people have accurate information regarding the number of minutes until their bus will arrive. There are two forms

- Dynamic Message Signs (DMS) at stops
- Internet access, from computers and wireless devices, including web-enabled cell phones

MTA plans: MTA will install DMS at BRT stops as an early phase of BRT implementation.

Analysis: The predicted time of bus arrivals at stops is typically calculated in a component of the central CAD/AVL system – the future Orbital/ACS system in Nashville's case. That data is then transmitted to the signs at stops and/or

made available for customer access over the internet. MTA has received stimulus funding to acquire these components. Given the size of the MTA fleet, a single data radio channel should be adequate to provide the required communications with buses as well as with the DMS, avoiding any communication charges. Internet distribution has the advantage that information can be provided for all stops, not just those equipped with signs. Passengers can also consult this information before going to the bus stop. As in TSP, although open standard interfaces between a CAD/AVL central server and signs at stops have been defined, they are not commonly deployed. Most systems use proprietary standards defined by the system supplier making it difficult to utilize competitive procurement for wayside signs. A similar situation applies to internet distribution of bus arrival data.

Figure 7-9: Next Bus Sign at a Station


Figure 7-10: Mobile Unit with Bus Arrival Data


Cost/Lead time: Installation of DMS at 25 stops would cost on the order of $150,000. The additional cost of supporting internet access by customers should be fairly nominal. The Orbital system will support provision of such information. Design and installation could take 9-18 months.

Action: It would be very desirable to be able to procure DMS units competitively.  his will require that a point of demarcation between the Orbital system and the signs, with defined interface standards, be established.

*Improved Fare Collection - (speed)*

Some U.S. BRT projects have adopted Proof of Payment (POP) fare collection, the system used on virtually all light rail systems. With such a system passengers that have some form of prepaid ticket to board at any door without stopping at the driver for inspection (ticket validators are installed at each doorway), greatly speeding boarding, a major portion of bus service delay. Those without a ticket can still pay the driver, who must give them a receipt. Teams of fare inspectors randomly check all passengers on a given bus for evidence of fare payment – POP (either a validated prepaid ticket or a receipt); those without POP are issued a citation, like a traffic ticket and are subject to a substantial fine. Research has shown that an inspection rate of about 20% is required to provide an adequate deterrence to violations (that is, passengers must perceive that they are asked for evidence of fare payment at least 1 trip out of every 5). POP does not have to be utilized during all periods of service; for example, some systems do not utilize it during evening and Sunday periods. It is not necessary to install fare vending machines at all stops along the route although this provides the greatest level of customer service and can improve the image of the BRT.

MTA plans: MTA has identified advanced fare collection as a potential element of a BRT implementation.

Analysis: With fare vending machines already deployed and 70% of MTA's passengers already carrying various forms of prepaid tickets, the foundation is in place for POP fare collection. Operation of POP could be limited to weekday daytime periods only. With BRT service stopping only at busy stops the dwell time at these stops could be extended. However, vehicles on the BRT route(s) would need to be equipped with ticket validators at all doorways. The MTA would need to deploy fare inspectors (using its own staff or contracting with another agency or private firm). The MTA's authority to levy fines for non-payment of fares would need to be confirmed.

Cost/Lead time: Ticket validators should be integrated with the MTA's farebox system. They are not an off-the shelf item; cost and development time is not known. It is anticipated that implementation would require the deployment of a single two person inspection team (i.e. two FTE positions) to provide an adequate deterrence to travel without fare payment.

Action: Further analysis of the capital cost of implementation is required. A comparison should be made between the operating cost savings from the estimated reduction on running time that would result from drivers no longer being involved in most fare collection transactions and passengers being able to board at both doors of the BRT vehicles vs. the cost of deploying fare inspectors. The increased ridership and revenue that would result from the faster travel times would also have to be considered. Implementation as part of the initial BRT rollout is not recommended.

Figure 7-11: Smart Card Reader Installed at Rear Door of Bus


*Reduced Stops/Enhanced Stations - (Image and Speed)*

Most bus stops are identified only with placement of a simple metal sign. Some stops along Gallatin road have passenger shelters, although these vary greatly in design and condition. Most BRT systems replace all-local service, with half mile or one mile stop spacing. This significantly reduced number of stops is then normally greatly enhanced, with such features as uniform, stylish passenger shelters, real-time and fixed passenger information, lighting, and benches. The station design is typically a key part of the BRT branding effort. A few BRT systems have installed raised sections of sidewalk, or "platforms, (like light rail) at stations.

MTA plans: MTA will install enhanced stations as part of the initial phases of BRT implementation.

Analysis: Stops along the Gallatin BRT should be spaced about ¾ mile apart. If practical, each of these should have features such as a boarding/alighting platform long enough for a BRT vehicle to be berthed with both doors on the platform. Shelters should provide protection from rain and configured to give shade from the summer sun. There should be lighting and information displays (including a DMS). Without designing the stations, a reasonable estimate of $60 - 80,000 each is suggested for a typical site. With the complex topography of the Gallatin corridor installation of near level boarding would be very challenging.

Cost/Lead time: Based on ¾ to 1 mile stop spacing, there would be about 28 stations. Thus, cost for the stations is estimated at $1.7M. Design and construction would take less than two years.

Action: An initial list of recommended BRT stops, based on ridership and spacing considerations, includes Sam's Club, Rivergate Mall, McHenry Shopping Cetner, One Mile Parkway, Old Hickory Blvd, Due West Plaza, Walton, Inglewood Library, Greenfield, Burchwood, Douglas, Eastland, and East Middle School, as well as key stops in the downtown area. This list includes several more stops in this segment than are included in the Northeast Corridor Alternatives Analysis which is focused on providing service all the way to Gallatin. Standard designs for shelters and markers must be developed as well as application to each site. Installation of near level boarding at BRT stations is not recommended.

Figure 7-12: Kansas City MAX Station, with Marker and Shelter


*(Note: the marker incorporates map and schedule displays as well as a DMS)*

*Improved Service (Image)*

Frequent service/Increased capacity is often considered a key element of BRT service.

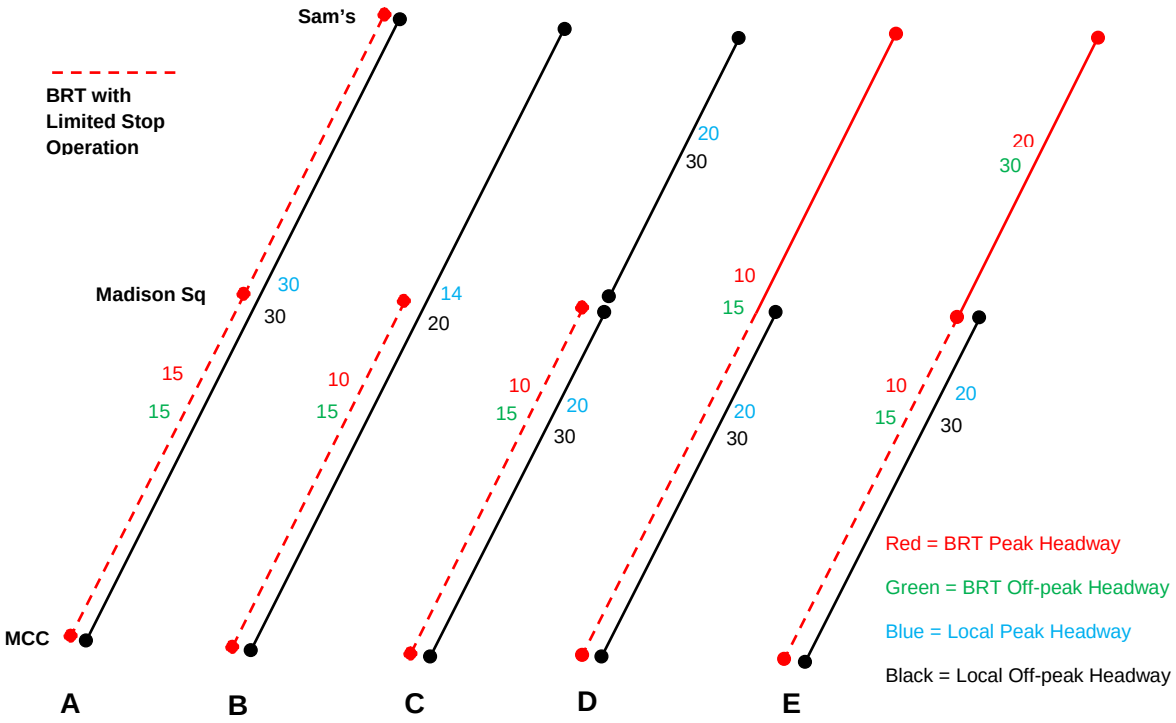
MTA plans: The MTA has indicated that it intends to provide 15 minute peak, 15 minute midday, 30 minute evening and Saturday service, and 50 minute Sunday service in the entire Gallatin Road corridor.

Analysis: Several service patterns were studied for the combined BRT and Local service. Five of these are illustrated schematically in the following figure.

Cost/Lead time: Estimated annual operating cost changes for these alternatives vary from about $2.35M to $3.2M (as calculated by MTA Service Planning), with the increase in peak period bus requirements varying from 6 to 8.

Action: Addendum 7-A (found at the end of this chapter) provides a more detailed description of these alternatives, with the advantages and disadvantages of each. Alternative A is recommended because it has the lowest operating costs and bus requirements while providing improvements in service to all users of the corridor. Under this alternative the BRT would operate through from Rivergate (Sam's). Operation would be simple due to the lack of short turn trips at Madison Square, as considered in all of the other alternatives. Ten BRT vehicles are required in peak periods and 6 in midday periods. The MTA has already purchased 6 BRT vehicles. Assuming that two vehicles are required as maintenance spares, then 6 additional units will be required. At the same price as paid for the recently received vehicles now on order, this will require an additional expenditure of about $5.1M.

Figure 7-13: Alternative Service Patterns for Gallatin Road BRT




*Branding and Marketing*

Key to the promotion of BRT service required to attract new riders is the careful attention to detail in branding the service. It should be very clear how the system and its service are different from the service that it replaces. They should look different and feel different to the passengers. The more dramatic the difference the better, as this will attract media buzz and conversation among the public. At a minimum, branding requires that all of the BRT elements (buses, stations, signs, etc.) should use colors and a logo different from the "regular" system.

## Summary of Implementation Actions for Gallatin BRT:

The readiness of the various elements for early installation should be considered and a package prepared for simultaneous implementation, based on what is realistically possible. The table below proposes elements that could realistically rolled out within about 18 months of the availability of funding and would have the greatest impact. Development of dedicated lanes or queue jump lanes must be considered a long term goal; design and right-of-way acquisition will be extremely time-consuming and expensive. Implementation of POP fare collection may require establishment of a legal framework and would requirement deployment of fare inspectors (either MTA employees, law enforcement personnel from another agency, or contractor employees). Without POP fare collection, which allows rear door boarding, the value of near level boarding platforms at stations is quite limited

Following in Table 7-2 is a summary of projected BRT costs with the recommended options.

Table 7-2: BRT Cost Summary

| BRT Capital Cost Item | Cost |
|---|---|
| 6 Additional BRT Buses | $5.1M |
| Victory Memorial Bridge Lane | nominal |
| Signal Priority | $0.5M |
| Real-Time Info | $0.2M |
| Enhanced Stations | $2M |
| Branding & Marketing | $50,000 |
| Contingency (20%) | $1.6M |
| **Total** | **$9.4M** |

Before BRT can be implemented some decisions must be made and some design is required, as outlined in this report. A reasonable timeframe for implementation is within 24 months, assuming that funding for the elements is in place.

## Potential Extension of BRT from MCC to Vanderbilt

Some preliminary consideration has been given to the potential for operating a Gallatin Road BRT route beyond the Music City Central (MCC) through to the West End / Vanderbilt area. A routing via Charlotte, Union, Church, and 21st Street is being considered by MTA and this routing is already utilized by Route 35X Rivergate Express. Such an extension would appear to be logical since it would provide distribution/collection through much of the downtown area as well as providing a direct link for passengers travelling to/from the Baptist Hospital, Vanderbilt University, and the Vanderbilt Medical Center. These are some of the strongest trip generators in Middle Tennessee. Providing through service would attract more riders to transit as well as provide more capacity in the segment between downtown and Vanderbilt. This is primarily served by Route 7 Hillsboro whose buses sometimes have standing-room-only due to the short distance passengers.

There would be an increase in BRT capital and operating costs as a result of this extension: Capital costs are estimated at $5 million and include:

- 3-4 additional peak period vehicles
- TSP (about 24 additional signalized intersections are involved)
- Branded BRT stations, with DMS units (an estimated 12 locations).

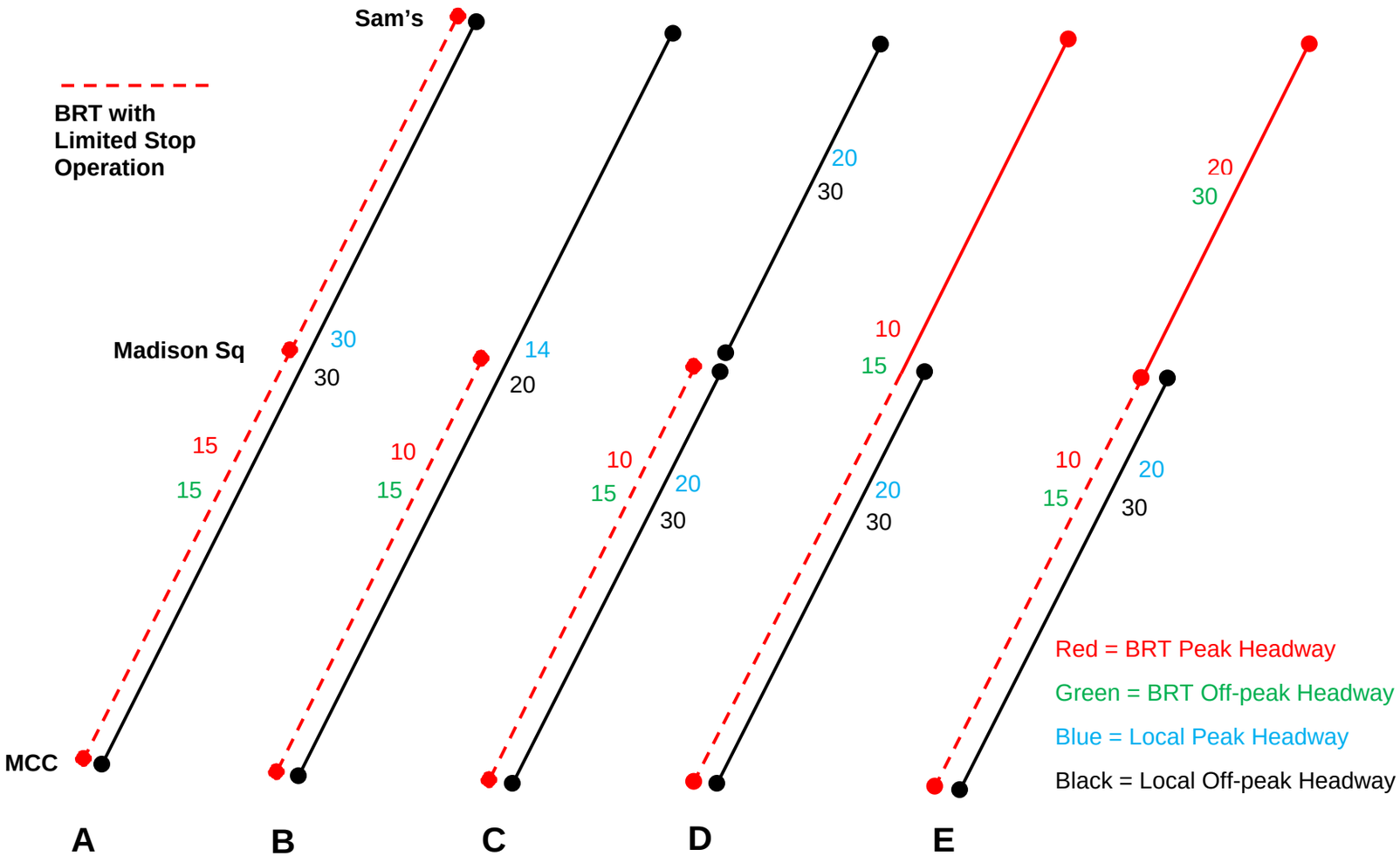
Operating cost assumptions:

- 4 buses in the peak period for BRT
- 3 buses in the off peak for BRT
- 2 buses evenings for BRT
- 2 buses Saturday for BRT
- 1 bus Sunday for BRT
- Reduction of 1 bus on Route 7 Hillsboro weekdays daytime

With these assumptions, the annual additional operating cost for a BRT extension would be about $925,000. Further analysis of this concept is required and implementation of this improvement is included as one of the mid-term *Strategic Transit Master Plan* actions.

## Addendum 7-A: Alternative Service Patterns (these two pages provide support for operating plan decisions described earlier in the chapter)

| Alt. | Description | Pros | Cons | Increase in Buses Required | | | | | | Net Increase in Annual Oper. Cost $ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AM rush | Midday | PM rush | Evening | Saturday | Sunday | |
| A | BRT added with all trips operated to Sam's Club; Local headways widened to 30 in peak and midday; 60 minutes nights and weekends | Significant service increase on outer portion of route. Least expensive. | Least frequent local service | 8 | 6 | 7 | 7 | 2 | 2 | $2.3M |
| B | BRT added south of Madison Sq.; no change in local service | Simplest service pattern | Riders on outer portion of #26 receive no benefit from BRT service. Expensive. | 8 | 6 | 7 | 7 | 7 | NC | $3.20M |
| C | BRT added south of Madison Sq.; Local headways widened to 20 in peak and 30 in midday with outer end converted to shuttle when BRT service is running | Simple service plan | Riders on outer portion of #26 may use BRT service (timed transfers would be provided ), but would be forced to transfer | 6 | 5 | 5 | 6 | 6 | NC | $2.55M |
| D | BRT service operated, with all trips running through to Sam's; local service cut back to Madison Sq. with BRT making local stops north of Madison Sq. | Simple service plan, outer end riders benefit greatly | Expensive | 9 | 8 | 8 | 7 | 7 | NC | $3.04M |
| E | Same as D, but with half of BRT trips terminating at Madison Sq. | Outer end riders receive faster service, but less frequent. | | 6 | 5 | 5 | 6 | 6 | NC | $2.35M |


Sam's
BRT with Limited Stop Operation
Madison Sq
MCC
30
30
15
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14
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30
A
B
C
D
E
Red = BRT Peak Headway
Green = BRT Off-peak Headway
Blue = Local Peak Headway
Black = Local Off-peak Headway

# Chapter 8 Opportunities for Improving MTA Service and Image

Chapter 8 provides an overview of the opportunities for service improvement. These opportunities include service opportunities as well as opportunities to be a better environmental citizen. Following is a discussion of the opportunities in each priority category as well as the environmental opportunities.

## Bring Service Frequency to Meet Service Policy Minimums

While the geographic coverage of the MTA service is good, the frequency of service provided should be increased (given adequate funding) so all routes have headways less than the minimum frequencies specified in the *Service Delivery Policy*, with the exception of those routes that have very low ridership or revenue compared to the service provided (those routes falling in the bottom 10 percent in service and cost effectiveness as discussed in Chapter 5).

A comparison in Chapter 5 of MTA service versus the *Service Delivery Policy* showed times and days when service on particular routes throughout the system should be improved to bring service to minimum standards for frequency. Chapter 5 also identified certain routes which require further study because their service or cost effectiveness is at the bottom 10 percent of MTA routes. Excepting the routes designated for further study, Table 8-1 shows the routes recommended for frequency improvements to bring them up to standard.

Table 8-1: Routes Recommended for Frequency Improvements to Meet Minimum Frequency Standards

| Route No. | Route Name | Proposed Service Class | Span of Service Needing Improvement | Current Frequency (in minutes) | Proposed Frequency (in minutes) |
|---|---|---|---|---|---|
| 2 | Belmont | Frequent | Weekday Midday | 70 | 60 |
| | | | Weekday Evening | 70 | 60 |
| 6 | Lebanon Road | Frequent | Weekday Midday | 90 | 60 |
| | | | Weekday Evening | 70 | 60 |
| 8 | 8th Avenue South | Frequent | Saturday | 60-120 | 60 |
| | | | Sunday | 60-120 | 60 |
| 23 | Dickerson Road | Most Frequent | Weekday Midday | 35 | 30 |
| 24X | Bellevue Express | Commuter | Weekday Peak | 20-45 | 30 |
| 28 | Meridian | Most Frequent | Weekday Midday | 50 | 30 |
| 33X | Hickory Hollow - Hickory Plaza Express | Commuter | Weekday Peak | 30-60 | 30 |
| 35X | Rivergate Express | Commuter | Weekday Peak | 10-40 | 30 |
| 37X | Tusculum Express | Commuter | Weekday Peak | 90 | 30 |
| 38X | Antioch Express | Commuter | Weekday Peak | 25-60 | 30 |
| 41 | Golden Valley | Commuter | Weekday Peak | 60 | 30 |

Figure 8-1: MTA Routes Recommended for Headway Improvements to Meet Standards

Figure 8-1 provides a picture of the MTA service with routes shown in dark brown that are recommended for frequency improvements. Figure 8-1 also shows Route 26 Gallatin Road which will be improved with the BRT. While the MTA's ability to make these improvements will depend upon financing of service, these are the types of improvements needed to make public transportation viable as an alternative to the private automobile, at least for trips to downtown and that are reachable with the current route configuration. These improvements will affect 44 percent of households which are located within ½ mile from each route that is improved.

The improvements in these eleven routes have the following benefits:

- Provide additional express service for some of the outer areas of the county that have been growing and are expected to increase in density in the future.
- Increase service in the midday on Dickerson Road, the route with the highest level of service effectiveness.
- Except for the commuter routes, recommended service increases are in off-peak times which do not increase peak vehicle requirements. Research indicates that greater percentage increases in ridership can be expected at these times.[i] This is likely due to the prevalence of discretionary travel in the off-peak.

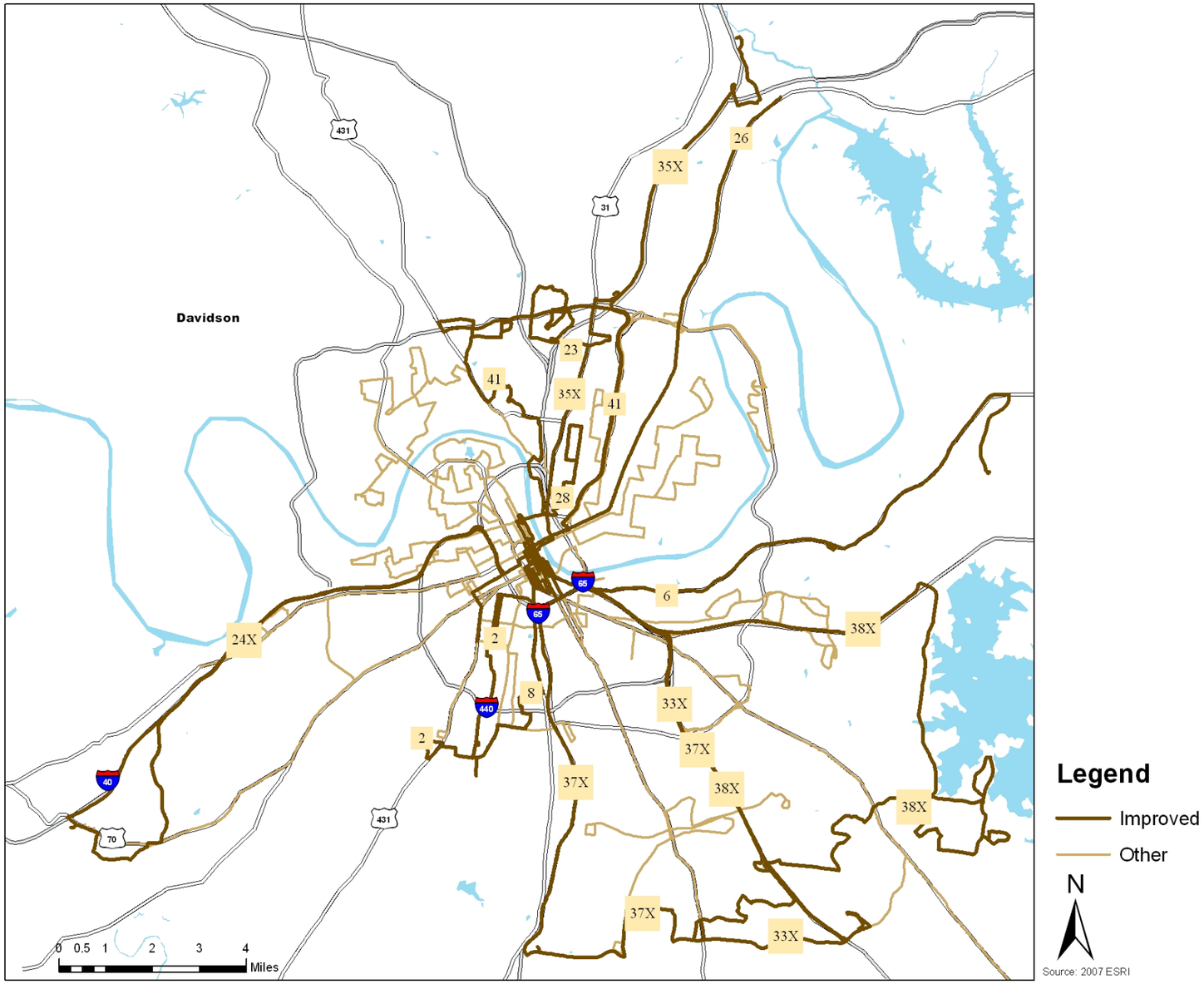


Table 8-2 and Table 8-3 show the total capital and operating cost estimates for bringing the services up to minimum standards. The total yearly operating cost to bring these routes to standard is $1,156,000 and the capital cost for an additional 17 buses at $300,000 per bus is $5.1 million. The main contributor to additional capital cost is additional peak hour service for commuter routes, where additional trips requires additional vehicles. Service improvements are spread throughout the day and evening, with small amounts on weekends to bring services offered up to standard.

Table 8-2: Cost to Bring Service up to Frequency Standards Listed By Service Type

| Proposed Service Class | Service Cost Per Year | Capital Cost |
|---|---|---|
| Most Frequent | $297,000 | $0 |
| Frequent | $498,000 | $0 |
| Commuter | $361,000 | $5,100,000 |
| **Total** | $1,156,000 | $5,100,000 |

Table 8-3: Costs to Bring Service up to Frequency Standards Listed By Service Time

| Proposed Service Class | Service Cost Per Year | Capital Cost |
|---|---|---|
| Weekday Peak | $361,000 | $5,100,000 |
| Weekday Midday | $552,000 | $0 |
| Weekday Evening | $234,000 | $0 |
| Saturday | $4,000 | $0 |
| Sunday | $5,000 | $0 |
| **Total** | $1,156,000 | $5,100,000 |

## Improve Speed of Transit

Improving the speed of transit service is another critical component to making a system that can compete better with the automobile and that can provide a viable alternative to those who don't have automobiles to rely on. Speed improvements should be aimed at the routes with highest ridership to have the greatest impact on the most passengers. There are several opportunities for improving the speed of transit service.

*Bus Rapid Transit (BRT) in Key Transit Corridors*

Nashville is preparing to implement a BRT in its heaviest corridor for bus ridership on Gallatin Road. (This opportunity was discussed in much detail in Chapter 7) While the BRT design suggested in Chapter 7 does not include exclusive right of way along most of the corridor, it does use other techniques to improve service such as traffic signal priority for buses, the elimination of stops to speed service, and possibly a dedicated lane on the Victory Memorial Bridge.

Another key opportunity is to extended BRT to Music City Central Station and the West End/Vanderbilt area. The large number of trips between these destinations could benefit from the addition of a higher capacity transit service, particularly one connected to the highest ridership Route 26 Gallatin Road.

In addition to the development of a BRT along Gallatin Road, other routes should be considered for speed improvements such as traffic signal priority (TSP), exclusive right of way and limited stops. These include:

- Route 15 Murfreesboro Road: This is the second largest route in the MTA system, carrying over 71,000 passengers in February 2009. It serves an area expected to grow in population density over the next 25 years. Recommendations from the 2003 Transit Development Plan for the MPO recommended express bus service on Murfreesboro Road using bus only contra-flow lanes. Recommendations from the SE Corridor Study recommended express and limited stop service along Murfreesboro Road as the locally preferred alternative.
- Route 12 Nolensville Road: This is the third largest route in the MTA system, carrying over 43,000 passengers in February of 2009. It runs along a corridor which is expected to increase in population density by 2035. Recommendations from the 2003 Transit Development Plan for the MPO recommended express bus service on Nolensville Road using bus only contra-flow lanes.
- Route 23 Dickerson Road: This has often been the route showing the highest level of passengers per hour and would benefit from additional service and faster service. Although its overall ridership is less than half of Gallatin Road, the yearly average passengers per hour for Dickerson Road was over 44 as of February 2009. Projected development in 2035 shows employment development beyond the current terminus of the route, indicating that an extension may be warranted in the future.

*Downtown Circulator*

Although MCC is located in the heart of downtown Nashville, many customers need to transfer to reach their ultimate downtown destinations. A route that would offer very frequent service could speed the distribution of MTA customers after they reach downtown. In addition, such a route could serve many other purposes including distribution of Music City Star riders to downtown destinations, and providing mobility to tourists and other downtown visitors between sports venues, the convention center, downtown hotels and other attractions.

Figure 8-2 shows the existing downtown shuttles including the downtown shuttle route for the Music City Star and the lunchtime shuttle. Figure 8-3 shows one of several options developed as concepts for a Downtown Circulator. While this *Strategic Transit Master Plan* was not tasked to develop a downtown circulator route, a number of concepts were developed to demonstrate the type of service that could be provided.

To be attractive to downtown users, the Downtown Circulator would have to be very frequent—a headway of every 10 minutes was assumed for this service. In addition, it would have to run from early morning to distribute Music City Star riders and other commuters until late in the evening to serve tourists, bars and entertainment locations. A model for this is the Hartford Star Shuttle route, which is a 1-way loop connecting the convention center with other attractions, particularly restaurants and bars. The Hartford Star Shuttle runs approximately every 12 minutes from 7:00AM to 11:00PM weekdays and 3:00PM to 11:00PM on Saturdays.

Allowing for a four vehicle system operating weekdays and Saturday and Sunday, the cost of a Downtown Circulator providing 10 minute service for Nashville is estimated at $1.8M for operation and $1,300,000 for vehicles and specially signed bus stops.

Figure 8-2: Existing Downtown Shuttles

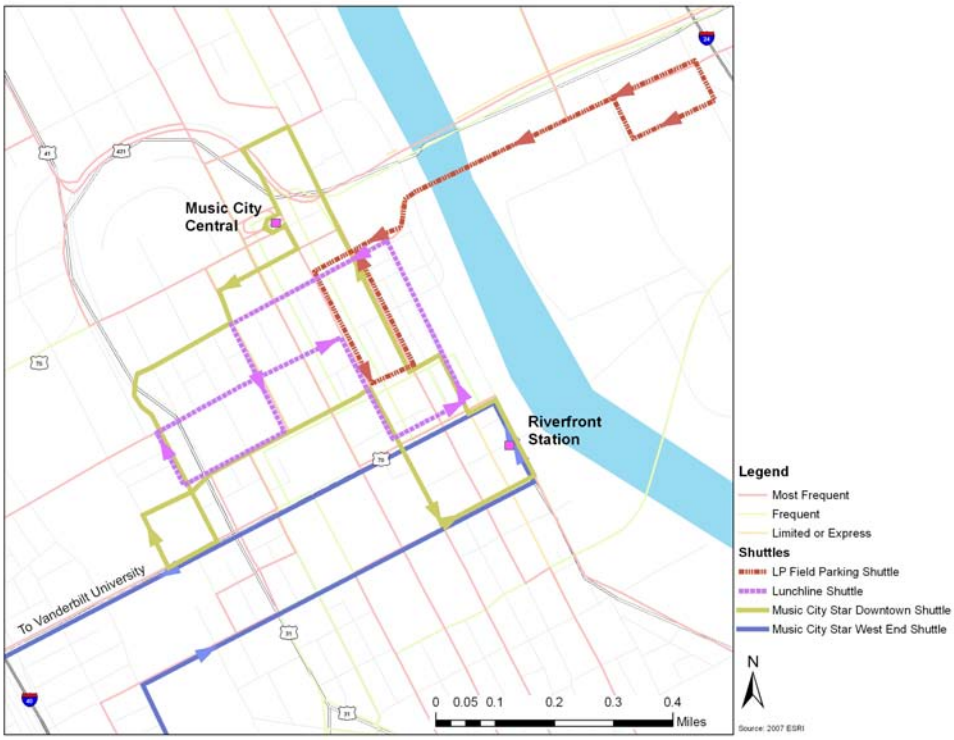
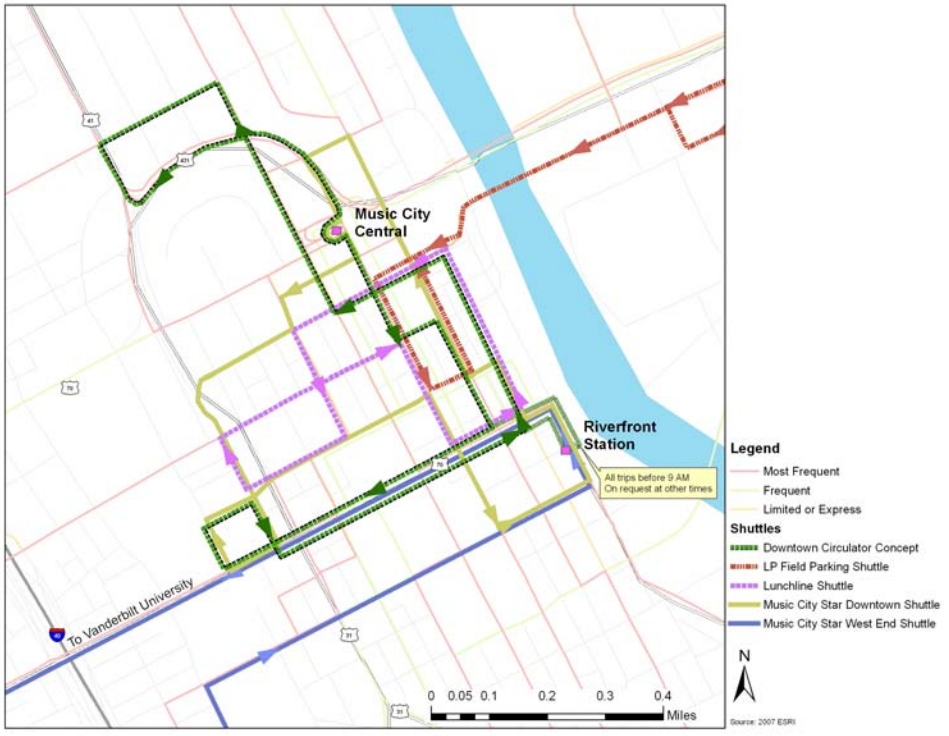



Figure 8-3: One Concept for a Downtown Circulator



*Connections Outside of Downtown Nashville*

Many of the concerns about taking public transportation voiced at the public meetings included the need to reach cross-county destinations without having to travel downtown. Indeed, cross-county routes might be a solution to improving travel time for MTA customers. However, MTA has not had a good ridership experience with cross-town routes in the past. Its existing cross-town route, Route 25 Midtown, is not particularly strong, and the service effectiveness measure for 12 months ending February 2009 averaged only 16.3 riders per hour. The problem is that most other destinations in the county are so much smaller than downtown Nashville where over 45,000 workers are destined.[ii] Thus it is difficult to get a density of trips along cross-town routes to justify such services. The MTA Service Analyzer identified a cross-town need to service the Opry-Mills area, but a prior MTA attempt to serve did not prove successful.

Another approach to reducing the travel time for some cross-town trips is to look for places distant from downtown Nashville which could serve as a meeting place for several routes, thus enabling transfers without going downtown. The idea of mini-hub comes from the following arguments:

- Provide some crosstown connections without going downtown to transfer
- Connect routes that are already close together
- Focus service on significant destinations (malls, neighborhood centers, BRT stops)
- Facilitate existing trips and create new opportunities

Note that min-hubs may be more effective than crosstown routes as they are likely to have lower cost than new crosstown routes and they serve a greater variety of markets. However a transfer is still required. The MTA currently has a mini-hub at Lipscomb University. This is a heated and cooled shelter served by two bus routes.

Six different mini-hub locations were examined as shown in Figure 8-4. Table 8-4 summarizes the mini-hub locations and routes affected. The MTA Service Analyzer was used to test all of the mini-hub concepts simultaneously. Of the various mini-hubs proposed, the Clarksville Pike mini-hub appears to be a winner in attracting 5 percent additional riders for very little cost ($1.19/new rider). The Gallatin Road mini-hub also attracts 4 percent additional riders, but the cost to detour the service increases substantially, so the cost per new rider is not attractive (over $8 per new rider). The other mini-hubs did not appear to be winners under current conditions.

The MTA Service Analyzer will be able to analyze changes in the attractiveness of the mini-hubs as development occurs. It can also be used to explore other options for rerouting to serve potential mini-hub locations to improve the rider benefits and minimize the cost. For example, the Gallatin mini-hub will grow in attractiveness as the BRT is implemented. The mini-hub proposed at 100 Oaks will grow in attractiveness as that facility becomes more active.

Figure 8-4: Schematic of the Mini-Hub Concept

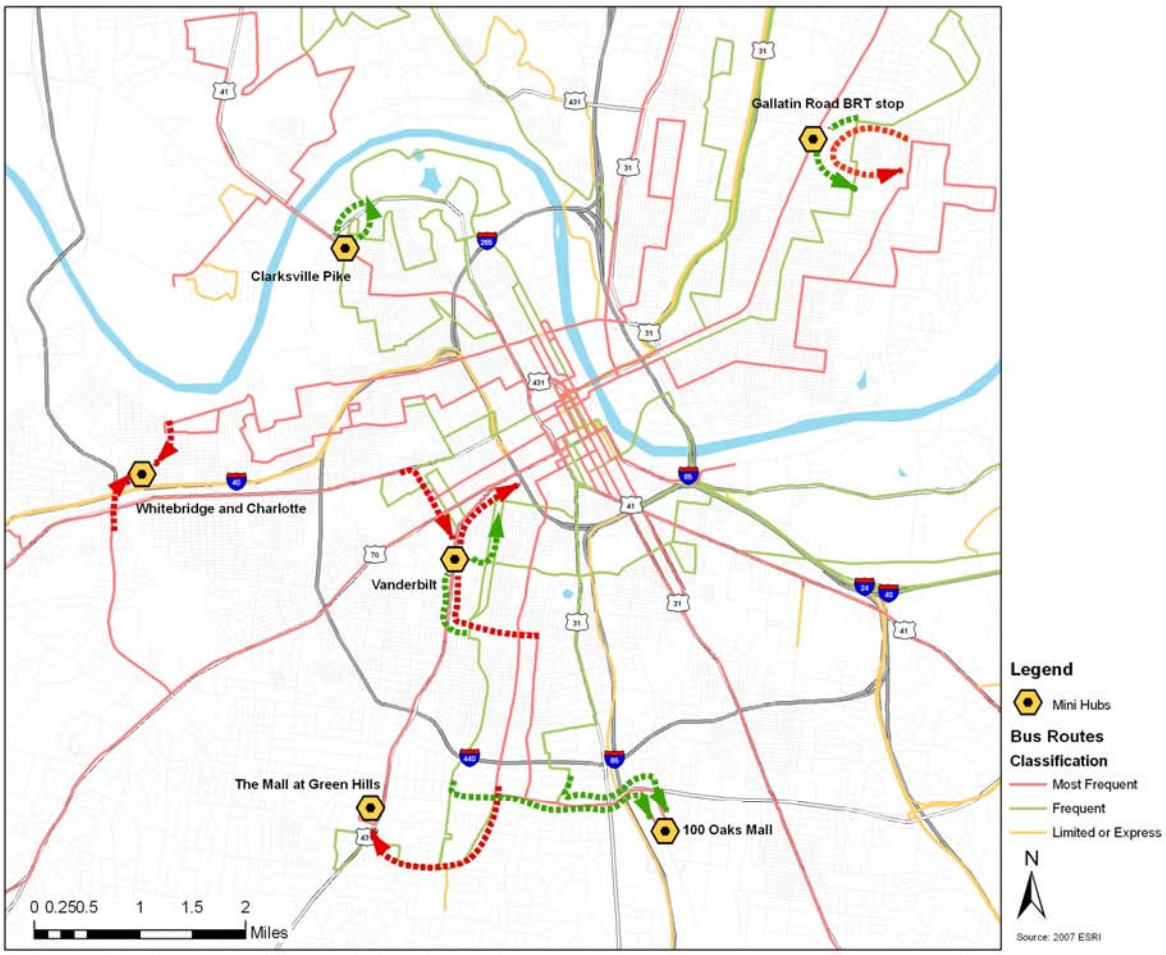



Table 8-4: Mini-Hubs Concept and Routes Served

| Mini Hub Location | Routes Served |
|---|---|
| Gallatin Road BRT stop | Routes 4, 20 and 26 |
| Clarksville Pike | Routes 9, 22 and 42 |
| Whitebridge and Charlotte | Routes 3, 10, 19 and 29 |
| Vanderbilt | Routes 2, 3, 7,10 and 17 |
| The Mall at Green Hills | Routes 7 and 17 |
| 100 Oaks Mall | Routes 2 and 8 |

## Serve New or Unserved Areas

*Areas within Davidson County*

There were strong concerns expressed at public meetings from those who had lost service in July of 2008, but most of the routes eliminated served areas of lower density, where fixed route bus service would not be recommended. MTA is providing a new flexibly routed service (BusLink) in Madison—this type of service is more appropriate in low density neighborhoods. Since flexibly routed services work well in some neighborhoods and not as well in others, MTA's approach is to test it in different neighborhoods as appropriate.

The MTA *Service Delivery Policy* suggests providing fixed route service where there is a household density of at last 5000 persons per square mile, but also says that service could be provided in areas with density as low as 2500 persons per square mile as long as there are excellent pedestrian conditions to allow walking longer distances. The geographic analysis of service coverage provided in Chapter 5 showed that overall, there is good coverage of MTA service of residences and attractions in Davidson County. There were some isolated areas or attractors that would qualify for fixed route service, but most of these would be difficult to serve with the current route configuration. Following are recommendations for serving some of the unserved areas of greater than 5000 persons per square mile.

Two areas with density greater than 5000 persons per square mile that are beyond a half mile of MTA route service are to the east of Gallatin Pike and just north of the new Madison Bus Link area. These might be served by expanding BusLink northward to Anderson Lane. A caution is that because Madison Park divides the two unserved areas from the present Bus Link service area, it may be difficult to expand BusLink (at its current set of vehicles) without a deterioration of the service. Accordingly, in August 2009 MTA has determined to expand the BusLink service area to include a smaller portion of the recommended expansion.

Another denser area falling outside the ½ mile buffer is an area between Route 3 West End and Route 7 Hillsboro, part of the Hillsboro-West End area . This area would be a candidate for a neighborhood route or flexible route connecting to the Mall at Green Hills.

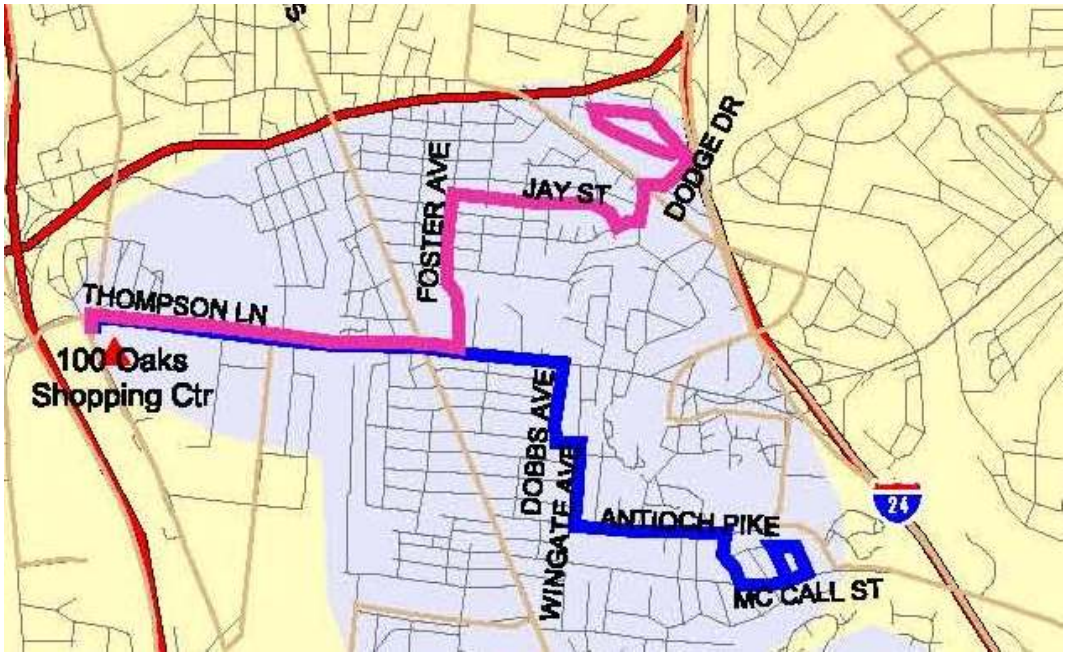
There is also part of the block group south of Huntington on Route 37 Tusculum/ McMurray Express which falls outside the service area for Route 37 Tusculum/ McMurray Express in the area of the Villages of Brentwood. Also, there is an area of greater than 5000 persons per square mile along Bell Road just north of J. Percy Priest Lake . This area is quite some distance from the MTA service area may be infeasible to serve in a cost/effective manner currently, but it will need to be served in the future given growth projections.

One area of higher density where service might be appropriate is located to the south of Route I-440 between Nolensville Road and I-24. As of April 2009, some of this area receives service from MTA Route 72 Edmondson Pike Connector. A set of feeder routes or flexibly routed services would be appropriate to connect neighborhoods north of Route 72 Edmondson Pike Connector with the 100 Oaks facility.

Two routes were suggested previously in the Transit Development Plan which are still appropriate. These are a Woodbine-100 Oaks route and a Glencliff route. The Woodbine-100 Oaks route would connect the Woodbine neighborhood to the 100 Oaks Shopping Center via Jay Street, Foster Avenue, and Thompson Lane. The Glencliff route would connect the Glencliff neighborhood via Antioch Pike, Wingate and Dobbs Avenues, and Thompson Lane. If operated as an interlined service (where the buses alternate between the two routes), two buses would be required to provide 45-minute service between 6:30AM and 8:30PM weekdays and Saturday service from 9:00AM to 7:00PM.

The operating cost for service would be around $700,000 annually and the capital cost for two buses would be $250,000 assuming smaller buses. Figure 8-5 shows the Glencliff and Woodbine Routes.

Figure 8-5: Glencliff and Woodbine Routes




As Davidson County continues to grow, and as areas develop at the fringes of MTA service, there will need to be additional service provided. Current MTA express bus routes to the southwest (Route 37X Tusculum/McMurray Express and 38X Antioch Express) cover areas that are increasing in density, so may merit at least *Frequent Route* service in the future. Route 23 Dickerson Road will need to be extended further north to serve growing employment areas. Route 6 Donelson will need to be extended south of the Hermitage Commuter Rail Station to serve the Summit Medical Center and growing residential areas.

Park and ride lots are another way for the MTA to provide service to suburban areas of lower density. Most of the MTA park and ride lots have capacity, but at 90 percent utilization, the Goodlettsville lot is closest to capacity. Given the high utilization of Route 35X Rivergate Express, the MTA should look for additional capacity along that route, especially if the park and ride lot at Rivergate grows from the 60 percent utilization. *Commuter* Route 41 Golden Valley is one that does not have a park and ride lot, and might benefit from one near White's Creek and Green.

*Areas Outside Davidson County*

The need for transportation connections does not stop at the county boundary, and there are several opportunities for expanding regional connections. The MTA/RTA is providing *Commuter* service to Gallatin and Murfreesboro via Routes 92X Gallatin/Hendersonville Express and 96X Nashville/Murfreesboro Relax and Ride. With additional resources, the frequency of these services could be improved to the half hour frequency standard for peak periods, and park and ride lots added if there are capacity constraints. Also, service commuter service to Franklin would appear to be warranted as growth continues in Williamson County continues.

The need for higher capacity (BRT, light rail or commuter rail) transit service between Davidson County and surrounding counties is continuing to be studied. It is likely that such service will be needed at some point in the future, especially if the groundwork is set with good quality bus linkages.

## Make Service Easier to Use

MTA has taken many steps to increase the user-friendliness of transit. One key step is to make pass use widespread—which eliminates the problem of figuring out what the fare is. MTA was the first in the nation to pilot a program to accept credit cards on all buses. The program was successful overall but MTA determined the technology still had too many limitations and ended the program until further development is made by the farebox and credit card companies.

MTA also has up-to-date system maps with substantial information on routes, schedules, park and ride lots and key destinations. The downtown insert on this map is complex however, and should be improved. Implementation of a Downtown Circulator could help clarify issues of downtown circulation. The available information on routes and schedules on-line is also very helpful.

The installation of ITS equipment expected summer 2009 will provide the capacity to provide customers with real-time information on bus service. This will also make service easier to use by letting customers know when buses are running off schedule. Especially when service is scheduled infrequently, this information will help customers feel less concerned about missing their bus.

MTA will look to provide an additional marketing budget for helping non-users learn how to use the service. This effort has already begun with an excellent video created by Transit Now which is available on the MTA website. This effort should be expanded to include information about particular routes—for example, how to read a particular route map. It might also indicate how to get to important destinations such as the airport. Finally, this video should be marketed to MTA employer partners and through other MTA email lists. A marketing program that regularly reminds people to use transit through promotions and other techniques can be very cost effective as well.

There has been concern expressed that the MTA system is too complex—that there are too many route branches and patterns. However, two experienced TranSystems schedulers examined the system and find that it is much less complicated than most systems.[iii] The assessment from these analyses is that the services provide excellent coverage, especially given the low population densities in Davidson County. The services are also relatively simple—having fewer branches and patterns than those of similar systems.

When APCs become widely available for counting passengers, the MTA may want to revisit the various branches that it currently has. For example, although Route 17 is in the “Most Frequent” category, service on its two branches does not meet the minimum standard of service every half hour during the day. Solutions for improving the service effectiveness of Route 17 include combining the branches so that service would be more frequent, adding service so the branches have better service, or reducing service all around so that it moves into the “Frequent” category. Good data on ridership by route segment and time period is needed to determine if any of these options makes sense.[iv] Given development at 100 Oaks Mall, the future for Route 17 should be strong.

A final key recommendation for making the system more simple does require additional funding. In the past in order to cut service without eliminating coverage, the MTA combined pairs of routes in the evening—increasing the complexity of service to keep some service available. Routes 4 Shelby and 20 Scott, 28 Meridan and 30 McFerrin, 2 Belmont and 7 Hillsboro, and 19 Herman and 29 Jefferson are still combined in the evening so that one route is outbound and another inbound. Passengers may have to ride out on one route and back in part-way to reach their destination. MTA has been undoing those pairs as funding permit and sees this as an important step to increase service simplicity as well as the speed of service.

## Improve the Image of Transit

The MTA has already taken many steps to improve the image of transit. The Music City Central Station is a new state-of-the-art facility that replaced our street level transfer site which resulted in crowded downtown sidewalks. The well lit areas, with heated customer waiting areas, provide a new look for downtown transit.

The new buses being utilized for BRT service will also improve the image of transit. Similarly better bus stop designs for the BRT service will help.

MTA's widespread program to provide transit passes through employers means that more people may see themselves as potential transit riders which improves the general image of transit customers as "being like me.".

Research has shown that for all transit a continued and targeted message to identified sub-markets of the user and potential user population is essential for continued growth of the system. Segmented and targeted marketing augments the strong public relations and advertising that is currently done by the MTA. In particular, the MTA should develop a targeted marketing campaign to help get out the word for the Gallatin Road BRT and any new services.

## Environmental Opportunities

MTA can contribute greatly to providing an environmentally friendly lifestyle in Nashville and a focus by MTA on improving the environment can also have financial benefits. This Strategic Transit Master Plan focuses on both of these issues.

The first focus is concerned with reducing the adverse impacts of transit operations on the environment. The MTA has already taken steps in this direction such as ordering six hybrid articulated buses and utilizing several hybrid vehicle fleet cars. In addition, the MTA provides bike racks to allow customers to combine green modes.

There are, however, a wide range of other possible actions. The FTA has established a "Clearinghouse of Transit Agency Sustainable Practices" which currently provides information on the practices of nine agencies. Sample practices from these agencies include:

- Supporting sustainable development practices
- Green building practices:
    - using environmentally "friendlier" (e.g., low VOC paints and calks) materials
    - using recycled materials in construction (e.g., using fly ash in the concrete)
    - using more energy efficient materials
    - redesigning paint booths to minimize paint waste and VOC emissions
    - installing photovoltaic panels to generate clean energy at main facilities and at remote bus stops
    - increasing the use of natural day lighting
    - using heat recovery units to pre-warm incoming air using warm exhaust air (At one NY garage and maintenance facility this reduced heating energy costs by 48%)
    - increasing the use of natural ventilation to minimize the need for mechanical ventilation
- Conserving electricity through the use of LEDs and fluorescent lighting
- Conserving water through rainwater collection and "grey water" (e.g., bus wash water) reuse
- Increasing the use of "clean fuels" such as ultra-low sulfur diesel fuel, bio-diesel, and natural gas
- Using cleaner bus engines and technology such as four-stroke rather than two-stroke engines, diesel particulate filters, and hybrid-electric power systems

Most of these sustainable practices can result in operating and maintenance cost savings to a transit agency. Examples of practices with cost savings include efforts to conserve electricity and water, and the use of photovoltaic panels and heat recovery units. Even projects like the redesign of the paint booths can reduce costs by reducing the amount of wasted paint, and therefore the agency's cost of supplies.

The second focus is environmentally related financing of transit. There are three principal categories of activities:

- Using funds allocated to improving the environment to fund transit improvements
- Using taxes related (directly or indirectly) to the generation of pollution to fund transit
- Selling carbon credits derived from transit operation

Using funds allocated to improving the environment is the concept that has long been behind using CMAQ funds for transit. More recently, California passed a referendum to fight global warming that provides funds which can be used for transit. Similarly, in 2006 the Canadian government shifted some environmental funding to providing a 15.25% income tax credit for the cost of monthly, bus, subway, train, or ferry passes.

Using taxes which are indirectly related to pollution to fund transit has also been used in the United States. Two such taxes are gas taxes and parking taxes. Gas taxes are favored by many as a source of funding as they can increase transit ridership (by raising the cost of auto travel); thereby reducing the pollution of congestion caused by auto travel, while simultaneously providing the revenue required by transit. Parking taxes, especially in the downtown or other congested areas, provide a similar set of benefits, but more targeted to reducing congestion and pollution in downtown, the region best served by transit. A final type of tax or fee would be congestion or cordon pricing, such as charging vehicles to enter downtown, or another specified area, whether or not they park. Such a fee can vary by day of week and time of day, or even based on the current congestion level downtown. These fees have been successful in many cities around the world, including London and Stockholm; however they have not yet been adopted in any US city. New York City Mayor Bloomberg proposed a congestion pricing plan last year with 100% of the revenues going to fund transit. This required approval by the state legislature, which was not obtained, due in large part to objections by legislators from the outer boroughs of New York City as well as from surrounding areas.

One promising source of financing for transit in the future is income that could be derived from sales of carbon credits. This has been successfully implemented in Milan, Italy, where carbon credits were sold on the basis of carbon savings from implementing their BRT service. Such an approach has not been implemented elsewhere due to a lack of consensus regarding the method for computing the carbon credits, e.g., who should get credit for a trip switching from single occupancy vehicle to transit and how should the carbon savings from that trip be calculated. The American Public Transit Association (APTA) has argued to Congress, and in other forums, that transit should receive revenues for reducing greenhouse gas emissions through carbon credit or cap-and-trade programs and has been working with the Climate Registry, a nonprofit collaboration of North American governments and companies, to develop a protocol for reporting carbon and greenhouse gas reductions.

MTA can help to set the stage for claiming credits by documenting the value of various actions and investments taken by the MTA, following the protocols that are ultimately adopted by the Climate Registry, and including environmental weighting in the evaluation of future actions. The MTA Service Analyzer will be an excellent tool for estimating the change in mode split from auto to transit given various actions by the MTA.

## Summary of Opportunities

Chapter 8 discussed the various types of opportunities for the MTA to pursue to improve transit in Nashville/Davidson County. These start with bringing service to standards proposed by the *Service Delivery Policy* though frequency improvements. Other opportunities discussed are ways to speed service, serve new areas, simplify service and improve the image of transit. Environmental initiatives can also help improve the MTA's green image. Finally, the regional environmental impact of actions taken by the MTA in improving service may have value if a future financial market rewards reduction of greenhouse gases.

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[i] TCRP Report 95 Traveler Response to Transportation System Changes, Chapter 9, Transit Scheduling and Frequency, TRB, 2004.

[ii] Downtown Community Plan, Current Conditions Chapter, Metro Planning Department. Adopted Feb 22, 2007, p. 33. Downtown Nashville had 45,000 workers in 2005 and was expected to have 55,000 in 2010.

[iii] James Wensley of TranSystems helped plan the service changes for the MTA Central Station. He has done successful routing and scheduling studies throughout the United States (Honolulu, Washington DC, San Juan, Sevierville, Bridgeport, Kalamazoo, among others). David Phillips of TranSystems worked for years as a scheduler for the Chicago Transit Authority.

[iv] The MTA will receive passenger counters in the summer of 2009 and these should be used to get a detailed reading on routes that are underperforming as well as those that might be exceeding loading standards.

# Chapter 9 Summary of Recommendations for the Short, Mid and Long-Term

This chapter summarizes the recommendations into three distinct timeframes – or phases.

- Short Term – 2009-2015 – the main focus of this *Strategic Transit Master Plan*
- Mid Term – 2016-2025
- Long Term – 2026-2035

## Short Term Recommendations (2009-2015)

*General Recommendation 1*

Adopt a *Service Delivery Policy.* The policy (Appendix C) provides general guidance on where to put fixed route bus service, how much service to provide, and how to evaluate service.

*General Recommendation 2*

*Work with Metro Government, the MPO, Cumberland Region Tomorrow and other stakeholders to pursue a dedicated funding source for public transportation*. Such a dedicated funding source will be important for continuing the MTA's progress in improving public transportation in Nashville/Davidson County. The new regional transit enabling legislation provides an exciting opportunity to move towards this goal.

*General Recommendation 3*

*Implement 'green' building practices as part of all facility upgrades or renovations*. Continue to move towards a hybrid bus fleet with bus replacements.

*Short Term Recommendation 1: Implement BRT on Gallatin Road*

*Implement a BRT service for Gallatin Road*. The recommended BRT service will improve service frequency in the corridor, increase speed of many trips, improve signage, and improve the image of transit. In short, BRT will make improvements in 4 out of the 5 priority categories. The increased operating cost for the recommenced service is $2.3M per year. The increase in capital cost will be $9.4M, broken down as follows.

Table 9-1: BRT Capital Costs

| BRT Capital Cost Item | Cost |
|---|---|
| 5 Additional BRT Buses | $5.1M |
| Cumberland River Bridge Lane | nominal |
| Signal Priority | $0.5M |
| Real-Time Info | $0.2M |
| Enhanced Stations | $2M |
| Branding & Marketing | $50,000 |
| Contingency (20%) | $1.6M |
| **Total** | **$9.4M** |

*Short Term Recommendation 2: Increase Frequencies on Eleven Routes*

*Provide frequency improvements on eleven routes to bring them up to minimums as described in the Service Delivery Policy*. Note that many of these suggested service additions are in off-peak hours which do not require additional vehicles, and which can provide an excellent boost to ridership. The total operating cost per year for these improvements is estimated at $1,156,000 and the capital cost for new buses at $300,000 each is $5.1 M.

Table 9-2: Frequency Recommendations

| Route No. | Route Name | Span of Service of Concern for Frequency/Head-way Adjustments | Current Headways (in minutes) | Service Class Recom-mended Maximum Headways (in minutes) |
|---|---|---|---|---|
| 2 | Belmont | Weekday Midday | 70 | 60 |
| | | Weekday Evening | 70 | 60 |
| 6 | Lebanon Road | Weekday Midday | 90 | 60 |
| | | Weekday Evening | 70 | 60 |
| 8 | 8th Avenue South | Saturday | 60-120 | 60 |
| | | Sunday | 60-120 | 60 |
| 23 | Dickerson Road | Weekday Midday | 35 | 30 |
| 28 | Meridian | Weekday Midday | 50 | 30 |
| 24X | Bellevue Express | Weekday Peak | 20-45 | 30 |
| 33X | Hickory Hollow - Hickory Plaza Express | Weekday Peak | 30-60 | 30 |
| 35X | Rivergate Express | Weekday Peak | 10-40 | 30 |
| 37X | Tusculum Express | Weekday Peak | 90 | 30 |
| 38X | Antioch Express | Weekday Peak | 25-60 | 30 |
| 41 | Golden Valley | Weekday Peak | 60 | 30 |

*Short Term Recommendation 3: Implement a Downtown Circulator*

*Institute a Downtown Circulator to provide better connections between transit facilities such as the Music City Central, the Music City Star, state office buildings, downtown businesses and residents, and tourist destinations*. The Downtown Circulator will speed transit service as it will provide very frequent pickups for any passenger arriving in the downtown.

While the exact routing(s) have not yet been worked out the service can be estimated to require 4 buses to provide a very frequent level of service. Operating 17 hours a day weekdays and 8 hours a day on Saturdays and Sundays would cost around $1.8 M for operations and $1.3M for vehicles and specially signed bus stops.

*Short Term Recommendation 4: Provide Service to a New or Unserved Area*

*Reserve an amount of funding for service to a new or unserved area*. While the densities in most unserved areas are not sufficient to recommend fixed route services, the MTA's BusLink service (flexibly routed service) can link lower density neighborhoods with important destinations and other fixed route services. The capital cost of vehicles could be lower for such services as well. A budget of $700,000 would allow for two buses operating 12 hours weekdays and 10 hours on Saturday. The MTA implemented a BusLink service in Madison in April of 2009. An additional amount is recommended in the near term to provide service for another (unspecified) area.

*Short Term Recommendation 5: Increase Marketing*

*Provide an additional marketing budget for helping non-users to learn how to use the service*. This effort has already begun with an excellent video created by Transit Now which is available on the MTA website. This effort should be expanded to include information about particular routes—for example, how to read a particular route map. It might also indicate how to get to important destinations such as the airport. Finally, this video should be marketed to MTA employer partners and through other MTA email lists. A budget of $30,000 is recommended to expand this project. Note that BRT implementation also calls for a special marketing budget of $50,000.

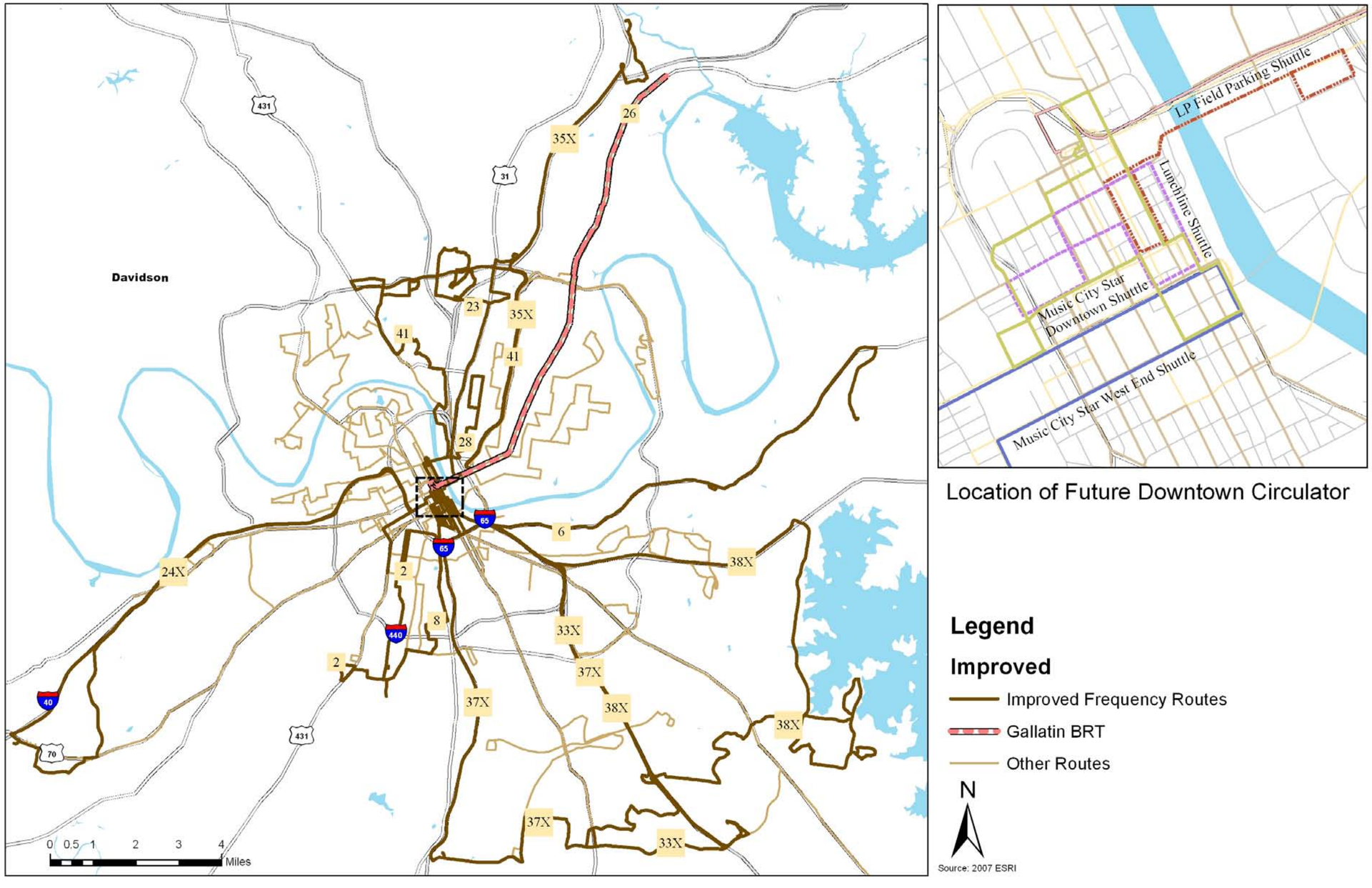
The table below summarizes the short-term recommended investments/improved services for the MTA along with the five priority areas for improvement: As can be seen, all of the priority areas are affected by the improvements.

Table 9-3: Recommended MTA Improvements and Priority Areas

| Service | Operating Cost ($1000) | Capital Cost ($1,000) | Increase Frequency | Faster Transit | Serve New Areas | Easier to Use | Improve Image |
|---|---|---|---|---|---|---|---|
| Gallatin BRT | $2,305 | $9,400 | X | X | | X | X |
| Frequency improvements on 11 routes to bring to minimums | $1,156 | $5,100 | X | | | X | |
| Downtown Circulator | $1,800 | $1,300 | X | X | | X | X |
| Service to new or unserved areas | $700 | $250 | | | X | | |
| Program to show new users how to use the service | $30 | | | | | X | X |
| **Total** | $5,991 | $16,050 | X | X | X | X | X |

The total of the recommended service improvements comes to around $6M in additional operating funding and $16 M in capital funding. These recommended improvements depend upon MTA receiving additional capital and operating funding. However, if these services could be programmed they would go far to improving MTA service and elevating the profile of transit in Nashville / Davidson County. Figure 9-1 following summarizes the short term service recommendations.

Figure 9-1: Short Term Recommendations



## Mid Term Recommendations (2016-2025)

In the mid term, it is assumed that the MTA working with the Mayor's office and Metro Council, Tennessee DOT, the Nashville MPO, Cumberland Region Tomorrow and other stakeholders will be successful in finding a source of dedicated funding for regional transit services. If this is the case, it is likely that the MTA will be able to offer additional regional service. The medium term recommendations for the MTA assume that the MTA has implemented the *Service Delivery Policy* and that the Automatic Passenger Counters (APCs) have been installed successfully and are providing useful data on ridership by trip.

*General Recommendation 1: Reallocate Service Using Trip by Trip Ridership Data*

A general recommendation is that the service be monitored using the APC data to ensure that buses are reallocated to routes that exceed loading standards during heavy periods from routes that score lower on cost and service effectiveness. The objective would be to re-allocate service so there is no net increase in costs.

*Mid Term Recommendation 1: Extend Gallatin Road BRT from the MCC to West End / Vanderbilt*

This option has many benefits including providing a higher quality connection between two major employment centers, eliminating one of the larger transfers on the system (between Routes 26 Gallatin and 7 Hillsboro), and adding capacity to the portion of Route 7 Hillsboro where buses sometimes have standing-room-only due to the short distance passengers. Institution of this service may replace some of the downtown circulator service.

*Mid Term Recommendation 2: Improve Night Service on Certain Routes*

This recommendation is to improve frequency and simplicity of schedules for certain route pairs in the evening. Routes 4 Shelby and 20 Scott, 28 Meridan and 30 McFerrin, 2 Belmont and 7 Hillsboro, and 19 Herman and 29 Jefferson, have been combined in the evening so that one route is outbound and another inbound. Passengers may have to ride out on one route and back in part-way to reach their destination. Evening service should be restored to these routes so that the route patterns are the same as during the day.

*Mid Term Recommendation 3: Institute Mini-Hubs*

The mini-hub concept should be investigated further and refined using the Mobility Tracker to test alternatives. In the medium term with BRT development, it is likely that the Gallatin Road mini-hub will become attractive. Thus two mini-hubs are recommended:

- Clarksville Pike Mini-Hub
- Gallatin Road Mini-Hub

*Mid Term Recommendation 4: Implement BRT Service Elements on Other Arterials*

If the use of traffic signal priority and limited stops is proven on Gallatin Road, then a similar priority system should be implemented on Murfreesboro Road, Dickerson Road and Nolensville Road. Service would elements would include reduced stops, traffic signal priority, improved stops, better buses, and increased service.

*Mid Term Recommendation 5: Expand Park and Ride Service*

Additional park and ride capacity should be found for Route 35X Rivergate Express near the Kmart-Goodlettsville area. Also park and ride facilities should be provided for Route 41 Golden Valley near Whites Creek and Green. Park and ride service should be extended to Rutherford, Sumner and Williamson Counties. In particular, half hour service should be offered during the peak hour to Murfreesboro and Gallatin. Park and ride service to Franklin should be instituted.

*Mid Term Recommendation 6: Institute Service in Unserved Neighborhoods*

A number of improvements are recommended to provide service to unserved neighborhoods, particularly those of greater than 5000 persons per square mile. Two such areas are to the east of Gallatin Pike and just north of the new Madison Bus Link area. These areas can be served by increasing and expanding the Madison Bus Link service northward to Anderson Lane.

Another denser area falling outside the ½ mile buffer is an area between Routes 3 West End and 7 Hillsboro, part of the Hillsboro-West End area. This area would be a candidate for a neighborhood route or flexible route connecting to the Mall at Green Hills.

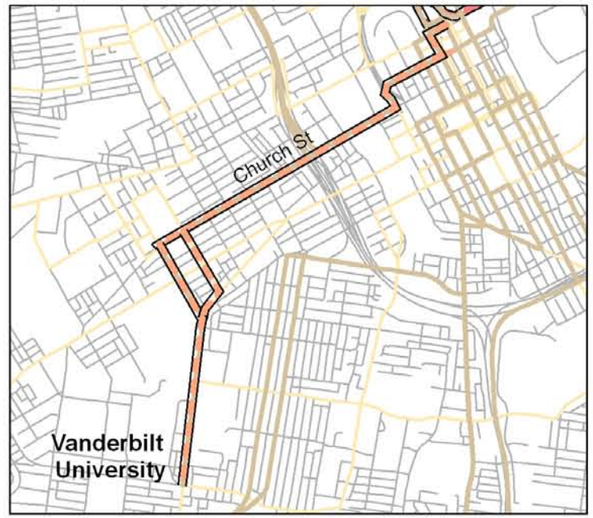
A larger area of density greater than 5000 persons per square mile is south of I-440 between MTA Route 12 and I-24. To service this area, two connector routes are suggested for the Glencliff and Woodbine communities. Alternatively, a flexibly routed service could be instituted in the area.

*Mid Term Recommendation 7: Improved System Map and Increased Marketing*

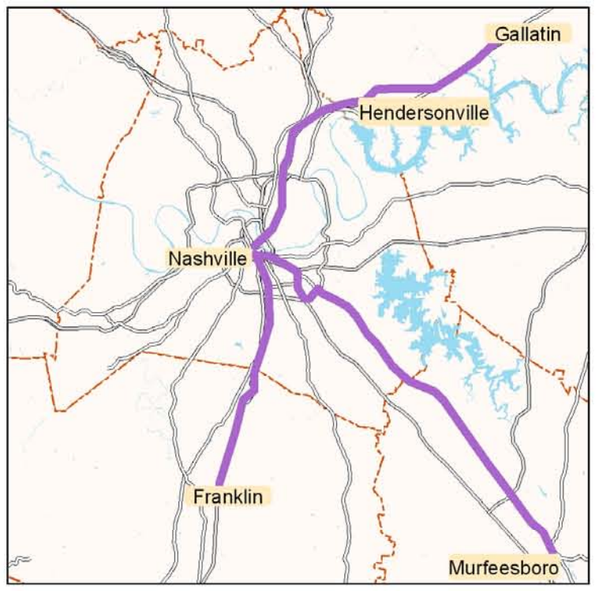
The system map should be improved to clarify the paths of bus routes in the downtown. Targeted marketing campaigns should be instituted for each new or improved service.

Figure 9-2 following shows both the short and medium term service recommendations.

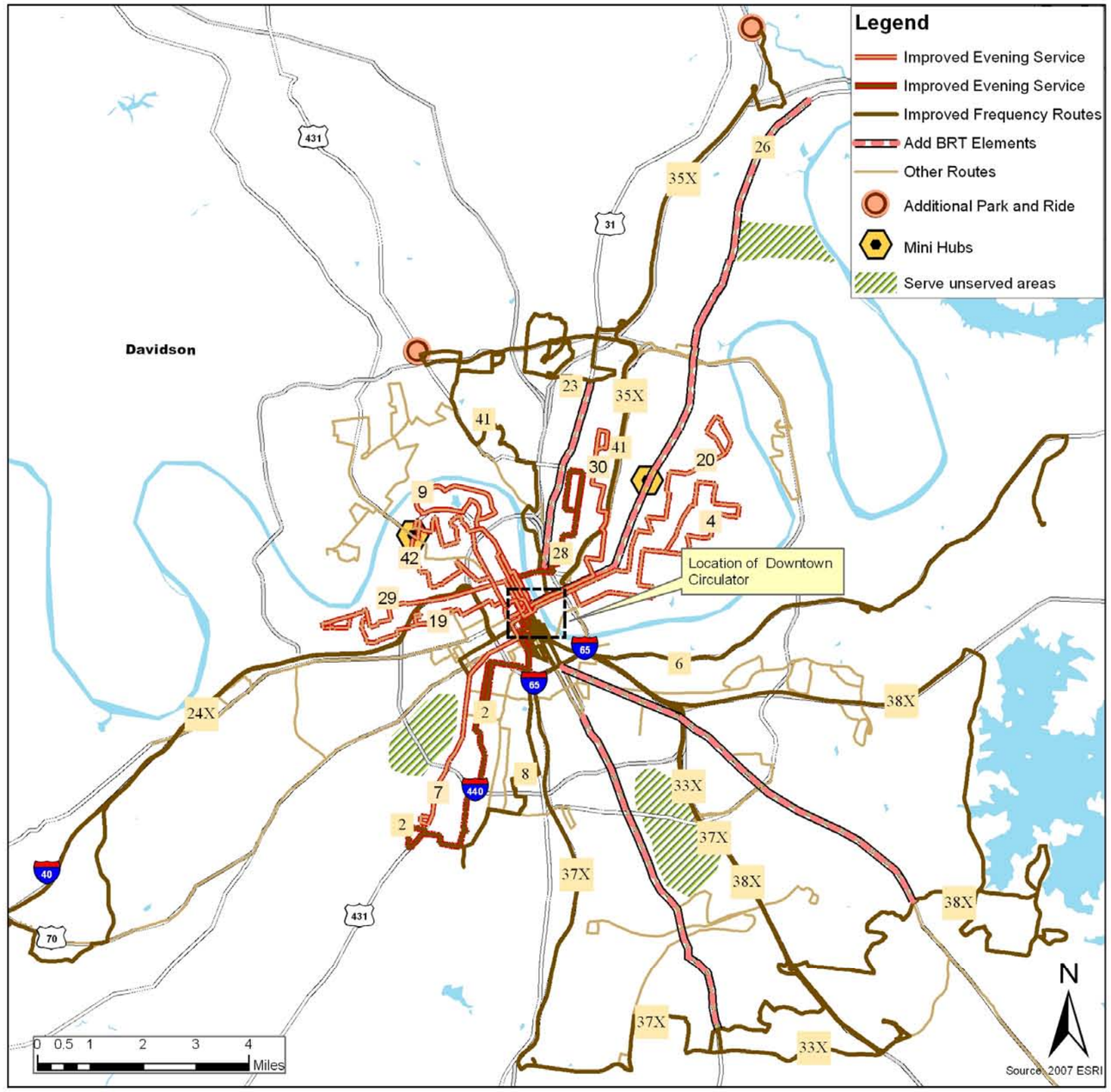
Figure 9-2: Short and Mid Term Recommendations




BRT Extension to Vanderbilt/ Western Avenue




Expand Regional Commuter Service



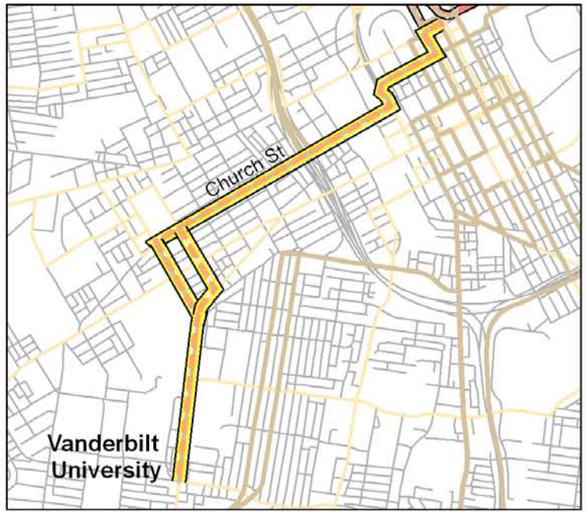
### Long Term Recommendations (2026-2035)

In the longer term, it is assumed that the MTA will play a larger regional role in improving inter-regional connecting service in accordance with regional alternative analysis studies. Given the expected population and employment changes within Davidson County, the following types of improvements can be contemplated:

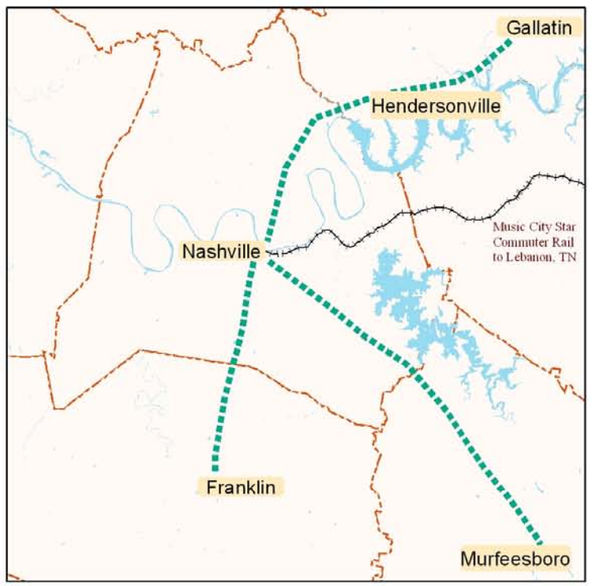
- Extend Route 23 Dickerson Road to reach emerging employment areas north of the current service area.
- Extend Route 6 Lebanon Road southward to reach new developing communities and employment areas, including Summit Medical Center.
- Further improve transit capacity between downtown Nashville and the West End with dedicated bus lanes, queue jump lanes or streetcar service.
- Provide high capacity service (BRT, light rail or commuter rail) to Rutherford, Sumner and Williamson Counties. If BRT service, improve existing right-of-way for buses with exclusive lanes or queue jump lanes.
- Provide additional service to the developing neighborhoods currently served by Route 37X Tusculum/McMurray Express and Route 38X Antioch Express. These neighborhoods are expected to reach densities that would justify more than peak hour service. The express bus services could be expanded throughout the day and into the early evening or alternatively, the service could be used to connect with the regional high capacity service.
- Institute an additional mini-hub at 100 Oaks to improve connections.

Figure 9-3 following shows the short, mid and long term recommendations for service improvements for the MTA.

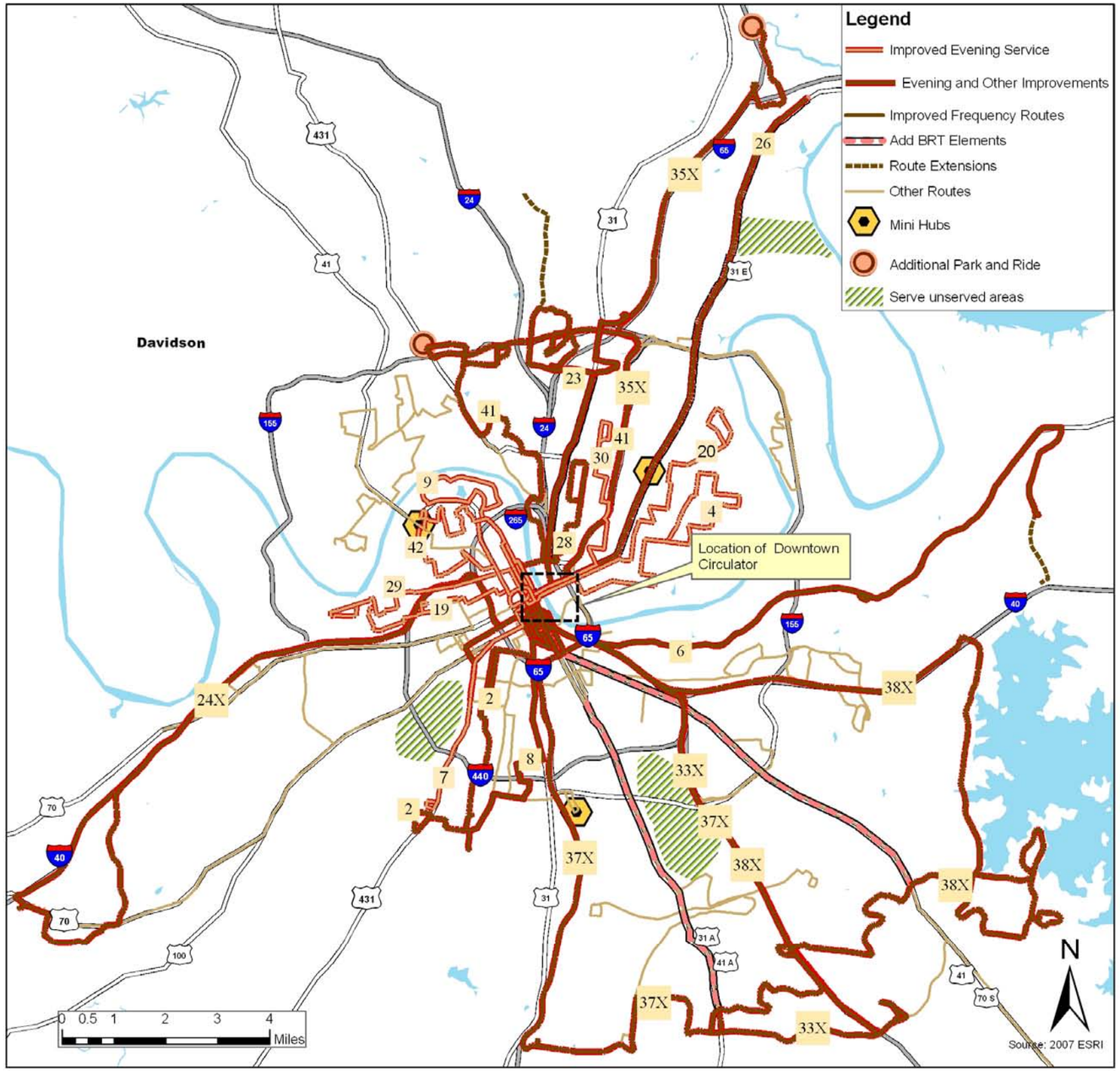
Figure 9-3: Short, Mid and Long Term Recommendations




High Capacity Improvements ( Light Rail or BRT Queue Jumps/Reserved Lanes)




High Capacity Regional Connections



## Summary

The Strategic Master Plan recommendations in the short, mid and long term for MTA service focus on bringing service to minimum standards and improving the speed, image and simplicity of service. Additional service is recommended for unserved areas, particularly those that exceed 5000 persons per square mile. The implementation of Bus Rapid Transit (BRT) in stages is a key component of the recommendations in each time-frame, starting with a Gallatin Road BRT in the short-term. In the medium term the Gallatin BRT is expanded to Vanderbilt and the West End and BRT elements are added to additional high ridership routes. Another key recommendation is to institute a downtown circulator to serve the variety of worker and tourist needs. Other recommendations recognize the need to provide better service to commuters in Davidson County and high quality connecting service to other communities outside Davidson County. Table 9-3 summarizes the recommendations for each time period.

Table 9-4 Summary Table of Projects for Nashville MTA

| Short Term Actions (2009-2015) |
|---|
| Adopt a Service Delivery Policy |
| Pursue a dedicated funding source for public transportation |
| Implement 'green' building practices and continue to acquire hybrid buses |
| Implement BRT on Gallatin Road |
| Increase frequencies on eleven routes to bring them up to minimum standards |
| Implement a downtown circulator |
| Provide service to a new or unserved neighborhood |
| Provide a budget for increased marketing to help non-users learn how to use the MTA service. Provide a targeted marketing campaign for the Gallatin BRT. |
| **Mid Term Actions (2016-2025)** |
| Reallocate service using trip by trip ridership data from the Automatic Passenger Counters |
| Extend the Gallatin Road BRT from Music City Central to West End/Vanderbilt |
| Improve night service on routes currently paired routes: (Routes 4 Shelby and 20 Scott, 28 Meridan and 30 McFerrin, 2 Belmont and 7 Hillsboro, and 19 Herman and 29 Jefferson |
| Institute mini-hubs on Clarksville Pike and Gallatin Road to serve multiple routes |
| Implement BRT service elements such as fewer and nicer stops, traffic signal priority, better buses and increased service on Murfreesboro Road, Dickerson Road and Nolensville Road. |
| Expand park and ride capacity for Route 35X Rivergate Express near Kmart-Goodlettsville. Add park and ride capacity to Route 41 Golden Valley. Provide and improve park and ride service to Rutherford, Sumner, Williamson and Davidson Counties. |
| Expand the Madison Bus Link northward to Anderson Lane. Add fixed or flexible service from the Hillsboro-West End area to connect to the Mall at Green Hills. Add fixed or flexible service from the Glencliff and Woodbine neighborhoods to the 100 Oaks facility. |
| Revise downtown system map to clarify routes in the downtown. Provide a targeted marketing campaign for new and improved services. |
| **Long Term Actions (2026-2035)** |
| Extend Route 23, Dickerson, to reach employment areas north of the current service area. |
| Extend Route 6 Lebanon Road to developing communities and Summit Medical Center |
| Further improve transit capacity between downtown Nashville and the West End with dedicated or queue jump lanes or streetcar service |
| Provide high capacity service (BRT with queue jumps, light rail or commuter rail) to Rutherford, Sumner and Williamson Counties). |
| Provide Frequent service to developing neighborhoods served by Route 37X Tusculum/McMurray Express and route 38X Antioch Express. |
| Institute a mini-hub at 100 Oaks Road. |

# Appendix A: Features and Use of the MTA *Service Analyzer*

## Development of the MTA Service Analyzer

The "MTA Service Analyzer" is a tool that can help MTA identify transit needs, and evaluate proposed transit alternatives. It is an add-on program to the TransCAD geographic information system. The program shows how well public transportation serves travelers to and from various parts of Nashville/Davidson County. It generates thematic maps, tabular data, and summary statistics that can readily highlight opportunities for service improvements. It also provides quantitative information on service hours—thus system costs—and ridership changes in response to alternative service scenarios.

The MTA Service Analyzer contains a detailed representation of MTA routes as well as the underlying road network. The road network includes *all* roads in Davidson County (with added roads for the route of the MTA 96 bus to Murfreesboro). This complete network is far more detailed than the representational network used by the Nashville MPO in its transportation models. The comprehensiveness allows for a fair representation of walking paths to any bus stop, and it allows MTA planners to test new or modified bus routes along any road in the county.

The original idea for the MTA Service Analyzer was to use origin/destination (OD) data from the 2006 MTA passenger survey to determine: 1) how the MTA is serving existing trips and 2) how route and schedule changes might improve transit service for current passengers. However, it became apparent early on that the OD data were too sparse on certain routes to adequately represent current customers. The model *does* examine the 2006 OD data, but the data limitations prompted us to include in the model other information about trip patterns.

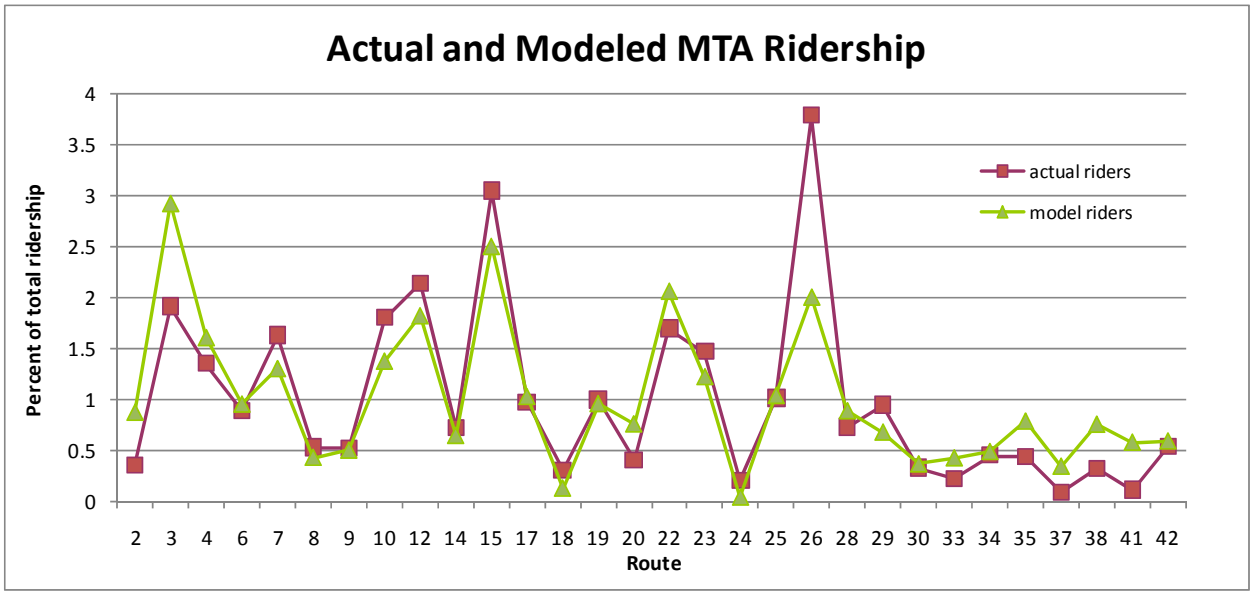
The first of these was the Journey to Work data from the 2000 census. This data, based on long-form census surveys to one in six households, shows commute trips between each of the metropolitan area's 162 census tracts.

The second source was the Nashville MPO, which provided trip tables for commute and other trip purposes between each of the 1,097 transportation analysis zones (TAZs) in the area covered by the MTA Service Analyzer. The MPO synthesized these trip matrices based on demographic and economic land use data, and with further calibration to match area highway volumes and other travel parameters. The MPO trip matrices are thus the best data available on the full set of trips within the region. The small size of the TAZs has the further advantage

We received the TAZ data in January 2009. It took some time to get the model working with the new TAZ data, but ultimately the model was able to use this data to represent the current MTA service reasonably well. Figure A-1 compares ridership as estimated by the model with actual ridership on each route in the system. These numbers are quite close for most routes, although routes 26 and 3 have large deviations.

Development of the MTA Service Analyzer occurred simultaneously with work on the Strategic Master Plan. We thus did not have the benefit of the completed MTA Service Analyzer until near the end of the process. We were nonetheless able to learn from the model throughout the project. The next section describes insights coming from the MTA Service Analyzer.

Figure A-1: MTA Service Analyzer Ridership Forecast Using TAZ Data Versus Actual Ridership




## Insights from the MTA Service Analyzer

By December of 2008, the MTA Service Analyzer was available for some analysis using census tract level data. Figure A-2 below provides graphical output from the model that indicates the relative share of income adjusted total jobs in a census tract and also the percent of those jobs that can be accessed by public transportation. In Figure A-2, the green portion of each pie shows the proportion of work trips to the zone where public transportation is a reasonable alternative. The blue indicates the proportion of work trips where public transportation is not a reasonable alternative. The red indicates the proportion of work trips that would be made by walking. The effect of the income adjustment is to weigh the trips more heavily if they are from a tract with lower income. This helps to highlight the trips with the highest propensity to use transit.

Examining Figure A-2, the corridor between downtown Nashville and the Vanderbilt Medical Center area shows up as a corridor with a large number of jobs. Improving transit to the Vanderbilt area—perhaps by increasing service between downtown and Vanderbilt would be suggested by this graphic. The idea of extending the proposed Route 26 BRT service beyond Music City Central to Vanderbilt would be supported by this analysis.

Figure A-3 shows the top 50 work flows in the area poorly served by public transportation. This map also shows flows weighted by income, so that lower income residential census tract work trips are weighted heavier than higher income trips. This analysis reveals that many of these work flows are coming from outside Nashville/Davidson County—pointing to the need for an expanded transit capability for the greater region. Another large unserved work flow is to the Opry Mills area from neighborhoods to the east of downtown. The MTA has not been successful in its attempts at providing cross-town service or service to Opry Mills, thus we did not recommend trying to meet this need at this time. However, as development continues in the future, the MTA may want to reconsider service to this area. The MTA Service Analyzer could be used to examine the potential for public transportation to serve this cross-town need.

Figure A-4 shows the way that the MTA Service Analyzer assigned trips to the different MTA routes, including the new Route 72 that was to be implemented in March of 2009. The MTA Service Analyzer predicted that Route 72 would have a similar ridership to Route 28 (about 19,500 riders per month based on 2007 data). However, work trips for the Correctional Development Center at the eastern end of Route 72 were not represented in the Journey to Work census data. Once Nashville MTA becomes familiar with the model, it will be important to make corrections in the underlying data to allow for special trip generators such as the Correctional Development Center.

Figure A-2: Transit Availability for Work Trips by Census Tract (Using Journey to Work Data)

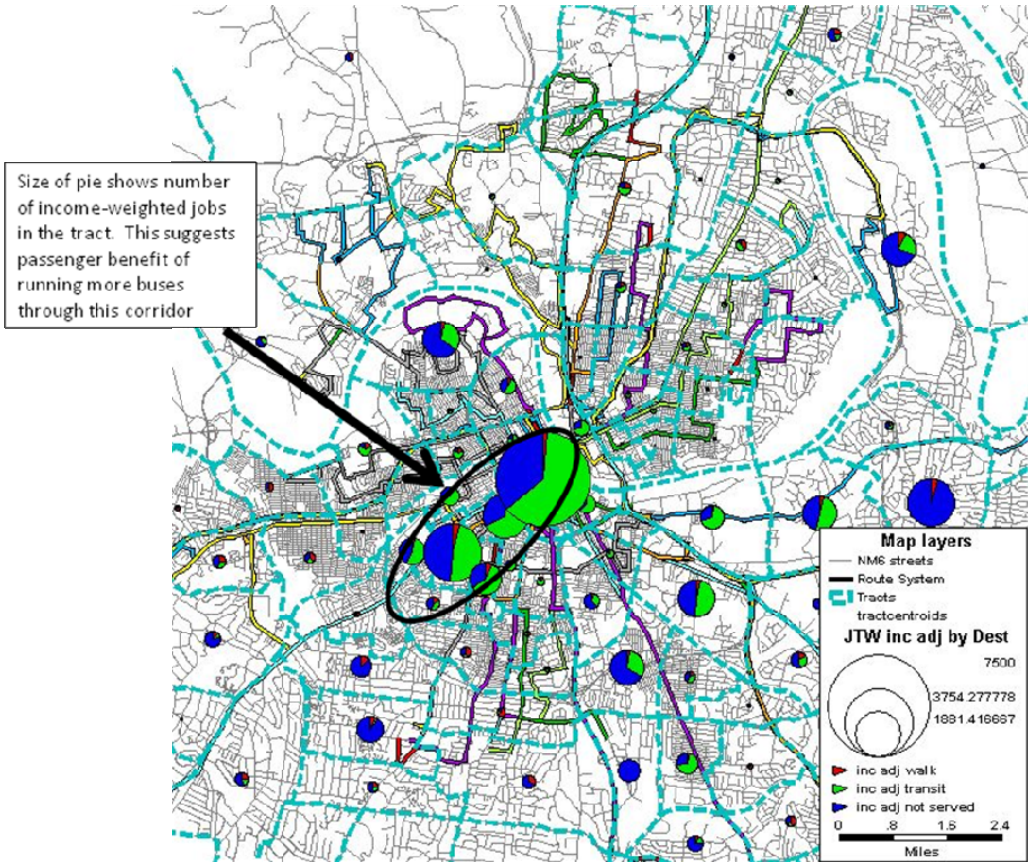


Figure A-3: Top Fifty Work Flows Poorly Served by Public Transportation

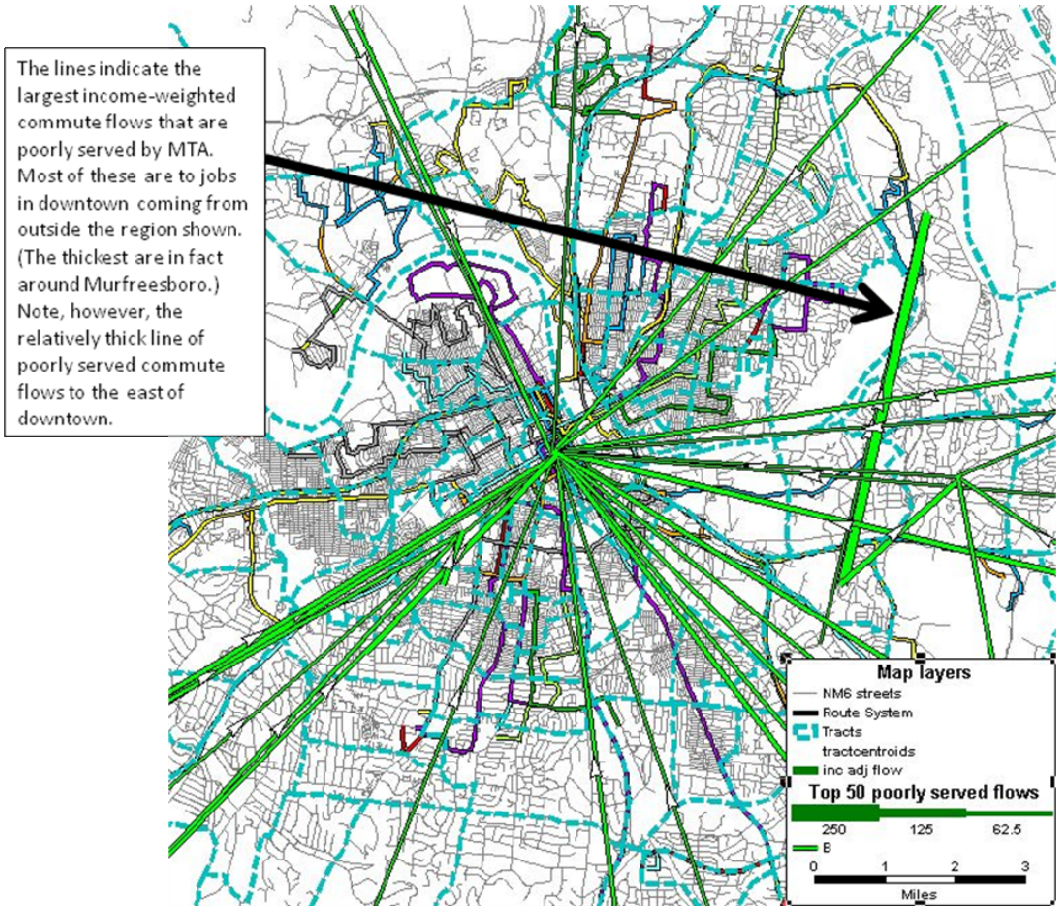
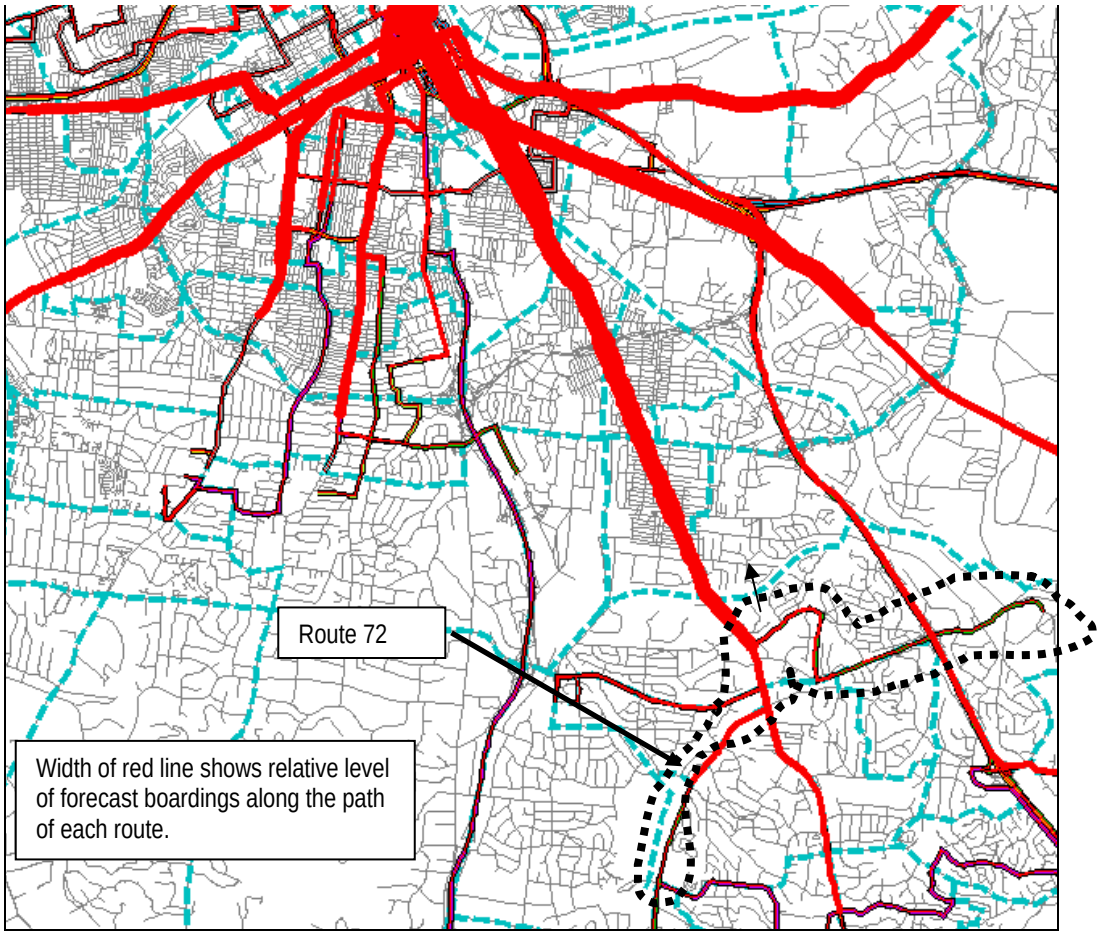


Figure A-4: Transit Ridership on MTA Routes Showing New Route 72




In March of 2009, once the TAZ data had been included in the MTA Service Analyzer, it was used to analyze the mini-hub concepts, which were developed as a way to help with some of the need for connections away from downtown Nashville. While the MTA Service Analyzer did not find that the set of all of the proposed mini-hubs was advantageous, some looked better than others. The data provided include change in ridership by route as well as change in total service time by route. Thus the data allow computation of the cost of the change (by multiplying additional service hours times the MTA cost per hour) and thus the cost per new rider due to the change. The MTA Service Analyzer will allow refinement and improvement of the mini-hub concepts.

# Appendix B: Public Input on MTA Priorities

The Nashville Strategic Master Plan process has been through three sets of public meetings and a daylong stakeholder meeting which have helped to establish priorities for the MTA for its budgeting process. In general, what was heard from the public is that they want more service—more frequent buses to eliminate overcrowding and to reduce waits, more service in the evenings and weekends and service to areas that don't have service. They want service to be faster by eliminating stops or providing cross-town service. And non-riders, in particular, want more information about service. Following is some of the information collected at the public meetings.

## November 2008 Public Meetings

Five public meetings were held over three days in November 2008 to gain initial input from the public regarding Nashville MTA's Strategic Master Plan. Seventy-six people attended the meetings. Following is the meeting schedule and locations:

- Monday, Nov. 17, 2008 from 4 p.m. until 6:30 p.m. at the Madison Library, 610 Gallatin Road
- Tuesday, Nov. 18, 2008 from 7 a.m. until 9 a.m. at Music City Central Community Meeting Room, 400 Charlotte Ave.
- Tuesday, Nov. 18, 2008 from 11 a.m. until 1 p.m. at the Easley Community Center (formerly Rose Community Center) at 1000 Edgehill Ave.
- Wednesday, Nov. 19, 2008 from 11 a.m. until 1 p.m. at the Bordeaux Library, 4000 Clarksville Pike
- Wednesday, Nov. 19, 2008 from 4 p.m. until 6:30 p.m. at University School of Nashville, 2000 Edgehill Ave.

Following are the top issues that emerged from those meetings:

- Hub and spoke system inefficient for riders; crosstown routes needed; park and rides needed. "I can't ride for an hour for a 12-minute drive."
- More express service needed.
- More frequency needed.
- Many buses are too crowded
- Later service hours needed
- Dedicated funding needed
- Need better bus and rail coordination (local, regional, statewide)
- Organize routes around work, medical, shopping. Figure out a way for grocery and other shoppers to more efficiently get their purchases home.
- Need more information and technology solutions, i.e., Google maps, version of MTA website for cell phones, real time info on buses, in shelters, etc.
- Improved safety on student routes
- More sidewalks needed everywhere
- Teach people how to ride the bus. This is a barrier.
- Green solutions desired and valued.
- Attract the less frequent rider.

Questionnaires were distributed at the November 2008 public meetings: Respondents were asked to provide ratings from 1 (least important) to 5 (most important) for the following improvements. There were 76 attendees in all, and 55 provided answers to the questionnaire. As can be seen service frequency was the most important improvement followed by a near tie for better information, on-time performance and making service faster. Note the lowest score for eliminating transfers—which may be a sign of the improvement represented by Music City Central Station.

| Improvement | Number of Respondents Rating 4 or 5 | Total of All Ratings Weighted by Score |
|---|---|---|
| Service frequency | 49 | 242 |
| More info at stops | 39 | 219 |
| On-time performance | 41 | 217 |
| Make service faster | 39 | 217 |
| Connect downtown with major employer | 34 | 207 |
| More shelters | 35 | 206 |
| Service to new neighborhoods | 35 | 201 |
| Eliminate transfers | 27 | 185 |

At the November public meeting held at the University School some participants came with a web survey they had taken of 165 people. Most of those answering were not transit riders. Of those responding, 37 or 22% regularly used the bus. These folks indicated unfamiliarity with routes and schedules in addition to other issues.

| Reasons for Not Taking Transit or Problems if Do | Percent Indicating Problem | Number |
|---|---|---|
| Routes are inconvenient. | 53.8% | 84 |
| It's easier to just drive. | 53.2% | 83 |
| I'm unfamiliar with the routes and schedules. | 45.5% | 71 |
| Travel by bus takes too long. | 44.2% | 69 |
| Buses run at inconvenient times. | 32.1% | 50 |
| It's hard to plan a multi-stop trip. | 31.4% | 49 |
| Buses don't regularly service the area I live or work. | 28.8% | 45 |
| Buses don't regularly service the areas I want to get to. | 22.4% | 35 |
| There's a lack of good bus shelters. | 17.3% | 27 |
| Buses are not reliable. | 14.7% | 23 |
| I'm scared of the bus. | 8.3% | 13 |
| I don’t really have any problems with the bus | 3.8% | 6 |

### December 16 Stakeholder Meeting:

After a discussion of what were the priorities for MTA, 24 stakeholders voted with colored dots to indicate what was most important to them (red was most important, green next, blue next and yellow least). The absolute number of votes is indicated in the first column, whereas the weighted votes are indicated in the second column.

| Item | Votes | Weighted Votes. |
|---|---|---|
| Increase frequency | 12 | 42 |
| Downtown Circulator | 13 | 30 |
| Cross-town routes | 8 | 24 |
| Attracting choice riders | 8 | 21 |
| Public education and marketing | 6 | 17 |
| MTA part of planning process | 5 | 15 |
| Reliability of service | 6 | 14 |
| Provide service to areas with no other transportation | 6 | 12 |
| Improve customer information technology | 5 | 11 |
| Feeder service | 3 | 10 |

### January 2009 Public Meetings

A second round of public meetings to gain public input on the Nashville MTA Strategic Master Plan was held January 20 through January 22, 2009. Five meetings over three days were held throughout Nashville, and attracted 43 attendees. Following is the meeting schedule and locations:

- Tuesday, January 20, 2009 from 11:00 a.m. until 1:00 p.m. at the Antioch Community Center, 5023 Blue Hole Rd.
- Tuesday, January 20, 2009 from 4 p.m. until 6:30 p.m. at the East Library, 206 Gallatin Rd.
- Wednesday, January. 21, 2009 from 7 a.m. until 9 a.m,, Music City Central Community Meeting Room, 400 Charlotte Ave.
- Wednesday, January 21, 2009 from 11 a.m. until 1 p.m., Looby Library, 2301 MetroCenter Blvd.; and
- Thursday, January 22, 2009 from 4 p.m. until 6:30 p.m., University School of Nashville, 2000 Edgehill Ave

The meeting format was open house and information station-style with multiple stations staffed by content experts and a note-taker with graphic boards available illustrating key points and providing a focus for discussion. Five hundred and nineteen attendee comments were documented from the attendees. In general, the attendees liked the opportunities shown including increased frequency on particular routes, Gallatin BRT, downtown circulator and mini-hub concept.

Participants were asked to allocate 100 points between different improvements the MTA could make to indicate their preferences. Following are the results:

| Improvement | Average Points |
|---|---|
| More buses/ more often (increase frequency of buses on key routes) | 28 |
| Faster transit trips (fewer bus stops, traffic signal priority, avoid going downtown to transfer) | 24 |
| Serve new areas (connect to areas that do not have service today) | 22 |
| Easier to use (signage, better access to information, simpler schedules) | 12 |
| Improve the image of transit (marketing, “how to Ride” training, nicer buses, nicer shelters & benches at stops) | 14 |
| TOTAL POINTS | 100 |

Participants were also presented with specific ideas for improving MTA service and asked to rate these ideas on a 1 to 5 scale. These ratings did not show great distinctions among the proposed services, but BRT was rated the highest. Following are the ratings:

| Improvement | Average Points |
|---|---|
| BRT | 4.5 |
| Mini-Hubs | 4.3 |
| More frequent service on specific routes | 4.3 |
| Downtown Circulator | 4.1 |

### July 2009 Public Meetings

A final round of public meetings to gain public input on the Nashville MTA Strategic Master Plan was held July 28 through July 30, 2009. Four meetings over three days were held throughout Nashville, and attracted 80 attendees. Following is the meeting schedule and locations: The meeting format was presentation-style followed by questions and answers. Graphic boards were available illustrating key points and providing a focus for discussion before and after the presentation.

- Tuesday, July 28, 2009 from 5:00 p.m. until 6:30 p.m. at the North Library, 1001 Monroe St.
- Wednesday, July 29, 2009 from 11:30 a.m. until 1:00 p.m. at Music City Central Community Meeting Room, 400 Charlotte Ave.
- Wednesday, July 29, 2009 from 5:00 p.m. until 6:30 p.m. at the Southeast Library at 2325 Hickory Highlands Dr., Antioch.
- Thursday, July 30, 2009 from 5:00 p.m. until 6:30 p.m., Green Hills Library at 3701 Benham Ave.

Meeting attendees included a strong mix of riders, most of whom are calling for more transit, more frequent transit, expansion of service into evening and weekend hours, additional fare choices, and interconnectivity with regional transit. One hundred and eighty-five attendee comments were documented.

Publicity for the meetings included a news release, Web banner for partner Web sites, email blasts to distribution lists, posted bus signs, fliers posted in neighborhood one week before, day-of-meeting outdoor and locale signage, and ads in the City Paper and El Crucero.

In general, people seemed pleased with the plan. There were many comments unrelated to the plan including several from those opposed to higher fares and paying a double fare when transferring. There were also many complaints and concerns about teenagers on the buses. There were calls for more service and crosstown routes. People were interested in learning more about the Gallatin BRT, the downtown circulator and the mini-hubs.

APPENDIX C

# MTA SERVICE DELIVERY POLICY

Nashville Metropolitan Transit Authority

August 27, 2009

Nashville MTA

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# 1 The Need for a Service Delivery Policy

The objective of this *Service Delivery Policy* is to provide a written policy and a set of standards which can be used to evaluate MTA service as well as requests for service. The policy can also help guide MTA in making service changes when merited by budget or to increase service efficiency and effectiveness. While service policies are all a little different, they cover similar things like geographic coverage, span of service, service frequency, and performance in terms of service effectiveness, cost effectiveness and cost efficiency.

In the application of the policy and standards, several overriding considerations must be recognized. First, it must be recognized that an overall evaluation of MTA services must be made with consideration of the cost of service and available funding. Second, it must be recognized that MTA is unlikely to fully meet all the standards. Third, it must be recognized that certain intangible factors, including the perceived value of the transit service to the Davidson County, may influence the services to be implemented, eliminated or changed. Because transit service is a valuable and necessary service, the County may decide to initiate or retain certain services regardless of performance or cost. The *Service Delivery Policy* is thus a guide to good practice, but can't be used to cover all circumstances.

MTA keeps close tabs on service effectiveness and performance, with monthly reports to the Board which show passengers per hour by route, and also survey results which track customer satisfaction. For service effectiveness, the bus routes have been divided into different service classes, and within each class, the routes are ranked by average passengers per hour. Each different class of service has a minimum standard for passengers per hour. If a route falls below this standard, it may be a candidate for reducing service or other remedial action. MTA uses another approach when determining which routes to cut in the case of budget shortfalls. It uses an average ranking of routes on four indicators: ridership, revenues, passengers per hour and revenue per hour. Thus MTA prioritizes routes that represent the most riders and revenue, and are also the most productive in terms of riders or revenue per hour of service provided.

While these measures are a good way to judge the effectiveness of each route, there are other factors which can provide guidance when considering modifications to bus service in Nashville-Davidson County and in the greater region. In particular, these other measures will be helpful in determining where to put service when Nashville-Davidson County is ready to expand public transportation.

# 2 Nashville MTA Service Delivery Policy

## 2.1 MTA Mission and Service Objectives

The mission statement of MTA is:

> The mission of MTA is to provide public transportation services to our community and its visitors so they can achieve greater mobility and experience a cleaner, healthier environment with less traffic congestion.

One of the significant steps that the MTA Board has taken to provide greater mobility to residents within the community is to provide expanded AccessRide services at the same hours as the fixed route system. AccessRide is a publicly funded para-transit service which operates specialized van services for persons with disabilities who are unable to use regular fixed-route buses. AccessRide provides door to door para-transit service within Davidson county if the pickup and drop-off locations are within 1.5 miles from a regular fixed route, excluding commuter or express service. This distance is double the federal requirement of .75 miles and effectively covers the entire county.

In an effort to achieve the goals of the mission statement such as attracting customers in order to reduce traffic congestion and improving the environment, MTA has established a number of *Service Objectives* which are:

- *Temporal Availability:* Service should be operated at convenient times and frequencies.
- *Geographic Availability:* Services should be geographically available throughout the community.
- *Competitive*: Services should operate at a speed which is competitive with an automobile.
- *Comfort and Image*: Services should offer a pleasant and comfortable riding environment.
- *Ease of Use*: Services should be easy to use.
- *Cost and Service Effectiveness:* Services should be tailored to target markets in a financially sound and cost effective manner.

Prior to discussing service standards and guidelines to implement these objectives, the different classes of service should be clarified. Following is a discussion of MTA service classes.

## 2.2 Service Classes

MTA provides several different types of service in the region. The MTA system map defines routes as *Most Frequent* – daytime frequencies 30 minutes or less; *Frequent* – daytime frequencies 30-60 minutes; *Limited* – Limited and Express routes; and *Other* – the Downtown Shuttle, Music City Star West End Shuttle and Music City Star Downtown Shuttle. The designations are represented on the system map and bus schedules by different colors: *Most Frequent* (red), *Frequent* (green) and *Limited* (gold). Internally, MTA uses a different set of service classes: *Corridor Routes*, *Neighborhood Routes*, *Commuter Routes* and *Other Routes*. Different minimum service standards are set for each of these classes. Most of the *Corridor Routes* are included in the *Most Frequent* service category and all *Commuter Routes* are *Limited service*. Addendum A shows the correspondence between the categories. To clarify the *Service Classes* for performance measure review there will be one classification system—largely based on the public one used in the system map and timetables. In addition the classification system will include new services that MTA is considering, such as bus rapid transit (BRT), a downtown circulator which could replace existing shuttle services, and flexible route services. Figure 1 below provides the suggested classification scheme. Note that Route 34X Opry Mills Express is reclassified as a Frequent route since it provides service for much more than regular commuting hours.

- *Most Frequent* – Routes that have daytime frequencies less than 30 minutes. This will include most but not all of the *Corridor* and certain *Neighborhood* routes. These key routes generally operate longer hours and at higher frequencies to meet higher levels of passenger demand in high-density travel corridors. The *Most Frequent* bus routes ensure basic geographic coverage of frequent service in the densest areas of the city's core and Davidson county.
- *Frequent* – Routes that have daytime frequencies 30-60 minutes. This will include the remainder of the *Neighborhood Route* and some *Corridor Routes*.
- *Commuter* – Most *Limited* and *Express* routes.
- *Circulator* – This class will include potential future Downtown *Circulator* service.
- *Bus Rapid Transit* – Service that carries a high volume of passengers with limited stops, special articulated buses, traffic signal priority, real-time information on bus arrivals and additional amenities.
- *Flexible Route Services* – Service aimed at lower density neighborhoods that provides neighborhood circulation and connection to other MTA services. The service may have no fixed route, but may have fixed time-points.

Figure 1: Consolidated MTA Classification Scheme and Performance Indicator Types

| Route Number | Route Name | Class |
|---|---|---|
| 2 | Belmont | Frequent |
| 3 | West End | Most Frequent |
| 4 | Shelby | Most Frequent |
| 6 | Lebanon Road | Frequent |
| 7 | Hillsboro | Most Frequent |
| 8 | 8th Avenue South | Frequent |
| 9 | Metrocenter | Frequent |
| 10 | Charlotte | Most Frequent |
| 12 | Nolensville Road | Most Frequent |
| 14 | Whites Creek | Frequent |
| 15 | Murfreesboro Road | Most Frequent |
| 17 | 12th Avenue South | Most Frequent |
| 18 | Airport Express - Elm Hill Pike | Frequent |
| 19 | Herman | Most Frequent |
| 20 | Scott | Frequent |
| 22 | Bordeaux | Most Frequent |
| 23 | Dickerson Road | Most Frequent |
| 24X | Bellevue Express | Commuter |
| 25 | Midtown Connection | Frequent |
| 26 | Gallatin Road | Most Frequent |
| 28 | Meridian | Most Frequent |
| 29 | Jefferson | Most Frequent |
| 30 | McFerrin | Frequent |
| 33X | Hickory Hollow - Hickory Plaza Express | Commuter |
| 34X | Opry Mills Express[1] | Frequent |
| 35X | Rivergate Express | Commuter |
| 37X | Tusculum Express | Commuter |
| 38X | Antioch Express | Commuter |
| 41 | Golden Valley | Commuter |
| 42 | St. Cecilia - Cumberland | Frequent |

## 2.3 Temporal Availability

The headway standard establishes a maximum waiting time (or headway) between buses. By most measures the cores of urban transit systems should have a maximum of 30 minutes for the headway. This means that weekday service on key routes should have buses arriving every 30 minutes or less.[2] A goal for service should be 10-15 minute headways, depending upon the type of service. Passenger loads should be the indicator of the need to increase service from the 30 minute headway towards a 15 minute headway. Outside the system core and in hours other than daytime periods, headways could be longer, but in no case should be longer than 60 minutes. If ridership cannot support a 60 minute headway, another way of

[1] Note that Route 34X behaves more like a Frequent Route than a Commuter Route in that it runs throughout the day and on weekends. It is suggested, therefore, that 34X be reclassified.

[2] Detroit Department of Transportation Service Standards, December 2007, p. 19
Denver Regional Transit District Service Standards, November 2002, p. 6
AC Transit Short Range Transit Plan FY 2003-FY 2012,May 2004, p. 3-8

providing service should be used, such as flexibly routed service or other non-fixed route options such as vanpools. The proposed standards are shown in Figure 2 by type of service.

Span of service identifies the times that service is provided each day of the week. The times proposed in Figure 2 are a suggested minimum policy goal for each class. The span of service of service should meet the needs of riders for each service class. For example, most *Commuter* riders will need service between the hours of 6 am to 6 pm (the peak periods) while riders on the other services will need longer hours. Service in the evenings and on weekends helps strengthen overall system ridership as it makes it easier for passengers to count on MTA.

The maximum headways shown in Figure 2 are set to be clock-face headways, which makes service easier for customers to remember, and can enhance the ability of the system to permit coordinated transfers. Research has shown that when system transfers are above 25 percent, 60 minute headways may be preferable to 45 minute headways, for example.[3]

[3] Graham Currie, "Setting Long Headways for Coordination and Service Timing Benefits—When Less Is More," November 11, 2008, presented at the TRB 2009 Annual Meeting.

Figure 2: Proposed Span of Service and Minimum Frequencies by Service Class

| Service Class | Span of Service | Minimum Frequency | Goal Frequency | Goal for Hours of Service Provided |
|---|---|---|---|---|
| **Most Frequent** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 30 minutes | 15 minutes | 18 Hours |
| | Midday (9am – 3pm) | 30 minutes | 20 minutes | |
| | Evening | 60 minutes | 30 minutes | |
| | Saturday | 60 minutes | 30 minutes | 18 hours |
| | Sunday | 60 minutes | 30 minutes | 12 hours |
| **Frequent** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 60 minutes | 30 minutes | 17 Hours |
| | Midday (9am – 3pm) | 60 minutes | 45 minutes | |
| | Evening | 60 minutes (if service is provided) | 30 minutes | |
| | Weekends | 60 minutes<br><br>(If service is provided) | 30 minutes | 17 Hours Saturday, 10 hours Sunday |
| **Commuter** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 30 minutes | 30 minutes | 6 Hours |
| **Circulator** | Daytime (Monday-Friday 6:30am--8pm) | 10 minutes | 10 minutes | 17 Hours |
| | Evenings (8pm to 11:30pm) | 15 minutes | 10 minutes | |
| | Saturday and Sunday | 15 minutes | 10 minutes | 8 Hours |
| **BRT** | Peak (Monday-Friday 6am-9am and 3pm-6pm) | 10-15 minutes | 10-12 minutes | 18 Hours |
| | Midday (9am – 3pm) | 15-30 minutes | 10-15 minutes | |
| | Saturday | 15-20 minutes | 10-15 minutes | 13 Hours |
| | Sunday | 30 minutes | 15 minutes | 13 Hours |
| **Flexible Route Services** | Weekdays (Monday-Friday 6am--8pm) | N/A | N/A | 14 Hours |
| | Saturday (10am – 8 pm) | N/A | N/A | 10 hours |

## 2.4 Geographic Availability

MTA will strive to serve as much of Davidson County as possible as long as the service meets cost and service effectiveness standards. This part of the service policy is characterized as guidelines rather than standards because uniform geographic coverage cannot always be achieved due to constraints such as topographical and street network restrictions. In addition, coverage in some areas may not be possible due to the infeasibility of modifying existing routes without negatively affecting their performance.

*Geographic Availability* will have several parts:

- *Distance to transit* – the area within a decent walking distance to the bus stop. Many cities define this as ¼ mile of a bus stop while others like Chicago use ¼ mile for high density and ½ mile for low density. Since the MTA service area has a low density (when compared to its peers and overall) the ½ mile standard will be used. Another industry standard is that a population density of around 3 dwelling units per acre is needed to justify fixed route transit, which translates to around 5000 people per square mile. MTA will strive to provide transit service within a ½ mile to residents of areas with a population density of over 5000 persons per square mile. In determining whether such service can be offered, MTA will consider other factors such as the likely performance of the service that might be provided. Request for service from such areas can be another indication of whether such service is needed.
- *Pedestrian Access* – the ability of customers on foot to access transit. The pedestrian environment is an important component of the availability of transit since in most bus systems, 75%-80% of riders walk to transit. Lack of pedestrian access lowers the area of service coverage and potential ridership. Excellent pedestrian environment means available sidewalks, protection from traffic, safe crossings for roadways and a pleasant walking environment. Because an excellent pedestrian environment will encourage transit ridership, the 5000 persons per square mile standard cited above could be relaxed in areas with an excellent pedestrian environment. MTA will strive to provide service within a ½ mile to residents of areas with an excellent pedestrian environment with a population density as low as 2500 persons per square mile. Service may be flexibly routed or fixed bus service.
- *Transit Supportive Areas* – areas with densities and usage that support and encourage transit use, such as: universities, colleges, shopping centers, major employers, major destinations. MTA will strive to provide transit service within ¼ mile to all universities, medical centers, major malls and employers with over 1000 employees. Service will be provided directly to the doors of these institutions whenever possible.
- *Park and Ride Access* – Ridership for routes in areas of low density is driven by access to parking. The *Transit Capacity Manual* notes that park and ride facilities are most successful when they are at least five miles from the major destination. MTA will strive to provide park and ride lots every 5 miles outside the Briley Parkway/I-40/I-440 where MTA has *Commuter* service.

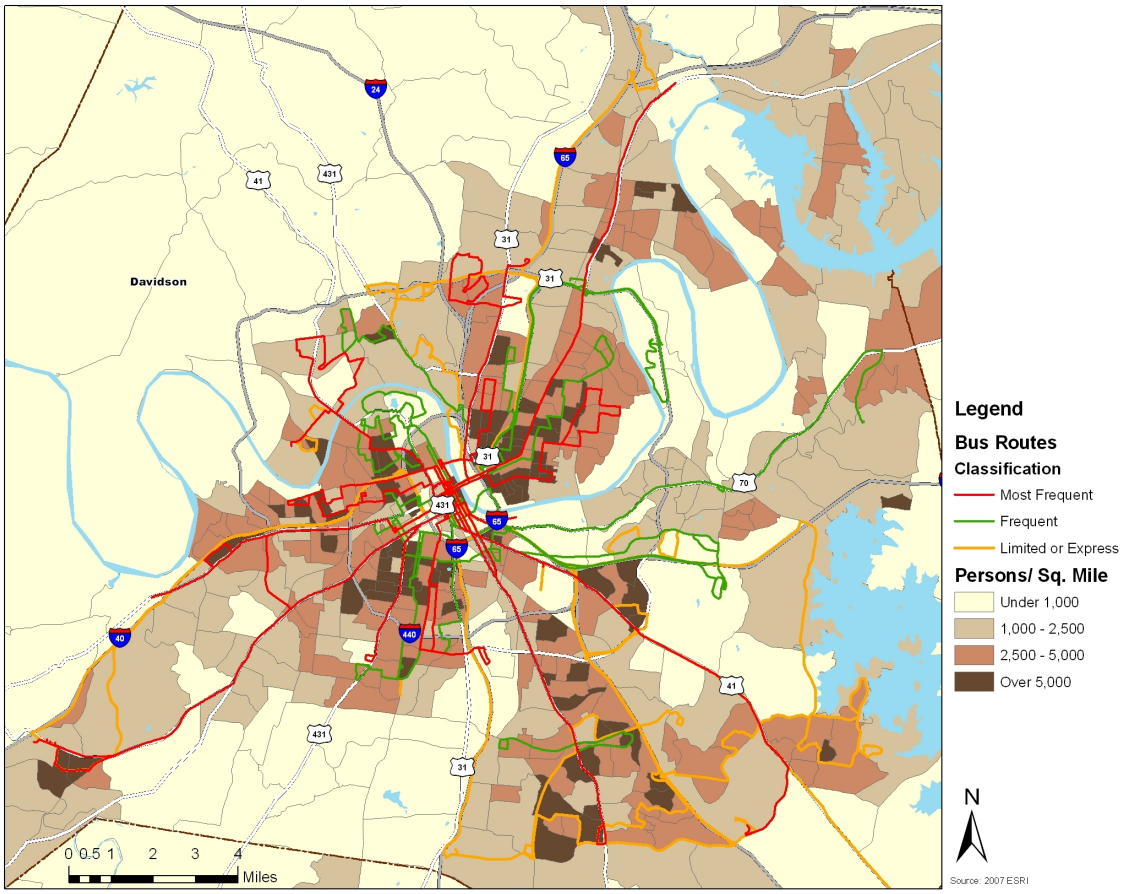



Figure 3: 2007 Population Density by Block Group and Current Service Classes

## 2.5 Competitive

For MTA to grow ridership, its customers need a service that is competitive with other modes. This part of the service policy is characterized as guidelines rather than standards because doing a comparison with auto travel is not straightforward. However MTA Ridership Model should be able to assist in making this comparison.

Evaluating transit performance originated in the 1965 Highway Capacity Manual where it is called the *Level of Service*.[4] Performance is divided into ranges and each range represents a letter grade. The travel time of a transit rider and motorist can be compared from a system perspective. Studies show that ridership increases as speed increases. Figure 4 provides a Level of Service grading for MTA which is adopted from TCRP Report 100.[5]

Figure 4 Level of Service Grading Transit vs. Automobile

| Perception Grade | Travel Time Difference (min) | General Comments |
|---|---|---|
| A | 0 | Transit faster than automobile |
| B | 1-15 | Transit and auto trips close to equal |
| C | 16-30 | Tolerable for "choice" riders |
| D | 31-45 | Round trip at least one hour longer by transit |
| E | 46-60 | System cannot compete for "choice" riders |
| F | Greater than 60 | Unacceptable to most riders |

Viewing this table, MTA should strive to make most trips with a perception grade of C or above. While some trips this is not possible the number of possible trips in the E grade should be kept to a minimum. The most financially prudent way to address this is to target a C grade for all trips below one hour during peak periods. MTA can tackle speed of service by reducing stops, implementing exclusive right of way, implementing signal priority for buses, and looking for ways to make service more direct for large flows of customers. Priority for speed improvements should be given to those routes carrying the largest numbers of passengers.

MTA's ridership model can be used as a tool to compare public transit trips to automobile trips between particular origins and destinations and for the system as a whole. In reviewing service, the competiveness of transit compare to automobile trips should be kept as a "reality check" to determine if transit is a viable option for people, especially those that have access to automobiles for their trips.

[4] Transit Cooperative Research Program (TCRP) Report 100: Transit Capacity and Quality of Service Manual, 2nd Edition, 2003. p 3-22

[5] Transit Cooperative Research Program (TCRP) Report 100: Transit Capacity and Quality of Service Manual, 2nd Edition, 2003. p 3-50

## 2.6 Comfort and Image

One measure of comfort for transit passengers is the number of passengers on a bus compared to the number of seats. The bus load factor is the ratio of passengers on board a bus compared to the number of seats available. A load factor of 1.0 means that all seats on a bus are used and there are no standing passengers. The bus load standard should differ for each service class due to the nature of the service. A MTA customer that commonly has to stand on a *Commuter* route for a 45 minute trip will most likely look for other alternatives, while a customer on a *Most Frequent* route will endure a 20 minute trip because of the average shorter trip. Figure 5 shows the standards for bus loading.

Figure 5: Maximum Bus Load Standards

| Service Class | Peak Load Factor | Peak Bus Environment | Off Peak Load Factor |
|---|---|---|---|
| BRT | 1.33 | Standees crowded | 1 |
| Circulator | 1.25 | Standees | 1 |
| Most Frequent | 1.25 | Standees crowded | 1 |
| Frequent | 1.25 | Standees | 1 |
| Commuter | 1 | No standees | N/A |

The load factors for each class will differ with the type of bus and the time of day. On a BRT bus which seats approximately 60 people, a 1.33 load factor will imply a maximum of 20 people standing during the peak. A *Frequent* route operating a 40 foot bus that seats 42 would have a maximum of 11 customers standing (with a load factor of 1.25) during the peak. In off peak service, all customers should be accommodated with seating.

System image is affected by many things including the quality and cleanliness of buses and facilities. MTA should work continually to insure that buses are kept clean and up to date, and that stations, shelters and signed stops are clean and attractive. The Music City Central Station is an example of a facility that helps improve the MTA image.

## 2.7 Easy to Use

This part of the service policy is also provided as guidance rather than as a standard. However, the easier the system is to use, the greater chance it will have of attracting new riders and riders that are not familiar with public transportation. Ease of use will be enhanced by:

- Using clock-face headways so that service schedule is easy to remember.
- Using new technology to provide on-line access to schedules and real-time information on service schedule by location.
- Simple fare collection methods (extensive use of passes and payment by credit cards)
- Routes that run consistently throughout the day with minimum variations.
- Information or training to help new users learn how to use the bus

## 2.8 Cost Effectiveness and Service Effectiveness

*Measures*

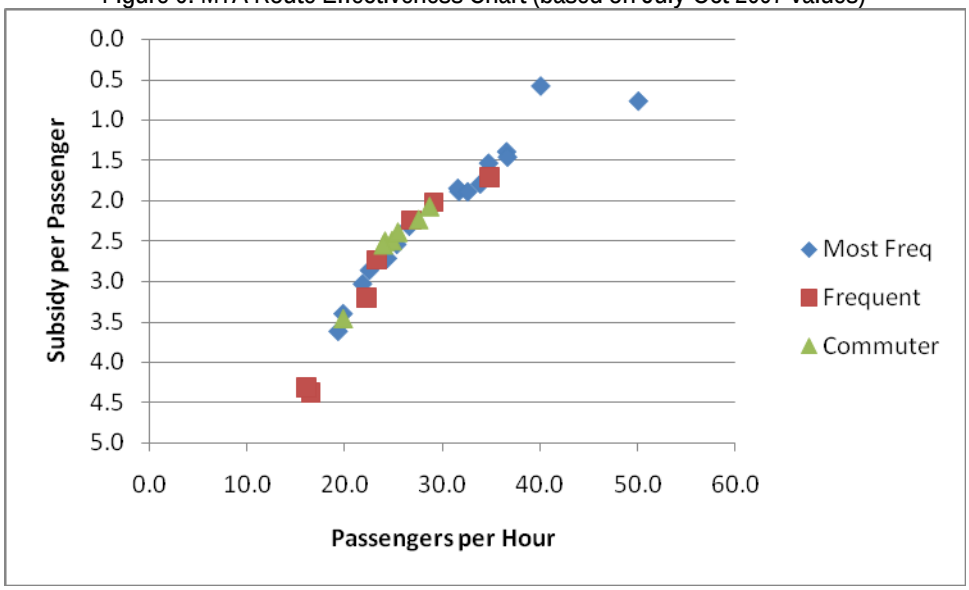
Cost and service effectiveness have to be a concern for transit systems which are dependent upon operating funding from taxpayers. The following measures are recommended for MTA. [6]

- Passengers/hour (service effectiveness for *Most Frequent*, *Frequent, BRT* and *Circulator Routes*)
- Passengers/trip (service effectiveness for *Commuter* routes)
- Subsidy/passenger (cost effectiveness)

The subsidy per passenger combines fare revenue and total costs to produce a metric that reflects the public cost of the service. A route that carries a higher number of passengers per hour or per trip is very desirable as is a route that requires a lower subsidy per passenger. These two measures of effectiveness (service effectiveness and cost effectiveness) probably are highly correlated, but don't have to be. A commuter route may have a higher cost per passenger than other services, but with a higher fare, the subsidy per passenger may be similar to other services. Both criteria will be used for the MTA.

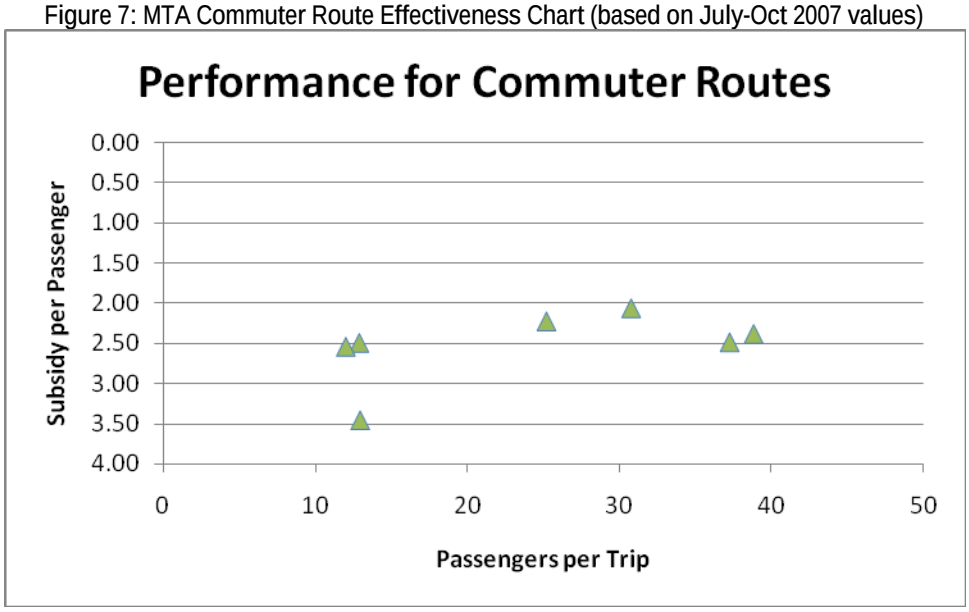
The MTA route effectiveness chart (Figure 6) shows cost effectiveness on the vertical axis and ridership per hour on the horizontal axis for the service classes as suggested in Addendum A. The *Most Frequent* routes in the MTA system are represented by blue diamonds, the *Frequent* routes by red squares and *Commuter* routes by green triangles. In this chart the better performing routes are those with values further to the right and higher vertically. Figure 7 shows the *Commuter* routes using the passengers per trip measure. Figure 7 is shown because ridership for commuter routes is limited to the seated capacity of the bus for each trip made. Ridership per trip then provides a measure of how well a commuter route is doing versus the best it can do (the seating capacity of the buses).

Figure 6: MTA Route Effectiveness Chart (based on July-Oct 2007 values)




[6] Denver Regional Transit District Service Standards, November 2002, p. 5

Figure 7: MTA Commuter Route Effectiveness Chart (based on July-Oct 2007 values)




*Process*

MTA will focus on trying to improve service and cost effectiveness of all of its routes by looking at the top and bottom 10 percent of routes in terms of subsidy per passenger and passengers per hour, considering all route classes together. If budget allows, routes performing at the top in these measures should be targeted for frequency improvements, particularly if crowding is an issue. When a route is targeted for evaluation due to it being ranked lowest in these measures, several actions should be taken to help increase the effectiveness of the route.

The first action is to conduct market research to determine what might be causing a loss in ridership. The most recent survey done by MTA customer service should be evaluated. Ride check information or information from Automatic Passenger Counters (APCs) should be analyzed. Also bus operator input could be sought to help investigate a routes condition.

An option to help increase the effectiveness of a route is to increase marketing. Customers and potential customers may not know the service and destinations that a route serves. Many transit users are not familiar with service that is outside of their normal travel patterns. Additional marketing, such as the distribution of information about the route for those living along it can help highlight the advantages of a route. Distribution of "free ride" tickets is another way to help introduce a route to new passengers.

Route restructuring is a tactic that can improve a route's performance. Route restructuring will entail a review of where, who and what times a route serves. This could result in the change of streets served or a reduction of the length of a route, based on data that shows ridership by route segment and time of day.

Headway adjustment is a strategy that can impact a route's effectiveness. A route may provide too much service and the reduction of the headway could result in a more effective route. Headway adjustments might cause a route to be re-classified if its revised headway puts it into a different service class. This tactic, while able to improve a route's effectiveness, could cause long term harm to the route by making it a less attractive service.

All of these options can be used together (Figure 8) or separately. Some of the strategies in this section may have previously been implemented and are more effective than others. Different strategies will have a different effect on each route.

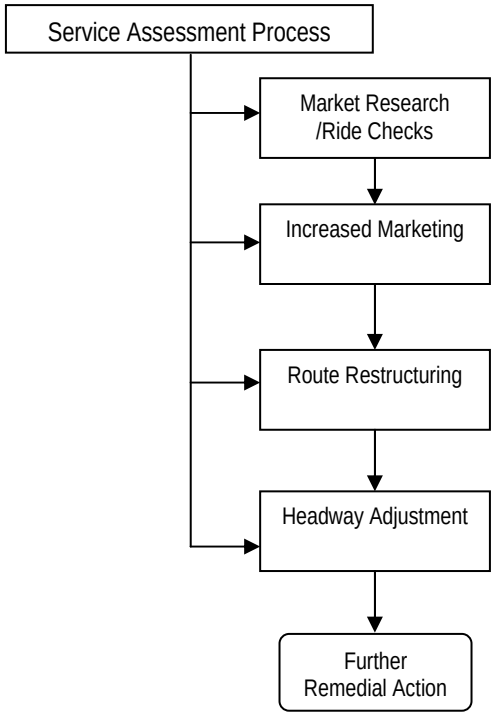



**Figure 8: Flow Chart of Route Evaluation Process**

*Timeframe*

MTA should allow a minimum of four months to allow a strategy to work. If there is some improvement, but not enough to move the route above last place in its class, it is recommended that the strategy be allowed two additional months of implementation. If none of these strategies results in the increase of the effectiveness of a route, then the route becomes a candidate for further remedial action such as route elimination or replacement of the route with a flexibly routed service.

## 3 Implementing the Service Delivery Policy

Service policies help support the goals and objectives of MTA. For these policies to be most effective they should be applied to service on a bi-annual schedule. Comparisons should be made so that service can be adjusted twice a year. Performance measures should be monitored on a monthly basis so that problems can be identified quickly. The Policy itself should be updated every two years to insure that it reflects current reality for MTA.

## Addendum A: Correspondence between MTA Classification Schemes

| Route No. | Route Name | Public Type | Perfomance Indicator Type |
|---|---|---|---|
| 2 | Belmont | Frequent | Neighborhood |
| 3 | West End | Most Frequent | Corridor |
| 4 | Shelby | Most Frequent | Neighborhood |
| 6 | Lebanon Road | Frequent | Corridor |
| 7 | Hillsboro | Most Frequent | Corridor |
| 8 | 8th Avenue South | Frequent | Corridor |
| 9 | Metrocenter | Frequent | Neighborhood |
| 10 | Charlotte | Most Frequent | Corridor |
| 12 | Nolensville Road | Most Frequent | Corridor |
| 14 | Whites Creek | Frequent | Neighborhood |
| 15 | Murfreesboro Road | Most Frequent | Corridor |
| 17 | 12th Avenue South | Most Frequent | Neighborhood |
| 18 | Airport Express - Elm Hill Pike | Frequent | Neighborhood |
| 19 | Herman | Most Frequent | Neighborhood |
| 20 | Scott | Frequent | Neighborhood |
| 22 | Bordeaux | Most Frequent | Corridor |
| 23 | Dickerson Road | Most Frequent | Corridor |
| 24X | Bellevue Express | Limited | Commuter |
| 25 | Midtown Connection | Frequent | Neighborhood |
| 26 | Gallatin Road | Most Frequent | Corridor |
| 28 | Meridian | Most Frequent | Neighborhood |
| 29 | Jefferson | Most Frequent | Neighborhood |
| 30 | McFerrin | Frequent | Neighborhood |
| 33X | Hickory Hollow - Hickory Plaza Express | Limited | Commuter |
| 34X | Opry Mills Express | Limited | Commuter |
| 35X | Rivergate Express | Limited | Commuter |
| 37X | Tusculum Express | Limited | Commuter |
| 38X | Antioch Express | Limited | Commuter |
| 41 | Golden Valley | Limited | Commuter |
| 42 | St. Cecilia - Cumberland | Frequent | Neighborhood |
| 44 | M.T.A. Shuttle | Most Frequent | Other |
| 50 | Downtown Shuttles | | Other |
| 93 | Music City Star West End Shuttle | Limited | Other |
| 94 | Music City Star Downtown Shuttle | Limited | Other |
| 96X | R.T.A. Murfreesboro Express | Limited | Other |