

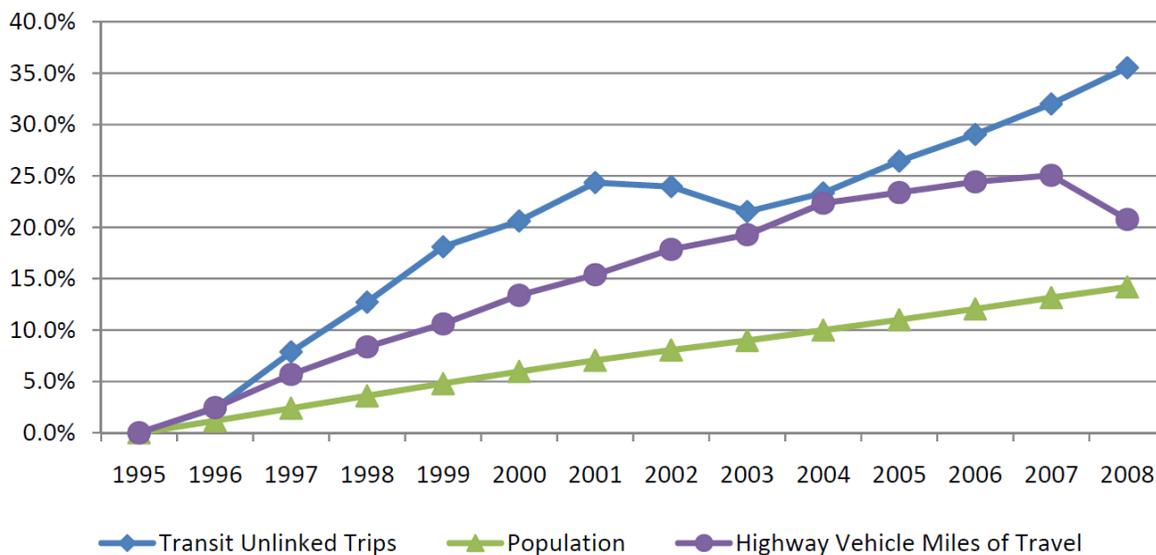
## 5.0 A Bold, New Vision for Mass Transit

### 5.1 Transit for Mobility, Economy, and Livability

Public transportation in the United States is a crucial part of the solution to the nation's economic, energy, and environmental challenges – helping to bring a better quality of life for both those who ride transit and those who do not. Every segment of American society – individuals, families, communities, and businesses – benefits from the integration of public transportation choices into the transportation system.

In the last decade and a half, public transportation ridership has grown by 36 percent, almost three times the growth rate of the U.S. population (14 percent) and substantially more than the growth for vehicle miles of travel (VMT) on our nation's streets and highways (21 percent) over the same period.

**Figure 47. Growth in National Transit Ridership, Population, Highway VMT, 1995 to 2008**



It is no surprise that ridership is on the rise. Regions across the nation are becoming more aware of the benefits of public transportation. The Middle Tennessee region's top economic competitors (e.g., Charlotte, Austin, Denver, etc.) have recently invested billions of dollars in modernizing their public transportation system to position their areas for attracting and retaining the labor force that will be required to compete in an ever-changing global economy. That, combined with transit's unique ability to help provide alternatives to traffic congestion, prepare for higher energy prices, and establish a more sustainable path for future growth and development, is a major reason why the MPO has established as one of its three major policy initiatives of the 2035 Regional Transportation Plan, a call to create and adopt a bold, new vision for mass transit. The following provides a quick overview of the more obvious reasons to invest.

**Mobility & Convenience** - Mobility, the freedom and ability to travel, has always been an important part of the American lifestyle. However, as more and more vehicles crowd the nation's roadways, traffic congestion is having an increasingly debilitating effect on our quality of life.

- Congestion caused 4.2 billion hours of travel delay and 2.9 billion gallons of wasted fuel in 2005, according to the 2007 Texas Transportation Institute (TTI) Urban Mobility Report.

- The average person in the Nashville-Davidson area loses about 40 hours and wastes 25 gallons of fuel per year sitting in traffic congestion.
- Public transportation services in America's most congested cities saves more than 1.1 billion hours of additional delay.
- Public Transit enhances economic growth by increasing the local customer base for a range of services.
- National research shows that four out of five seniors believe public transit is a better option than driving alone. By 2025, an estimated 20 percent of Americans will be over the age of 65 and more reliant on alternative forms of transportation.
- The greater Nashville region is expected to grow from 1.3 million people in 2008 to more than 2.1 million by 2030, adding significant demands to the regional transportation network.
- Public transportation is an important part of most disaster relief or emergency evacuation plans.
- Transit offers mobility options for rural residents that might have no other way to medical appointments, work, or school.
- Public transportation provides a safe alternative to driving with 0.03 fatalities per 100 million miles, about 1/25<sup>th</sup> the rate for automobiles.

**Personal & Regional Economic Prosperity** - Transportation is the backbone of a strong and prosperous economy, and investments in public transportation generate significant economic benefits.

- The average household spends 18 cents of every dollar on transportation, and 94 percent of this goes to buying, maintaining, and operating cars, the largest expenditure after housing.
- Public transportation provides an affordable, and for many, necessary, alternative to driving.
- Households that are likely to use public transportation on a given day save over \$8,400 every year.
- According to the American Public Transportation Association, for every 10 dollars invested in transit capital, 30 dollars is returned to the economy through increased business sales. Even more is returned for every 10 dollars invested in transit operations.
- Public transportation provides economic stimulus by creating jobs. Every \$1 billion in federal investment in transportation infrastructure supports and creates 47,500 jobs in manufacturing, construction, finance, insurance, real estate, retail, and other services.
- Mass transit enhances personal economic opportunity by saving employees money on daily commutes. The average household spends 18 cents out of every dollar earned on transportation costs – 94 percent of that on maintaining and operating personal autos. Transit riders save an average of \$1,400 per year on gas and up to \$6,251 in savings by eliminating the need for one car.
- A multi-modal transportation systems saves everyone money. For every \$10 million invested in transit, more than \$15 million is saved by highway and transit users. Americans living in areas with transit save an estimated \$18 billion in annual congestion costs.
- Transit provides access to jobs and education.
- Residential, commercial, or office properties that are served by public transportation are valued more highly than properties not accessible by transit.

**Environmental Sustainability** - As we become more conscious of how our travel behaviors affect our environment, public transportation will play an important role in meeting local, state, and federal environmental sustainability goals.

- Each year, public transportation saves the U.S. 1.4 billion gallons of gasoline per day, the equivalent of one supertanker leaving the Middle East every 11 days.
- The health effects of mobile source pollution are a growing hazard for people across America. According to the U.S. EPA, asthma accounts for more than 2 million emergency room visits, 5,000 deaths, and costs the nation more than \$14 billion per year.
- Public transportation produces 95 percent less carbon monoxide, 90 percent less volatile organic compounds, and 50 percent less carbon dioxide and nitrogen oxide per passenger mile than private vehicles.
- The Nashville region is expected to be designated by the EPA as non-attainment for ozone levels by 2011 – indicating a growing health hazard for residents.
- Public transportation supports quality growth management policies aimed at reducing sprawling land development patterns by providing residents more choices for travel.
- Communities that invest in public transit reduce the nation’s carbon emissions by 37 million metric tons annually – equivalent to New York City; Washington, DC; Atlanta; Denver; and Los Angeles combined stopping using electricity.
- One person switching to public transit can reduce daily carbon emissions by 20 pounds or more than 4,800 pounds in a year.
- A single commuter switching his or her commute to public transportation can reduce a household’s carbon emissions by 10 percent, and up to 30 percent if he or she eliminates a second car. When compared to other household actions that limit CO<sub>2</sub>, taking public transportation can be 10 times greater in reducing this harmful greenhouse gas.

## 5.2 Transit Service Strategies and Technologies

There is a wide range of mass transit services offered throughout the United States and in order to develop a regional vision for transit that makes sense for Middle Tennesseans, it is extremely important that policy-makers understand the menu of options available to the region so that the appropriate solutions are deployed to address the unique service needs of different communities.

In forming a more complete understanding of that menu, planners typically categorize or describe available transit options by the types of markets they serve (i.e., service strategy) or by the mode or technologies employed to provide the service (e.g., light rail, commuter rail, etc.).

### Transit Service Strategies

In discussing the characteristics of mass transit service and appropriate areas for implementing them, it is helpful to start by grouping services based on the types of markets served and/or function.

- **Commuter Transit:** This service is principally operated during the periods of day when commuting is at its heaviest levels (e.g., AM or PM rush hours) and serves to connect regional employment centers with suburban residential areas. A range of choices are available to connect people with job sites including commuter rail, express bus, and vanpool service. The most appropriate mode for a particular area or



corridor will be determined by the level of expected ridership, available right-of-way, average trip length, and travel patterns.

- **Rapid Transit:** This service is intended to move large numbers of people along well-defined corridors to a variety of employment, retail, and recreational destinations throughout day, not just the peak commuting periods. Rapid transit operates in fixed-guideway or exclusive lanes with limited stops at designated stations. Examples of technologies used to provide rapid transit include heavy rail, light rail, and bus rapid transit.
- **Urban Fixed-Route Transit:** This is the most predominant type of service provided throughout the country, particularly in urbanized areas. Large- and medium-sized buses use the existing road network to carry up to 30-50 passengers on shorter trips on scheduled routes, usually with unlimited stops, although sometimes offering express service. In some higher-density communities, urban fixed-route service may be provided by streetcars which may or may not operate in exclusive lanes.
- **Suburban or Community Circulators:** Circulator services primarily focus on connecting neighborhoods or job centers to other primary destinations including connections to other transit service. They are operated using a variety of methods including busses, shuttles, vans and in some cases can be offered as door-to-door services or flexibly routed services within individual communities, as well as in low-density, rural areas. They also include community or employer shuttle service between fixed-route transit lines and scattered employment, shopping, or residential areas within individual communities.
- **Demand-Response/ Paratransit:** Shared ride/door to door/flexibly routed services are van or small bus based services that generally operate in lower density areas (with fewer residences per square mile). Unlike door to door services which are required by the Americans with Disabilities Act, these services are designed to serve everyone, and are not limited to individuals with disabilities. They are often used either to provide transportation from rural or other low density areas to minor urban centers or as a feeder service to other types of transit. Trips generally need to be pre-scheduled, sometimes 24 hours or more in advance. Service may be provided seven days per week, on weekdays only (especially for employment focused services), or on only a few days every week (especially rural transportation services).

## Transit Modes and Technologies

The following sections look more specifically at each type of transit service of interest and the conditions where it is appropriate. The final section summarizes the discussion of transit mode technologies and provides tables which further describe the operating and financial characteristics of each specific type of service

### Commuter Rail Transit



Commuter rail is intended to carry large volumes of passengers with stations typically spaced in the 3 to 5 mile range. It is oriented to the peak period and typically serves suburban residents commuting to downtown employment centers. Usually, trains consist of one locomotive and several passenger cars which accommodate approximately 140 riders per car. Commuter rail is typically diesel powered and can operate on tracks shared with freight traffic. Another alternative is the diesel multiple unit (DMU) which is a train of several cars, each of which is powered by its own diesel engine (although trains can use a mixture of DMUs and regular coaches). DMU trains scale well as they allow extra motive power to be added at the same time as extra passenger

capacity. If the DMUs comply with the requirements of the Federal Railway Administration (FRA) safety requirements, they can be used at the same time as freight rail service.

### ***Financial Characteristics***

The actual cost of constructing a commuter rail line depends on the type of upgrades to the track and signaling system, the number of stations, and the negotiations with the owner of the track. For example, the Northstar Commuter Rail Line serving Minneapolis was constructed by improving a major freight rail line that was already double-tracked. Improving 40 miles of track and constructing 6 stations cost approximately \$170 million, or just over \$4 million per mile (2009 dollars), excluding vehicles. Similarly, the current cost estimate for the 33 mile Kenosha-Racine-Milwaukee Commuter Rail Line is approximately \$4.7 million per mile (2009 dollars), excluding vehicles.

Another issue is how payments to the owner of the track will be accounted for, with the Northstar line requiring a payment to the private owner of the line of \$100 million and the Kenosha-Racine-Milwaukee line considering lease payments for the line as an operating expense.

While the total range of costs experienced for commuter rail systems have ranged from about \$1.5 million to \$10 million per mile, given the assumptions that service in the greater Nashville region will take place in existing right of ways, and that that limited double tracking will be required, it is likely that the costs for the commuter rail alternatives being considered in the Nashville region would be around \$4.5 million per mile, and probably between \$3.2 million and \$5.6 million, excluding vehicles and payments for use of the existing rail line. FRA compliant DMUs cost approximately \$2.7 million - \$3 million each. Payments for use of the existing rail line vary with each line owner, the existing traffic on the line, and the improvements to the line being funded by the commuter rail project.

### **Light Rail Transit**



Light rail transit (LRT) is an electrically powered rail passenger system used for urban transportation, typically used on shorter routes than those covered by commuter rail. LRT typically operates at grade, primarily within a dedicated right-of-way. It can also operate in mixed traffic on street. LRT is capable of high speed (55 mph) when in an exclusive right-of-way. Stations are generally spaced at minimum of half mile intervals to allow the vehicles to reach higher speeds. Stops within a city's downtown, especially when the LRT is operating in the street, are often spaced much closer together, similar to bus stops. LRT typically operates with at least two cars in a train; each car can accommodate approximately 150 - 220 riders. LRT systems operate with overhead catenary wires and poles required for electrification.

### ***Financial Characteristics***

The cost of LRT depends on the characteristics of the line, with elevated segments and underground segments adding substantially to the cost of a project. Denver's T-Rex Line, which was constructed along several freeways at the same time as other work on the freeways, had a cost of approximately \$46 million per mile (2009 dollars), excluding vehicles. A similar light rail system in Portland, OR had costs of about \$69 million per mile (2009 dollars).

A good estimate for the costs of LRT around the Nashville region would be between the costs of these two projects, or about \$58 million per mile (2009 dollars). A reasonable range of costs would probably be between

\$46 million and \$69 million per mile. LRT cars cost between \$3 and \$5 million depending on capacity, power source, and other design characteristics and generally are operated in 2 car trains.

## Bus Rapid Transit



A bus rapid transit (BRT) is in theory a rubber-tire version of light rail transit, with the added advantage of being able to phase-in improvements over time with greater ease than a rail-mode provides. Many communities introduce BRT short of its ultimate goal of emulating LRT by improving regular bus service with increased amenities or travel time savings. Some of those improvements over regular bus may include operations on reserved or restricted lanes, priority at traffic signals, express operations with limited stops, special low floor buses, enhanced passenger facilities, branding, and other means for buses to emulate the

reliability and convenience of rail transit. Bus lanes can be designed for conventionally steered buses or for Curb Guided Bus operation. This latter option allows buses to operate at high speed in a right-of-way barely wider than the bus itself.

BRT services are flexible, and in some places like Nashville, vehicles operate on the street within mixed traffic as a standard bus. The key to BRT however, is that it has sufficient priority in traffic so that its operating speed is closer to the private automobile than a regular route bus service.

BRT buses usually have a more modern look than standard buses. Ridership is lower than some of the rail options as buses accommodate 40 to 60 riders. Typical station spacing is 1-2 miles apart. Stops within a city's downtown, especially when the BRT is operating in the street, are often spaced much closer together, similar to regular bus stops. Buses operate on shorter headways (or frequencies); 5 to 10 minutes apart ideally.

### *Financial Characteristics*

The capital cost of BRT systems depends upon the cost of the running way, the stations, the fare collection system, and the cost of the technologies implemented (e.g., Automatic Vehicle Location, Automatic Passenger Counters, Transit Signal Priority, and Driver Assist).

For the running way, designating existing lanes for BRT use through painting and signage (with no physical barriers) is on the order of \$50,000 - \$200,000 per mile. Reconstructing arterial lanes costs about \$2.6 to \$3.1 million per mile (2009 dollars). If new lanes need to be constructed, such as in a median, the capital costs of the lanes typically rise to between \$5 and \$10 million per mile, plus any right-of-way acquisition costs. Cleveland's Health Line is a one of the kind system, with costs of \$24.7 million per mile for a 6.8 mile system. The Health Line involved a complete reconstruction of Euclid Avenue from building face to building face. The reconstructed roadway included exclusive bus lanes, one lane of auto travel in each direction, and streetscape enhancements like new sidewalks, crosswalks, lighting, trees and other landscaping.

For Transit Signal Priority, which can play a very valuable role at highly congested intersections, the capital cost is roughly between \$3,000 and \$20,000 per intersection depending on the type of equipment currently used to control the intersections. The costs for stations along arterial streets (not including buildings) average in the range between \$50,000 and \$150,000 each, although much simpler (and cheaper) as well as more complex (and expensive) stations have been implemented by many transit agencies. For example, Cleveland's cost for a standard shelter with a bench, posted bus information and a ticket machine is about \$40,000, while an upgraded shelter with a bench, real-time bus information, and a ticket machine is about \$175,000. The cost of stations is

significantly increased if they include substantial parking lots, which can cost around \$4,000 - \$5,000 per parking spot.

The buses themselves also vary widely in cost, with stylized standard 45' buses costing between \$400,000 and \$600,000, while specialized BRT articulated buses can cost anywhere from \$600,000 to \$1,600,000. Automatic Vehicle Location systems are required for real-time bus information, and add about \$5,000 to the cost of each bus. For the Nashville region, assuming that 1/3 of the length of the entire route is on existing arterial streets, which lanes are not reconstructed but only designated through painting and signage, and 2/3 is new median lanes in freeways, with stations averaging every ½ mile, the probable cost would be between \$4 million per mile and \$8 million, plus the cost of vehicles.

## Streetcar



Streetcars are electrically or diesel powered vehicles designed to travel in urban cores and serve a wide variety of trip types over shorter distances. The cars are “light weight” and maneuverable. They have relatively fast acceleration and can travel quickly between shorter spaced stations, typically within mixed traffic in the street. They accommodate a lower ridership because each train typically has one car. The vehicles can be modern (which accommodate up to 180 riders) or historic replicas (which accommodate approximately 50 riders) as shown below.

### *Financial Characteristics*

Streetcar systems are generally cheaper than LRT systems as the vehicles are smaller and lighter. LRT often requires reconstruction of urban roadway lanes as the roads are not designed to support the weight of the LRT vehicles. This is usually not required for streetcars. Furthermore, the size (and cost) of stations and other system elements are also usually less. Streetcar systems therefore tend to cost about 70 percent to 80 percent of the cost of LRT systems. Streetcar vehicles, however, tend to cost around the same amount as LRT vehicles, or between \$3 and \$5 million.

## Regular Fixed-Route Bus

Regular route bus is the most common type of bus service where buses operate over fixed routes according to the preset schedule. Service is generally provided from early morning through the evening, although the frequency of service may vary between peak and off-peak periods. Stop spacing is generally based on the density of the area, with stops as close as 1/8<sup>th</sup> of a mile in high density areas, such as the urban center, and up to 3/4<sup>th</sup> of a mile in low density areas.

**Express bus or coach service** is a bus operating strategy that is designed to operate faster than regular bus service. This is generally accomplished by dividing the route into three sections:

- A section which operates as regular bus service,
- A line-haul section with that operates at higher speeds with few or no stops, possibly along a limited-access highway,
- A distribution section which operates as regular bus service within a downtown core or other high density area.

Express bus is typically oriented to the peak period and serves suburban residents (or residents or outer urban areas) commuting to downtown or other major employment centers. Peak period headways can be anywhere from every 10 minutes to hourly, and frequently service is reduced or eliminated during off-peak periods.

Another version of express bus operates between smaller urban centers on a less frequent service, anywhere from hourly to only 2 or 3 trips per day. This service may be focused on a major employer, a major shopping center, or a major medical center that serves the entire region and is intended to provide a minimal level of access to that location from the entire region.

Express bus services frequently make the collection of riders more efficient by serving one or more park & ride lots in addition to, or instead of, operating regular service in a suburban area. The park & ride lot has the effect of collecting relatively large numbers of riders at a limited number of locations, significantly increasing the effectiveness and efficiency of the express bus.

Express bus service can be operated either with regular transit buses or with coaches similar to those used for intercity bus services. Such coaches may have reclining seats, luggage storage, Wi-Fi, and/or other amenities. These coaches also often have less standing room and may have fewer or smaller entrances and exits. The additional amenities are most common on long routes where additional time spent boarding and disembarking from the bus is of less importance than the additional comfort during the line-haul section of the route.



### ***Financial Characteristics***

Buses vary significantly in costs. Standard buses cost between \$40,000 and \$500,000, while articulated buses generally are generally in the range between \$500,000 and \$700,000.

A 100 parking space park & ride lots generally ranges in cost between \$450,000 and \$550,000, excluding land acquisition costs. However, many agencies have arrangements with churches and malls to use a portion of their existing parking lots as park & ride lots, since these lots generally have low usage during the periods when there is high demand for the park & ride lot. Such lots can have capital costs as low as a few thousand dollars, primarily for signage.

### **Shared-Ride/ Vanpool Service**

Shared ride/door to door/flexibly routed services are van or small bus based services that generally operate in lower density areas (with fewer residences per square mile). Unlike door to door services which are required by the Americans with Disabilities Act, these services are designed to serve everyone, and are not limited to individuals with disabilities. They are often used either to provide transportation from rural or other low density

areas to minor urban centers or as a feeder service to other types of transit. Trips generally need to be pre-scheduled, sometimes 24 hours or more in advance. Service may be provided seven days per week, on weekdays only



(especially for employment focused services), or on only a few days every week (especially rural transportation services).

**Table 12. Summary of Service Concepts for Transit Options**

<b>Transit Option</b>	<b>Service Concept</b>	<b>Characteristics of Service Area</b>	<b>Width of Corridor</b>	<b>Average Passenger Trip Length</b>
<b>Commuter Rail</b>	Operates 4 – 6 car trains on exclusive ROW (may be shared with freight trains)	Low population and employment density terminating in a major population/employment center with either another major center at the other terminus or clusters of employment/population along the route	5 miles around park & ride; farther at terminal stations	37 miles
<b>Light Rail</b>	Operates 2-4 car trains primarily on exclusive ROW	4750 households per square mile and/or 35 MSF of commercial/office space	Primarily ¼ mile, lesser importance out to ½ mile	7 miles
<b>Streetcar</b>	Operates 1-2 car trains primarily in mixed traffic	4750 households per square mile and/or 35 MSF of commercial/office space	Primarily ¼ mile, lesser importance out to ½ mile	5 miles
<b>Bus Rapid Transit</b>	Operates generally in exclusive ROW with limited stops, possibly no stops along part of the corridor	4750 households per square mile and/or 12 MSF of commercial/office space	Primarily ¼ mile, lesser importance out to ½ mile	4 miles
<b>Express Bus</b>	Operates with limited stops, possibly no stops along part of the corridor	Service to an area with over 10,000 employees and over 32,000 employees per square mile AND corridor meets the qualifications for moderate regular route bus service (see below)	Primarily ¼ mile, lesser importance out to ½ mile. 5 miles around park & ride.	5 miles
<b>Regular Route Bus</b>	Frequent stops along route	Moderate service (2 buses per hour) – 3325 households per square mile and/or 8 MSF of commercial/office space. Minimum service (1 bus per hour) – 1900 households per square mile and/or 5 million square feet (MSF) of commercial/office space. Lower densities are appropriate to serve where walking conditions encourage transit use.	Primarily ¼ mile, lesser importance out to ½ mile	3 miles
<b>Door to Door/ Flexibly Routed Service</b>	May pick up customers at the curb or at special pick-up points by arrangement	May serve small neighborhoods or entire counties.	Any	13 miles (reflecting distances in rural systems)

The following table provides more detail on the operating characteristics of the different modes, including average speed, carrying capacity of the service per hour and per vehicle, type of right-of-way and typical station or stop spacing. Light rail has the highest carrying capacity on a per hour basis, whereas the door to door or flexibly routed services have the lowest carrying capacity.

**Table 13. Summary of Transit Operating Characteristics by Mode**

Transit Option	Avg. Speed w/ Stops	Route Capacity	Passengers / Vehicle	Right-of-Way (ROW)	Station Spacing
<b>Commuter Rail</b>	20 – 50 mph	2,000 – 10,000 passengers per hour	100 - 200	Exclusive ROW (may share with freight traffic)	2 - 5 miles
<b>Light Rail</b>	20 – 30 mph	3,000 – 15,000 passengers per hour	150 – 220	Exclusive ROW, generally running at-grade	0.5 – 1.5 miles
<b>Streetcar</b>	15 – 30 mph	1,000 – 6,000 passengers per hour	50 - 180	Mixed traffic, may have some exclusive lanes or ROW	¼ – 1 mile
<b>Bus Rapid Transit</b>	15 – 30 mph	2,000 – 10,000 passengers per hour	75 -100	Exclusive ROW or mixed traffic with priority measures	1/2 – 1.5 miles, may have larger gap in middle of route
<b>Express Bus</b>	10 – 20 mph	500 – 3,000 passengers per hour	40 – 110	Mixed traffic, may include freeways	¼ – 1.5 miles, may have larger gap in middle of route
<b>Fixed-Route Bus</b>	5 – 15 mph	200 – 1,200 passengers / hour	40 – 60	Mixed traffic on regular roads	¼ mile
<b>Door to Door/ Flexibly Routed Services</b>		< 20 passengers per hour / vehicle	4 – 8 in urban areas, less in rural areas	Mixed traffic	NA

**Table 14. Summary of Typical Costs by Transit Option**

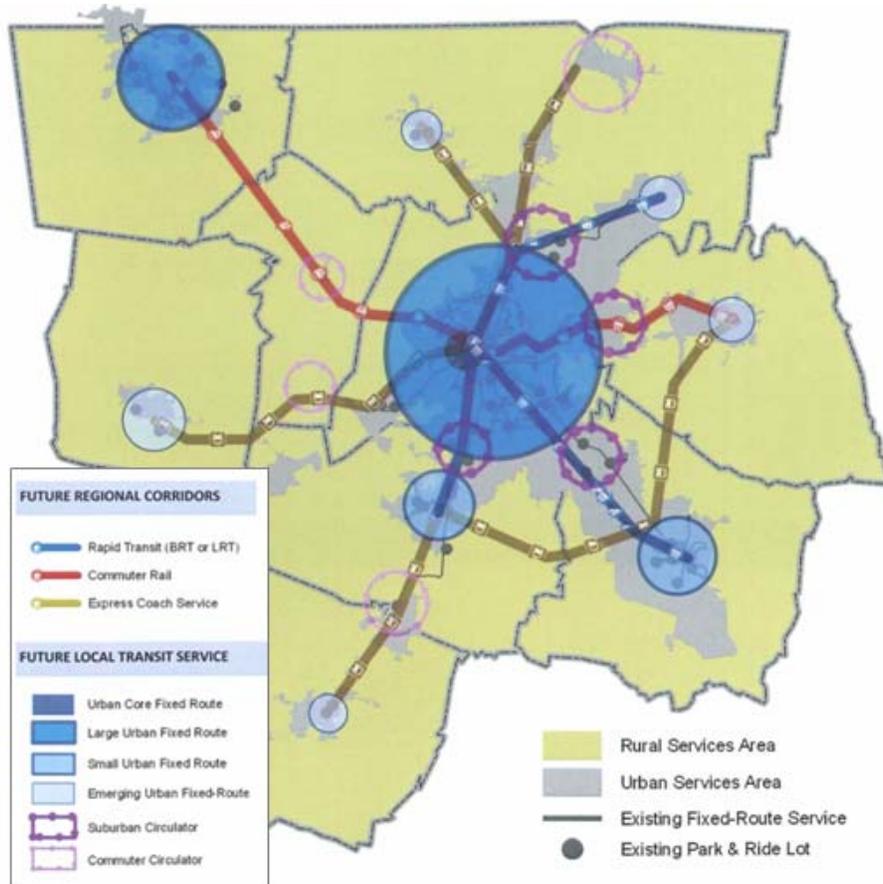
Transit Option	Capital Cost per Mile (millions)	Capital Cost per Vehicle (millions)	Operating Cost Per Hour (hundreds)
Commuter Rail	\$3.2 - \$5.6	\$2.7 - \$3.0	\$300 - \$400
Light Rail	\$46 - \$69	\$3.5 - \$5	\$200 - \$250
Streetcar	\$31 - \$56	\$3.5 - \$5	\$140 - \$170
Bus Rapid Transit	\$4 - 8	\$0.6 – \$1.6	\$120 - \$160
Express Bus	n/a	\$0.4 - \$0.7	\$100 - \$110
Regular Route Bus	n/a	\$0.4 - \$0.5	\$95 - 100
Door to Door/Flexibly Routed	n/a	\$0.05 - \$0.07	\$70 - \$75

*Costs in 2009 Dollars. Capital costs exclude cost of Right-of-Way.*

## 5.3 Long-Range Vision for Transit

A significant element of the 2035 Regional Transportation Plan involves the formal act of adopting a bold, new vision for mass transit that calls for the expansion and modernization of the region’s mass transit system. Such a move is a necessary part of the region’s preparation for the increasing competitive global economy, and proactively addresses the growing concerns about the health of our environment, worsening congestion, and the sprawling land development pattern that has begun to encroach upon the area’s cherished rural countryside. The vision includes a variety of new and expanded services for regional corridors, urban centers, suburban communities, and even the rural countryside.

**Figure 48. Long-Range Vision for Regional Transit**



The long-range vision for mass transit calls for a strategic mix of transit options for future generations of Middle Tennesseans, ranging from high-frequency rapid transit service to the continued provision of rural transit services for those who do not live nearby to fixed-route options. The following describes the various types of services proposed for Middle Tennessee.

- **Rapid Transit:** Three corridors are identified for future regional rapid transit service including the region’s northeast, southeast, and south corridors. These areas are the most densely populated and fastest growing within the region and have a well-established pattern of cross-county travel. The long-range vision for rapid transit in these corridors includes the development of either light rail transit or dedicated-lane bus rapid transit that would operate at high levels of service throughout the day. The specific mode or technology used will be determined by future study and depend heavily on development patterns, anticipated ridership, cost of construction, and public support for funding.

- **Commuter Rail:** The long-range vision calls for continued support for the Music City Star’s east corridor commuter rail service and the development of a new commuter rail line in the region’s northwest corridor to connect Clarksville and Nashville, two of Tennessee’s five most populous cities.
- **Express Coach Service:** In corridors with strong commuting patterns but without the land development patterns or traffic congestion to warrant dedicated-lane transit service, the vision calls for the implementation of premium express coach service. Such service will offer a comfortable and stress-free ride to and from work for commuters, providing enhanced amenities along the way including high-back seats, wireless internet access, on-board televisions, and restrooms.
- **Urban Fixed-Route Service:** By far the most critical piece of the long-range vision, the region must continue to expand the existing urban fixed-route services in Nashville-Davidson County, Clarksville, Franklin, and Murfreesboro. Urban services are the backbone of any regional transit system and must be optimized in order to ensure the success of investments in regional rapid transit or commuter rail. The vision calls for continued investment in existing local bus systems, the eventual introduction of fixed-route service in Springfield, Gallatin, Lebanon, Columbia, and Dickson, and the return of the urban streetcar in downtown Nashville which serves as the central hub for the region.
- **Suburban and Commuter Circulators:** As the region begins to implement rapid transit, commuter rail, or express coach services in each of the regional corridors, the vision calls for the development of local circulators markets where a full-fledged urban fixed-route system would not make sense. Such local circulation will be important to customers to access regional services from primary destinations within their community. Suburban circulators, which would operate throughout the day, are envisioned for places like Goodlettsville, Hendersonville, Smyrna, La Vergne, and Brentwood, while commuter circulators, which would operate during peak commuting times, are envisioned for places like Portland, Spring Hill, Kingston Springs, and Ashland City.
- **Other Regional Services:** In addition to the geographically defined train, bus, and circulator services described above, the vision also calls for the expansion of the regional vanpool program and rural paratransit services. The regional vanpool program has been proven to be a popular and cost-effective way to provide ride-sharing opportunities to commuters who live too far away from fixed-route lines, and as the region’s population continues to grow older, rural paratransit services will be needed to ensure older Middle Tennesseans have transportation to and from life-sustaining services.

While the adoption of a bold, new long-range vision for mass transit is a momentous step by Middle Tennesseans towards the expansion and modernization of its public transportation system, the vision itself will not guarantee the successful implementation of transit improvements. The transit vision seeks to communicate the region’s intent for developing mass transit, but more difficult work is needed in order to make the vision a reality. The following sections of this plan provide specific guidance for how to achieve significant portions of the vision over the next 25 years.

## 5.4 Regional Corridor Recommendations

The Middle Tennessee area is served by seven major regional corridors, each a significant part of the overall vision for mass transit to provide increased connectivity between downtown Nashville and other traditional town centers and emerging activity centers across the area. Additionally, the MPO has begun to plan for emerging development along the SR 840 corridor, particularly between Lebanon, Murfreesboro, and Franklin, where the long-range vision calls for future express bus/ coach service as commuting patterns begin to yield sufficient demand for transit.



- North Corridor – Nashville to Springfield and Portland.
- Northeast Corridor – Nashville to Goodlettsville, Hendersonville, and Gallatin,
- East Corridor – Nashville to Mt. Juliet and Lebanon,
- Southeast Corridor – Nashville to La Vergne, Smyrna, and Murfreesboro,
- South Corridor – Nashville to Brentwood, Franklin, Spring Hill, and Columbia,
- West Corridor – Nashville to Kingston Springs and Dickson,
- Northwest Corridor – Nashville to Ashland City and Clarksville,

The region’s vision for mass transit calls for the implementation of rapid transit services in three of the seven major regional corridors, commuter rail in two, and premium express coach service in three. The following presents a set of recommendations for the short and long-term to encourage progress towards the vision.

## Rapid Transit Corridors

### Northeast Corridor (Davidson and Sumner Counties)

The region’s 30-mile Northeast Corridor extends between downtown Nashville and the City of Gallatin and is generally defined along US 31 (Gallatin Road, Nashville Pike), Interstate 65, SR-386 (Vietnam Veterans Blvd) and encompasses the areas of East Nashville, Madison, Goodlettsville, Hendersonville, and Gallatin.

The corridor ranges from relatively mature development in the southwest to new development in the northeast. East Nashville is undergoing revitalization of its commercial areas and residential neighborhoods while maintaining a traditional, compact urban development pattern. Gallatin Pike is an important transportation corridor in the East Nashville and Madison communities and future land use plans call for concentrating development in nodal community centers with a pedestrian-oriented character. The cities of Hendersonville and Gallatin are experiencing faster population growth and development with new upscale residential and commercial development occurring in less concentrated suburban development patterns.

The area is served by a variety of transportation services, highlighted by major north-south roadway facilities. Traffic volumes on those and other major facilities have increased significantly over the past decade, resulting in higher levels of congestion. A variety of transit services also are available within the corridor including fixed route bus service, express service and park and ride lots.

- Four north-south roadway facilities run in parallel in the northeast Nashville area, each with different transportation characteristics: Interstate 65, Vietnam Veteran’s Blvd (SR 386), Gallatin Road/ Nashville Pike (US 31E), Dickerson Pike (SR 11), and Ellington Parkway.
- Average traffic volumes have increased by 6 percent on the roadways in the study area between 2000 and 2006.
- An HOV lane is currently in use on I-65 between Briley Parkway and the I-65/Vietnam Veteran’s Blvd. interchange.
- CSX owns and operates a mainline railroad which travels through downtown Nashville, Madison, Hendersonville, and Gallatin.
- In 2005, there were about 96 trains per day using two existing tracks between downtown Nashville and Madison. Between Madison and Gallatin there were about 32 trains per day using one existing track.

- The Nashville MTA currently provides bus service (Route 26) between downtown Nashville and Rivergate Mall. In 2004 it carried 10 percent of all fixed route customers in the MTA's network and was the route with the overall highest ridership. 2007 data indicates substantially increased ridership.
- MTA introduced light Bus Rapid Transit (Route 56) in late September 2009. The service covers 12 miles along Gallatin Pike and runs between Music City Central in downtown Nashville to the edge of Sumner County, just north of Rivergate Mall.
- Bus service also is provided via Route 35X which extends from downtown Nashville to Hendersonville with service provided in the morning and evening rush hours.
- According to a 2006 survey, 54 percent of the MTA transit riders had no working vehicle and 74 percent had incomes less than \$15,000 per year indicating a heavily transit dependent customer base.
- RTA introduced Express Coach Service between downtown Nashville and Hendersonville and Gallatin in Sumner County via Route 92X on September 29, 2008. Since its inception, the service has been very popular. It currently operates two morning inbound trips and two afternoon outbound trips and averages around 2,200 passenger per month.
- Several park and ride lots are provided in the study area for bus transfers and car and van pools. These lots are located at the Madison Kmart, Madison Square, Hendersonville Kohl's (RTA), New Shackle Island (Hendersonville), Rivergate Mall and Gallatin Walmart. In total, over 250 parking spaces are available.

The urban design characteristics of the corridor represent a continuum of development patterns representative of time periods as the region has expanded over the last 50 years. Each community has small commercial nodes that formed their original town centers. Connecting these nodes are various scales of strip commercial. The scale of these strip commercial areas is smaller within the segment between Nashville's central business district and Madison.

With the exception of large grocery store developments, the size of these developments is typically under an acre with less than 100ft of street frontage. Larger strip commercial developments are more characteristic of the segments around the Rivergate Mall. These developments commonly include 3 or more acres with street frontage exceeding 150ft. Indian Lake Village in Hendersonville, a large office, residential, and retail center currently under construction, has begun to introduce a large-scale multi-use development pattern to the north Hendersonville portion of the corridor.

### **Short-Term Recommendations for Express Coach Service**

Options should be sought to further improve the express service to Gallatin. Recommendations are to add a third trip during each peak, either by combining the service with one trip on the 35X which could be extended, or adding a trip independently to Route 92X. Efforts should also be made to develop a formal Park & Ride lot east of the merge of the Vietnam Veterans Parkway merge with I65 north. Such a lot could add capacity to the Rivergate Mall Park & Ride (which is reasonably well utilized), it could make it easy and quick for the 92X to serve the Rivergate area. It could also be a very visible lot from the highway which would increase use.

An additional morning trip departing Gallatin at 7:00AM is recommended. An additional early evening trip would depart 21<sup>st</sup> and West End at 5:20PM. The one-way travel time would be approximately 70 minutes. One vehicle would be needed to operate these additional trips at a total capital cost of \$450,000. The annual operating cost would be around \$110,000. The additional trip is expected to increase in annual ridership by 13,000 passengers or about 50 per day.

Funding should be allocated for a Park & Ride lot in the vicinity of Conference Drive and Vietnam Veterans Boulevard. The cost for a 200 space lot at \$9,000/space can be estimated as \$1,800,000.

### Mid-Term Recommendations for Evolutionary Bus Rapid Transit

Understanding that implementing the region’s Light Rail Transit vision for the Northeast Corridor will not happen overnight, a series of interim projects based on a Bus Rapid Transit alternative are being recommended to lay out the path to accomplish that ultimate vision. Some of those recommendations for the Davidson County portion of the corridor include the intensification of the light BRT service currently operated by MTA on Gallatin Pike to add dedicated lanes at selected locations north of Briley Pkwy, enhancing bus stations to include real time information and ticket vending machines as recommended on phase 2 of MTA’s BRT implementation plan, and incorporation of queue jumps at selected intersections to allow buses to improve travel time. In the Sumner County portion of the corridor, dedicated/managed lanes are recommended for bus travel including the possibility of slip ramps to provide access to TOD sites along the corridor like in the case on Indian Lake Village in Hendersonville. Additionally, new circulator routes providing access to the main line in certain strategic areas in both counties is also recommended.

### Long-Term Vision for Rail Transit

Following a similar approach to that one taken by the Denver region for its southeast corridor (T-Rex), an urban/suburban LRT alignment along a freeway corridor represents the locally desired alternative for Nashville’s Northeast Corridor. In order to get there, an alternative growth scenario that provides a different approach to the trend that has been taking place during the last several years needs to be designed and followed. This alternative approach is imperative to position the corridor in a place where an LRT investment makes sense and can respond to the different realities permeating these types of investments. Answers to several question ranging from future ridership and capital and operating costs to economic and land use impacts and public policy and funding need to be considered and analyzed thoroughly in order to move forward. At a minimum, the following steps needs to be taken to advance the long term vision



- Translate revised growth scenario into the future land use plans of local governments;
- Educate the public and policy-makers on the benefits of targeted density with good urban design;
- Analyze gaps in policies to identify regulatory barriers to a more compact land development pattern;
- Identify and promote market incentives that encourage increased development around targeted TOD locations;
- Align public sector investment strategies with stated vision to help created a more suitable environment for major transit investment, or at least to not contradict it.

## **Southeast Corridor (Davidson and Rutherford Counties)**

The Southeast Corridor area is approximately 30 miles in length from downtown Nashville to just south of the City of Murfreesboro and encompasses an area of approximately 350 square miles. The corridor has experienced tremendous population growth in recent years and is expected to continue growing at a rapid pace. The population in the study area, which includes portions of both Davidson and Rutherford Counties, was 331,000 in 2000 and is forecast to grow to more than 438,000 by the year 2025.

There are two major thoroughfares in the corridor, Interstate 24 (I-24) and Murfreesboro Road (US-41/70S), which connect Nashville with La Vergne, Smyrna and Murfreesboro. Both thoroughfares provide access to high concentrations of employment sites, including large state and federal offices in downtown Nashville, commercial/retail development in suburban areas, and single-family and multi-family housing throughout. With rapid growth in the area, congestion along these major roadways is forecast to increase. This increased congestion will make existing bus service less attractive due to longer travel times and buses that are stuck in traffic.

There are limited opportunities for roadway expansion due to topographic constraints and development adjacent to the right of way. For example, I-24 in and around downtown Nashville was constructed in the late 1950s and roadway improvements over the last several decades have expanded to the maximum amount of available right-of-way within the corridor. As a result, there is no available median right-of-way. The outside travel lanes are 20 to 30 feet below the surrounding topography and abut rock walls. The physical challenges and potential costs of expanding the right-of-way under these conditions, along with the impacts of taking the highly developed urban and industrial land which surrounds the right-of-way, limits the potential to expand the roadway. Additionally, in other parts of the I-24 corridor, major widening has occurred within the available median right-of-way to avoid affecting development alongside the edge of the roadway. Similar limitations exist along Murfreesboro Road which includes numerous commercial and retail establishments with driveways or parking facilities that directly access the roadway.

Currently, few options in the corridor provide alternatives to driving in heavily congested conditions. Options for longer-distance commuters are limited to: carpools and vanpools using park-and-ride lots; the Regional Transportation Authority (RTA) "Relax-and-Ride" commuter bus service which operates only during rush hour periods; local and express Metropolitan Transit Authority (MTA) routes that operate over shorter segments of the corridor; and use of the HOV lane on I-24. The HOV lane on I-24 runs between Murfreesboro and Nashville but terminates at Harding Road, several miles short of downtown Nashville. Drivers using the HOV lane must enter mixed traffic at that point creating significant congestion and limiting the utility of the HOV lane for carpools and transit. In addition, the HOV lane is not enforced, further limiting its benefit. For existing bus service there are no options that enable buses to bypass congestion. Considering this, ridership on the existing commuter services is relatively high which indicates a potential unmet demand for transit options in the corridor.

Potential commuters that do not have access to private transportation are denied access to jobs and educational opportunities throughout the corridor as a result of the lack of transit options. This lack of access reduces opportunities for all people throughout the region, hinders social and economic advancement, and reduces regional economic development. As the Southeast Corridor High-Performance Transit study illustrates, the lack of mobility and transportation options combined with the current and projected growth of population, employment—and traffic congestion—requires that transportation alternatives be developed now to address these needs.



### **Short-Term Recommendations for Express Coach Service**

It is recommended that the Murfreesboro trips be modified to provide easier connections between Rover, Murfreesboro's bus system, and the express route. The Murfreesboro express trips could begin at the Rover transfer location at Walnut and Burton. The bus would then run on Medical Center Parkway and serve a new Park & Ride located near the interchange with I-24. A Park & Ride could either be established at the Avenue Shopping Center or a new one could be constructed since land is available near the interchange. This location is preferred over the existing Park & Ride at Old Fort Park. It is unlikely that there is space for a transit coach to serve this lot and it is located two miles east of the I-24 interchange.

From the I-24 and Medical Center Parkway interchange, the route would run express to Downtown Nashville, using the HOV lane from Highway 96 to the Davidson County line. The estimated travel time to Nashville is about 50 minutes.

Possible morning inbound departure times for the Murfreesboro route could be 6:00 AM, 6:30 AM, 7:00 AM, and 7:30 AM. Possible afternoon outbound departure times could be 3:50 PM, 4:10 PM, 4:50 PM, and 5:20 PM. Two additional vehicles would be needed to operate this service, with a total capital cost of \$900,000. The annual operating cost would be \$157,000 with an expected increase in annual ridership of 23,000 passengers or about 90 per day.

Funding should be allocated for a Park & Ride lot in the vicinity of Medical Center Parkway and I-24. The cost for a 100 space lot at \$9,000/space can be estimated as \$900,000.

The Smyrna and La Vergne express service would begin at the Smyrna K-Mart and run north on US 41 through La Vergne, serving the Park & Ride at the Kroger. It would then turn left on Parthenon Boulevard to reach I-24 and run express to downtown. The travel time from La Vergne to downtown should improve to around 30 minutes.

Possible morning inbound departure times for the Smyrna and La Vergne route could be 6:00 AM, 6:30 AM, 7:00 AM, and 7:30 AM. Possible afternoon outbound departure times could be 3:50 PM, 4:10 PM, 4:50 PM, and 5:20 PM. Two additional vehicles would be needed to operate this service, with a total capital cost of \$900,000. The annual operating cost would be \$142,000 with an expected increase in annual ridership of 23,000 passengers or about 90 per day.

The local service connecting Nashville to Murfreesboro would operate similar to the current service. There would be three northbound trips and three southbound trips. The trip times should be reviewed with MTSU to make sure the service is meeting the travel needs of its students, staff, and faculty.

### **Mid-Term Recommendations for Enhanced Bus Service/ Bus Rapid Transit**

In 2007, the MPO completed a Transit Alternatives Analysis which determined that the most practical investment in the short- and mid-term was to significantly enhance the regional express bus service by integrating features to increase its attractiveness to choice users that have access to a personal automobile. The study also recommended the implementation of new local circulator service in communities along the corridor including LaVergne and Smyrna. The MPO has budgeted planning funds to assist those communities in identifying possible startup services.

### **Long-Term Vision for Rapid Transit Service**

Given the continued rapid growth between Nashville and Murfreesboro, and the ongoing interest in rapid transit in the region's urban corridors, the MPO recommends that as bus service is incrementally improved along I-24 and US 41 and local governments find opportunities to densify existing communities, the Southeast corridor be re-evaluated for possible fixed-guideway investments within the next five to ten years.



## **South Corridor (Davidson, Williamson, and Maury Counties)**

The south corridor stretches 15 plus miles between Nashville and Franklin, TN and another 20 miles to Columbia. Currently served by express bus service during peak commuting periods, the corridor is a top candidate for more significant transit investment over the next decade. Williamson County is expected to more than double its population by the year 2035 and high-capacity rapid transit may be one of the most effective ways to keep this part of the region moving efficiently.

The long-range vision for the south corridor calls for high-capacity rapid transit in the form of light rail or bus rapid transit to connect residents to major employment and shopping destinations between Nashville and Franklin. The service should be integrated with local transit services in Franklin and Nashville and provide a catalyst for new local circulation in the Brentwood area.

Within the next two years, the MPO should work with the RTA and local governments in Davidson and Williamson Counties to conduct a major corridor study to evaluate the feasibility of light rail and bus rapid transit investments. Such a study will cost up to \$1.2 million and could be paid for with MPO planning grants with local governments providing the required 20 percent local matching funds.

### **Short-Term Recommendations for Express Coach Service**

#### ***Williamson County***

Almost 30,000 Williamson County residents commute to Davidson County. To serve this commuter market, the RTA started a new express service in December 2009 from Franklin and Brentwood to Downtown Nashville. Route 91X Franklin/Brentwood Express serves two Park & Ride lots in Franklin, one at the Williamson Square Kroger near Route 96 and I-65 and another at Lowe's Home Improvement near Cool Springs Boulevard and I-65. The route also serves a Park & Ride at the Brentwood Civitan Ball Park.

There are two trips to Nashville in the morning departing at 6:30 AM and 7:00 AM and two trips from Nashville in the afternoon departing at 4:20 PM and 4:45 PM. Running only two trips in each direction limits customers' choices of when to travel. The last afternoon departure is before 5:00 PM, the traditional end of the workday for many professions.

It is recommended that a third trip operate in both directions. The additional morning trip would depart Franklin at 7:30 AM and serve all three Park & Rides. The additional early evening trip would depart Music City Central at 5:30 PM and serve all three Park & Rides. The one-way travel time would be approximately 50 minutes.

One vehicle would be needed to operate these additional trips at a total capital cost of \$450,000. The annual operating cost would be \$79,000 with an expected increase in annual ridership of 13,000 passengers or about 50 per day.

The RTA also started an express bus service to Spring Hill, which sits partly in Williamson County and partly in Maury County. Population in Spring Hill has almost quadrupled in eight years from 7,725 to 26,320. Route 95X Spring Hill Express serves two Park & Rides in Spring Hill, one at Thompson's Station Baptist Church and another at Spring Hill Kroger. Route 95X only runs two trips. One trip departs Spring Hill at 6:20 AM and another departs Music City Central at 4:10 PM. The one-way running time is approximately 60 minutes.

The times these trips operate only allow employees to be at work 8.5 hours. Many professional positions require longer work days. Two additional morning and two additional early evening trips are recommended to provide an express bus option for these employees.



The two additional morning trips would depart Spring Hill at 6:50 AM and 7:20 AM and serve both Park & Rides. The additional early evening trips would depart Music City Central at 5:00 PM and 5:45 PM and serve both Park & Rides.

Two vehicles would be needed to operate these additional trips at a total capital cost of \$900,000. The annual operating cost would be \$189,000 with an expected increase in annual ridership of 23,000 passengers or about 90 per day.

### ***Maury County***

The number of commuters between Maury and Davidson counties has increased rapidly from 3,077 in 2000 to 7,073 in 2008. This 130 percent increase is the largest increase in the ten-county region. Some of this growing commuter market may be served by the new express Route 95X Spring Hill Express discussed above. RTA Express Bus Service to Columbia is not recommended in the short-term because of the length of trip required, which is more appropriately served by intercity service. However, a Park & Ride lot is recommended near Nashville Highway (US 31) and Bear Creek Pike (US 412). The lot could serve as a carpool and vanpool staging area. The cost of a 50 space lot can be estimated as \$450,000.

The South Central Tennessee Development District has begun intercity service that serves Columbia (stopping at the McDonalds at 110 Bear Creek Pike near Route 31). One trip leaves Columbia at 8:00AM and arrives at the Nashville Greyhound station at 9:45AM on Tuesdays, Thursdays and Fridays. The return trip leaves Nashville at 12:00 noon. On Monday and Wednesday, the trip runs to the Greyhound station in Murfreesboro, arriving at 9:45AM, with a return at 12:00 noon. This service is not aimed at the commuter market..

## **Commuter Rail Corridors**

### **East Corridor (Davidson and Wilson Counties)**

The region's east corridor stretches 30 plus miles between Nashville and Lebanon, TN. Currently served by the area's first example of local fixed-guideway rail service since the InterUrban rail lines closed down several decades ago. While ridership levels continue to ebb and flow with the price of fuel, the corridor is well positioned for growth over the next two decades as development begins to occur near stations. The MPO should continue to provide support to the line and seek ways to encourage densification of development to spawn new ridership.

Currently, the train operates 3 trips inbound to Nashville and 3 trips outbound to Wilson County in the morning peak period and 3 trips outbound to Wilson County and inbound to Nashville in the afternoon. The Music City Star also provides a fourth trip in the early evening from Wilson County to Nashville on Fridays only with a return trip leaving Nashville at 9:30PM.

### **Northwest Corridor (Davidson, Cheatham, and Montgomery Counties)**

Clarksville, the largest city in Montgomery County and the fifth largest city in Tennessee, is increasingly becoming a bedroom community to Davidson County. The number of commuters traveling from Montgomery County to Davidson County increased from 4,698 to 8,335 (68%) from 2000 to 2008.

Vanpools and informal carpools operate from six Park & Rides and Jarmon D and Q Transportation operates express bus service from northeast Clarksville to Nashville. With the increase in the number of commuters from Montgomery County to Davidson County, express bus service from Park & Rides along I-24 to Nashville is recommended en route to the longer-term vision for commuter rail.



## Short-Term Recommendations for Express Coach Service

### *Montgomery County*

Two new routes are recommended between Clarksville and Nashville. The first route would begin at the Park & Ride at the Walmart on Wilma Rudolph Boulevard near Exit 4 on I-24. The route would run on I-24, serve the Park & Ride at Exit 8, and then run express to Downtown Nashville. The travel time to downtown would be approximately 55 minutes. This route is similar to the Jarmon Transportation service, which could be used to demonstrate the feasibility of express bus service from Exit 4. This existing service would need to be marketed to commuters as it appears it is currently mostly marketed to Ft. Campbell personnel.

Possible morning inbound departures could be 6:45AM, 7:15AM, and 7:45AM. These departures would make timed connections to Clarksville Transit System (CTS) Route 7 at the Walmart.

A reverse trip could depart Nashville at 7:45 AM. This route would be designed to serve Hemlock Semiconductor (HSC) and other business in Commerce Park. Commerce Park is located approximately 1.5 miles east of I-24 on the northwest side of Highway 79. HSC is currently under construction and is expected to create at least 500 jobs for the region. Many of these jobs will require skilled professionals that are well paid and are likely to reside in Nashville.

Possible afternoon outbound departure times could be 4:00 PM, 5:00 PM, and 6:00 PM, with a reverse trip at 5:15 PM. Three vehicles would be needed to operate this service at a total capital cost of \$1.35 million. The annual operating cost would be \$345,000 with an expected annual ridership of 45,000 passengers or about 175 per day.

The second route would begin at the downtown transit center. The route would run east on Ashland City Road and Martin Luther King Parkway, serve the Park & Ride lot at Exit 11 and then operate express on I-24 to downtown. The travel time to downtown would be approximately 60 minutes.

Possible morning inbound departures could be 6:30 AM, 7:00 AM, and 7:30 AM. These departures would make timed connections to all Clarksville Transit System (CTS) routes at the transit center. A reverse trip could depart Nashville at 7:45 AM and operate express to downtown Clarksville. Possible afternoon outbound departure times could be 4:00 PM, 5:00 PM, and 6:00 PM, with a reverse trip at 5:15 PM. Three vehicles would be needed to operate this service at a total capital cost of \$1.35 million. The annual operating cost would be \$377,000 with an expected annual ridership of 45,000 passengers or about 175 per day.

### *Cheatham County*

While anticipated growth between Nashville and Ashville City is not as robust as that projected between Nashville and Clarksville along I-24, the plan recommends the introduction of express bus service from Ashland City. While the number of commuters from Cheatham County to Davidson has remained unchanged from 2000 to 2008, the total of 10,500 commuters is above the minimum threshold of 5,000 commuters.

A Park & Ride could be established at the Walmart just east of Ashland City (Route 12 and Old Hydes Ferry Run). The route would then run express on Route 12 into Davidson County, follow 8<sup>th</sup> Avenue into Downtown Nashville, and end at Music City Central. Possible morning inbound departures could be 6:40 AM, 7:20 AM, and 8:00 AM. Possible afternoon outbound departures could be at 4:15 PM, 5:10 PM, and 6:00 PM. The one-way travel time would be approximately 40 minutes.

Two vehicles would be needed to operate these trips at a total capital cost of \$900,000. The annual operating cost would be \$189,000 with an expected increase in annual ridership of 34,500 passengers or about 135 per day.

### Long-Term Vision for Commuter Rail

Over the next several years no major highway projects are expected to significantly improve intercity commute times in the Clarksville-Nashville corridor. Over the next 20 years, intercity commute time is expected to deteriorate further to 1 hour and 35 minutes from the 50 minute drive of today. Clarksville-Nashville commuters need a travel option which bypasses the deteriorating traffic conditions on I-24 and Clarksville Highway. That transportation option should be developed within the next 5-7 years.



The Nashville Area MPO recently participated in a study along with the Clarksville Urbanized Area MPO, TDOT, the Cheatham Rail Authority, and the Nashville Western Rail Authority to evaluate the feasibility of a high-capacity commuter service which would improve the current travel times and provide flexibility for low-cost expansions of capacity as travel demand increases. The study evaluated commuter rail service via three different alignments including I-24, existing CSX tracks through Springfield, and the old

Tennessee Central Railroad through Cheatham County. The study concluded that the following scenario was the most feasible, but further study is needed prior to the selection of a preferred alignment.

- **Project Alignment:** The old Tennessee Central Railroad, which follows the Cumberland River and passes through Ashland City, was found to be the most practical alignment. Most of the old railroad bed is still in place and the Nashville and Western short line freight railroad now operates on the line from the Farmer's Market area of Nashville to the Ashland City Industrial Park just south of Ashland City. The CSX alignment proves impractical since the private rail company has limited capacity to share with passenger service. The initial estimates for the cost of constructing new track along the I-24 corridor did not appear to be competitive with the Tennessee Central Railroad alignment.
- **Service Concept:** Passenger stations would be located in Mid-Town Nashville, Downtown Ashland City, and the Old Hospital/Madison Street area of Clarksville. Two train sets each make the full Clarksville/Nashville trip; 2 times in the AM and 2 times in the PM. Speeds would be up to 79 miles per hour over long sections, with an overall 50 minute Clarksville to Nashville trip time.
- **Initial Capital Costs:** \$114.8 million is the projected cost to rehab 16 miles of existing track, construct 27 miles of new track, upgrade 54 bridges or overpasses, construct 3 stations and the support and maintenance facilities, acquire new rights of way, purchase locomotives and train cars, and includes a budgeted contingency.

- **Annual Operating Costs:** \$5.7 Million to operate the service during peak commuting times, two runs in the AM, and two runs in the PM.

To date, the conceptual feasibility study represents the latest evaluation of the potential commuter rail in the corridor. In order to advance to the next level, the Nashville Area MPO recommends a continued partnership with the Clarksville Urbanized MPO and TDOT to further refine projects for ridership and costs to allow decision-makers to better understand the benefits and costs of moving forward with commuter rail in the northwest corridor. The following are proposed as the immediate next steps:

- Conduct a 10-county regional household travel survey in FY 2011 (\$800,000 to \$1.2 million) in order to update information about current regional travel behaviors. Such data will be needed in order to conduct a more thorough transit alternatives analysis to compete for Federal Transit Administration (FTA) grants for implementation.
- Program funds (\$800,000 to \$1.2 million) for the detailed corridor study to include the required FTA Alternatives Analysis that is required to qualify for federal grant funding. Should funds be available, the study could begin as early as Fall 2012, but not sooner than the completion of the household travel survey.
- Integrate corridor study recommendations into the MPO's regional transportation plan. Given the required work elements to complete the study, it is likely that those findings and project recommendations will be presented as part of the region's 2040 Regional Transportation Plan, scheduled for adoption in late 2015.
- Begin efforts to preserve and protect potential right-of-way located along the corridor. Such action now can help significantly reduce the cost of implementation by preventing unnecessary land acquisitions or business relocations to make way for the construction of tracks or stations.
- Work with TDOT to secure Truman-Hobbs funding for a new Cumberland River bridge that could be used by the commuter rail service should the FTA Alternative Analysis recommend an alignment through Ashland City.
- Continue investment in interim transit solutions along the corridor including inter-city bus service and the vanpool program to serve existing commuters and to help build ridership for future rail service.

## Regional Express Coach Services

Even within the “bold” vision for mass transit, much of the region does not have the concentrated development that is needed to support regularly scheduled transit service such as local fixed-bus service or light rail service. However, to build towards a future with a comprehensive public transportation system, some steps can be taken to improve and fill gaps in the public transportation services available today. In particular, Park & Ride with express coach services are an excellent way to accommodate transit commuters in less dense areas. Express coach service, combined with strategically located park and ride lots, allow customers of public transportation to access the service by car and thus this option increases the residential area that transit can serve by many times.

The potential for Park & Ride/express bus service is dependent upon the number of commuters traveling between a Park & Ride service area and the destinations served by the express bus service. Actual usage of Park & Ride lots will depend upon the quality and quantity of transit service, the degree of highway congestion, and the availability of parking at the destination. Following is an assessment of the potential for Park & Ride with express bus.



### **West Corridor (Dickson County)**

The number of commuters from Dickson County to Davidson County in 2008 was 6,620. This is barely above the threshold of 5,000 and express bus service from Dickson County can be considered a lower priority compared to the other eight counties.

A Park & Ride could be established near the intersection of I-40 and State Route 46. The route would then run express on I-40 and stop at existing informal and formal Park & Rides located at the intersection Interstate 40 and State Route 96 near the border of Dickson and Williamson Counties. The bus would continue to run express along I-40 and end at Music City Central. Possible morning inbound departures could be 6:30 AM, 7:00 AM, and 7:30 AM. Possible afternoon outbound departures could be at 4:15 PM, 5:10 PM, and 6:00 PM. The one-way travel time would be approximately one hour.

Three vehicles would be needed to operate this service at a total capital cost of \$1.35 million. The annual operating cost would be \$283,000 with an expected annual ridership of 34,500 passengers or about 135 per day. The cost of a 50 space Park & Ride can be estimated as \$450,000.

### **North Corridor (Robertson County)**

While the number of commuters from Robertson County to Davidson has increased slightly from 2000 to 2008, the total of 12,357 commuters is above the minimum threshold of 5,000 commuters.

A Park & Ride could be established near the intersection of I-65 and State Route 52. The route would then run express on I-65 and stop at another newly established Park & Ride located at the intersection I-65 and State Route 25. The bus would continue to run express along I-65 and end at Music City Central. Possible morning inbound departures could be 6:30 AM, 7:00 AM, and 7:30 AM. Possible afternoon outbound departures could be at 4:15 PM, 5:10 PM, and 6:00 PM. The one-way travel time would be approximately 55 minutes.

Three vehicles would be needed to operate this service at a total capital cost of \$1.35 million. The annual operating cost would be \$259,000 with an expected annual ridership of 34,500 passengers or about 135 per day. Two 50 space Park & Ride lots at \$9,000 per space can be estimated to cost \$900,000.

### **Summary of Park & Ride Service Recommendations**

The recommendations for new and additional Park & Ride service are summarized in the following table. Altogether improvements are recommended for ten existing routes, and five new routes are recommended. The total additional operating cost for these services is \$2.5 million, some of which will be offset by fares collected. Assuming similar fares of \$2.10 for express bus service in Davidson County (the current fare for express bus service) and \$3.50 for express bus service outside Davidson (the current RTA fare), and that the average fare will be around 70 percent of full fare (to allow for fare discounts), the overall net operating cost of service would be \$1.66 million. The additional capital cost for 33 vehicles is \$14.8 million. The cost for six new Park & Ride lots is \$4.5 million.

**Table 15. Summary of Express Coach and Park & Ride Service Recommendations**

County	Express Service	Total Operating Cost	Net Operating Cost	Capital Cost for Vehicles	Capital Cost for Park & Ride	Passengers
Davidson	Add 11 trips to existing express bus services	\$358,000	\$238,950	\$4,950,000		81,000
Sumner	Additional trip to/from Gallatin	\$110,000	\$78,150	\$450,000	\$1,800,000	13,000
Rutherford	Modify and improve express service on 96X	\$157,000	\$100,650	\$900,000	\$900,000	23,000
Rutherford	Modify and improve Smyrna and La Vergne service on 96X	\$142,000	\$85,650	\$900,000		23,000
Williamson	Improve service on 91X	\$79,000	\$47,150	\$450,000		13,000
Williamson/Maury	Improve service on 95X	\$189,000	\$132,650	\$900,000		23,000
Maury					\$450,000	
Cheatham	Ashland City to Downtown Nashville	\$189,000	\$ 104,475	\$900,000		34,500
Dickson	Intersection of I-40 and State Route 46	\$283,000	\$ 198,475	\$1,350,000	\$450,000	34,500
Robertson	I-65 to Downtown Nashville	\$259,000	\$ 174,475	\$1,350,000	\$900,000	34,500
Montgomery	Exit 4 I-24 to Downtown Nashville	\$345,000	\$ 234,750	\$1,350,000		45,000
Montgomery	Clarksville Transit Center to Downtown Nashville	\$377,000	\$ 266,750	\$1,350,000		45,000
<b>Total</b>		<b>\$2,488,020</b>	<b>\$1,662,125</b>	<b>\$14,850,000</b>	<b>\$4,500,000</b>	<b>369,500</b>

## 5.5 Local Fixed-Route Recommendations

### Nashville MTA

During most of the first decade of the 21st century, the Nashville MTA has been improving its service incrementally 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 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. The following sections present further recommendations for Nashville MTA service expansion over the short-, mid-, and long-term horizons. Further detail is available in the MTA's recently published *Strategic Master Plan*, which provides the foundation for the following.

## ***Short Term Recommendations (2010-2015)***

### **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 a new BRT along Gallatin Road. The proposed BRT will have stops around every  $\frac{3}{4}$  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 recommended 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  $\frac{1}{2}$  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. In March 2009, 2010 MTA implemented the Music City Circuit, a circulator providing free of cost service around downtown Nashville. The Circuit started with two routes, the Blue Circuit (Bicentennial Mall) and the Green Circuit (Gulch). On September 27, 2010 a third route named the Purple Circuit (Richard H. Fulton Complex) was introduced.

### **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 16. 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
<b>Total</b>	<b>\$5,991</b>	<b>\$16,050</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

***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 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 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.

## Murfreesboro Rover

Rover is the City of Murfreesboro's public transportation system and it provides fixed-route transit service within the City of Murfreesboro. It also works with and/or assists other regional providers with mobility issues.

Rover began bus transportation service to the public in April of 2007 along six routes throughout the city and expanded to eight routes in December 2008. Rover buses run Monday through Friday from 6 a.m. until 6 p.m. and all buses are equipped with bike racks and are wheelchair-accessible.

In August 2010, Rover completed a Transit Service Assessment study. The study purpose was to evaluate the system and identify service improvement needs and opportunities. The following are the specific study goals:

- Understand the needs of current riders,
- Identify opportunities to attract more riders,
- Identify if the current service is meeting rider needs,
- Identify unmet rider needs,
- Measure current levels of customer service delivery, including service quality, cleanliness, timeliness, etc.

Study results show that Rover has been doing a good job in general to provide frequent and reliable transit services as well as providing good geographic area coverage in Murfreesboro. The study also identifies some key findings that provide insight on how Rover can improve and increase service in the future. Several of those findings are already being addressed by Rover as specific projects included in the MPO's FY2011-15 Transportation Improvement Program. Additionally, the study outlines short and long term recommendations that can be implemented as additional resources become available. Those findings and service recommendations are described below.

### *Key Findings*

An on-board survey was conducted to learn more about Rover customers, how they ride Rover, and what would encourage them to ride more often. Survey analysis revealed:

- Rover passengers are very satisfied with the service and likely to continue riding.
- A majority of passengers use Rover to travel to and from work and ride frequently.
- Almost all of the customers do not have a car available for these trips.
- Passengers wish Rover went further west on Old Fort Parkway, served Cason Lane, and went further south on Church Street.
- Evening service until 9:00 p.m. and weekend service ranked the highest of the elements that may encourage customers to ride more frequently.
- Increasing the availability of shelters could contribute to an overall increase in satisfaction.

Stakeholder interviews were conducted to gain an understanding of the current and projected conditions in Murfreesboro. Overall, stakeholders had a positive view of Rover. The most common comments during interviews were:

- Extend service on weekdays,
- Start operating service on Saturdays,



- Add service on MTSU campus,
- Install shelters and benches.

A fixed route assessment was conducted. This assessment included an analysis of ridership data and on-board ridechecks to determine stop-level passenger activity. Rover is doing the following items well:

- Increasing ridership – Three routes (Mercury, Highland, Medical Center) continue to have ridership growth. Ridership on the remaining routes is stable.
- Frequency of service – Four of eight routes operate every 30 minutes. This level of frequency makes the service more attractive, especially to choice riders as it allows them the flexibility to travel when they want to travel.
- Better productivity than in-state peers – Rover’s overall productivity (passengers per revenue hour) is 10.2. This slightly exceeds the average productivity of Rover’s in-state peers<sup>1</sup> of 9.0 passengers per revenue hour.
- Service coverage – The eight routes provide good geographic coverage of Murfreesboro
- Disabled use – Several passengers with disabilities routinely use the fixed-routes. It is less expensive to transport these passengers on fixed route service than on paratransit service.

### ***Recommended Service Changes***

Two short-term service improvements were recommended for consideration:

- The extension of every other trip on S Church to Innsbrooke Boulevard near the frequently requested Barfield Crescent area. *This recommendation was implemented on September 1, 2010.*
- Creation of a taxi subsidy program to provide evening trips, Saturday trips, and serve areas of Murfreesboro not served by Rover. In a subsidized taxi program, eligible individuals can purchase discount coupons to use as taxi fare.

Three long-term service improvements were recommended for consideration for implementation after the taxi subsidy program has established demand for each service and funding is available:

- Westside route restructuring,
- Evening demand response service,
- Saturday fixed-route service.

### **Franklin Transit Authority**

Franklin Transit’s 5-Year Service Plan responds to the challenges of the next five years by refining the service standards by exploring new ways Franklin Transit can continue its innovative development with flexible services, use of smaller/efficient buses, connectivity with express services, and community shuttles, all supporting and complementing the network of regional transit services in our area. Three key components of Franklin Transit’s 5-Year Service Plan include:

- Replacement of aging equipment;
- Adding new vehicles and staff, as existing transit services continue to expand especially TODD (Transit On Demand) service;

- Planning and implementation of new sustainable transit services to continually meet the needs of the passengers and the community.

## 5.6 The Return of Urban Streetcar

Nashville once had an active streetcar system beginning in 1860 with mule drawn streetcars running on city streets operated by the McGavock & Mt. Vernon Horse Railroad Company and the South Nashville Street Railroad. In 1887 several “dummy” lines (streetcars pulled by little engines) were in operation and by 1889 the first electric streetcar ran in Nashville.

From the NashvillePost.com “The electrification of the street railways was a great occasion. Nashville was one of the first cities in the country to adopt the trolley. While the wires were being put up, everybody was speculating on how the trolley could run on the main wire without being obstructed by the supporting cross wires. .When the great day came and the first electric car, handsomely finished with plush upholstery, appeared, the streets were crammed and jammed with a curious crowd to see the lightning harnessed. Everybody was afraid of these half-tamed thunderbolts of Jove.”



Highlights of Nashville's history with streetcar include:

- In the 1890's the Nashville Street Railway built a casino at Shelby Park that later became a community center.
- On June 22, 1901 the Nashville Street Railway was forced into receivership when it defaulted on the interest payment for \$2,060,000 in bonds.
- In 1909 the Nashville-Franklin Interurban Railroad began running between Nashville and Franklin and it operated until 1943. The Nashville Gallatin Interurban operated from 1913 to 1932.
- Streetcars in the city of Nashville which once ran on many routes completed their last run in 1941

### Economic Development Potential of Streetcars

Today, the nation is seeing a resurgence of the streetcar all across the country. Communities instituting this mode of transit are using streetcars for many of the same reasons that they were originally built at the turn of the century. Streetcars are uniquely suited to serve high density areas in downtown districts across the country. They are slow and integrate well into an urban environment. They are much cheaper than light rail, are hugely successful in promoting development and street life, and fit easily into built environments with little disruption to existing businesses, residents and traffic. People are attracted to streetcars because they are nostalgic and a reminder of a simpler time. They are a comfortable mode of transportation with fixed routes making them less confusing than buses for the public regarding their destinations. They are an attraction in their own right and because people like to ride the streetcars, developers are attracted to them. Streetcars today are a form of entertainment as well as a mode of transportation that provides a tangible economic impact, while connecting core downtown districts.

In many cities today, the construction of a streetcar line produces significant businesses and residential development and attracts many more riders than a bus service following a similar route. People are more apt to give up their automobiles and ride the streetcars than with any other mode of transportation. People are also drawn to live in areas served by a streetcar route.

**Table 17. Economic Development Results for Streetcar Projects**

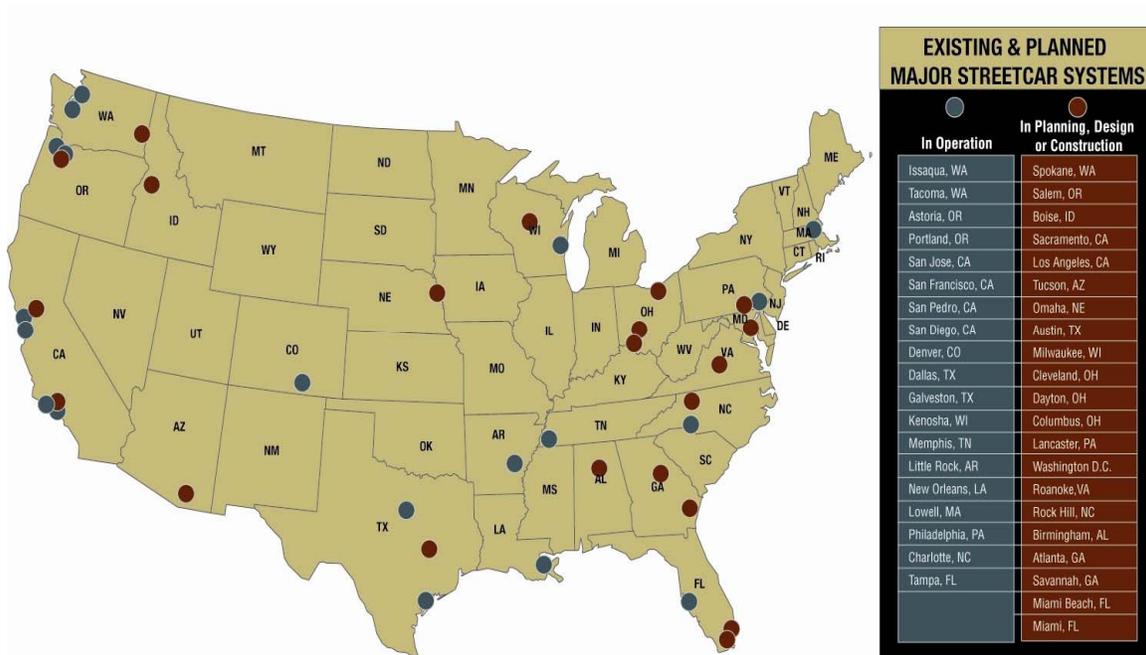
ECONOMIC DEVELOPMENT RESULTS FOR STREETCAR PROJECTS						
Recent Projects	Year Opened	Miles	Number of Cars	Cost in Millions	Economic Development	Return on Investment
Kenosha	2000	2	5	\$5.2	\$150,000,000	2885%
Tampa	2002	2.4	11	\$53.0	\$2,000,000,000	3774%
Little Rock (2 phases)	2004-2007	3.4	5	\$28.5	\$260,000,000	912%
Memphis (3 phases)	1993-2006	6.5	20	\$24.0	\$137,000,000	571%
Portland (2 phases)	2003	6	5	\$73.0	\$2,399,000,000	3286%

Source: Street Smart

Some of the cities benefiting from the construction of a streetcar route are Portland OR, Tampa FL, Little Rock AK, Kenosha WI and Dallas TX. Economic development in all of these cities has achieved financial success well beyond the original expectations and all of these cities have either expanded their original systems or plan to expand them in the near future.

Most of the streetcar systems constructed in the USA in the last 15 or 20 years have been constructed to encourage or spur economic development. All of the projects have been successful to various degrees.

**Figure 49. Map of Existing and Planned Streetcar Systems in U.S.**



The following table presents more information about the successes of streetcars in peer regions.

**Table 18. Examples of Recent Streetcar Success**

**Streetcar Example**



**Portland, Oregon**

A modern streetcar system (cars by Skoda) was constructed in Portland. The operation of the system began in 2001, and it has been extended several times. Initially, the system operated over a 3 mile loop with an approximately 13 minute headway. Economic development in the area surrounding the streetcar route has been \$2.3 Billion since the construction of the system.



**Charlotte, North Carolina**

This is a modern streetcar system that was just completed in the fall of 2007 in conjunction with a new light rail line. Development along the streetcar system has been rapid and more than \$400 Million in development has occurred prior to the start up of the system.



**Tampa, Florida**

Tampa built a heritage streetcar system using replica streetcars constructed by Gomaco Corp. of Iowa. The 2.3 mile system began operation in October of 2002. This system resulted in \$600 million in development that occurred prior to the opening of the system and over \$2 Billion in development through 2004.



### **Kenosha, Wisconsin**

Dealing with double digit unemployment, the loss of 5,300 jobs in three years and a dying downtown, the City of Kenosha undertook a massive redevelopment effort with a 2 mile streetcar loop as the centerpiece of development. Beginning construction in 1999, the system opened for business in 2000 using ex-Toronto PCC cars painted in the liveries of cities that had used the PCC car in their streetcar systems. Since the start up of the system, Kenosha has seen the construction of hundreds of condominiums, a museum and a park. Economic development is estimated at \$120 Million with three more museum buildings in the planning stages.



### **Little Rock, Arkansas**

The original project completed in 2003 consisted of 2.5 miles of track with three Gomaco replica streetcars. Since the original construction and second phase has been completed providing service to the William Jefferson Clinton Presidential Library, economic development has been calculated in the \$2 Billion range.

## **Lower Broadway-West End Streetcar Concept**

Generally streetcars are thought of as a circulator system and that lends itself to the establishment of circular routes. An added advantage of a circular route is the area of effect for the system is increased by using parallel streets for the return track. Several possible route locations were investigated including Demonbreun, Broadway, Central and Church Streets as possible route alternatives. After investigating these possible routes and walking or riding each of them, it was determined that the recommended route would be using Broadway as a two way spine from 1st Avenue to just beyond 31st Avenue, very close to the I-440 exit.

This route is recommended as a starter route because it has the best connectivity of any of the routes investigated. Connecting the high density residential units at the west end of the system, Centennial Park, Baptist Hospital, Vanderbilt University, a myriad of hotels, all to the most vibrant street in the downtown at the east end of the system, would be a great benefit to the community.

The route would also be close enough to the new convention center and be able to connect to the riverfront commuter rail station and the various activities that take place along the riverfront throughout the year.

The system would be three miles from end to end or six miles long for a round trip, and be able to operate with four cars, each making the complete circuit every 40 minutes providing a 10 minute headway. The street cars could be modern, newly constructed heritage (historic replication) cars or reconstructed older cars that would meet all current safety and ADA requirements. All cars would be powered electrically by a single overhead wire spanning between single poles that would be in the center of the spine on Broadway up to West End Avenue

and then be mounted behind the curb line on West End, 21st and the upper section of Broadway. Cars could be stored and displayed in a Car Barn in an area adjacent to the streetcar line.

### ***Capital Cost Estimates***

Estimated capital costs for the proposed 6 mile track system including track, power, maintenance, car barn (and property acquisition), cars and stops was estimated to be in the \$110 million dollar range.

The capital costs for the system have been estimated using the following assumptions:

- Two way spine in dedicated right of way on lower Broadway and street running on upper Broadway and West End Avenues;
- The existing bridges can be used as is with minor paving adjustments for the track structure and approaches;
- The car barn will be constructed within 1,000 feet of the existing or proposed streetcar line;
- Four new cars will be purchased;
- Project will be constructed within two years;
- Minimal utility relocations in existing streets will be required;
- Track and Overhead Wire;
- Car Barn and Related Track.

### ***Operating Cost Estimates***

Operating costs will vary based upon the hours of operation, the number of cars in service and system operator. At this stage of development, it is impossible to provide accurate forecasting for actual operating costs, but a range of \$2 to \$2.5 million per year would be a reasonable estimate. Many decisions will have to be made before an accurate estimate of operating costs can be put together. The largest portion of operating costs is the labor and direct overhead costs. Mechanic costs might be a little higher than bus costs because there are fewer cars to spread the cost over. Fuel costs are much lower as electric power does not increase at the rate that fuel will increase and the power consumption of streetcars is relatively low.

Operating assumptions include:

- Seven days per week operation;
- Average of 17 hours operation per day;
- Operations 7 days per week;
- Ten minute headway (time between cars);
- Four Vehicles operating to maintain headways.

### ***Funding Considerations***

The following are established funding methods utilized in successful systems across the country:

- Instituting a Business Improvement District (BID).
- Seeking a subsidy from the benefiting private entities and from Economic Development budgets.

- Launching a Capital Campaign to raise dollars from philanthropic sources. Many of the streetcar projects have also had a 501-C3 non-profit organization set up to help raise funds.
- Creating sponsorship models utilizing naming opportunities.
- Establishing agreements with the transit operator to provide operating funds when a streetcar replaces a transit service.
- Selling advertising in the streetcars and along the right of way.
- Using parking revenues to fund operations.
- Charging riders to generate fare box income.

### *Streetcar Design Considerations*

**Cars (Heritage & Historic):** There are several types of streetcars available. Portland used modern cars manufactured by Skoda, Little rock, Tampa and Charleston used newly constructed historic looking streetcars, Memphis and Savannah used reconstructed historic streetcars. The type of car used has little or no effect on the design of the track and the overhead contact system (OCS) and generally the type of cars that can be used are interchangeable.

There is a major difference in costs between the various types of cars. The new modern cars are currently selling between \$3.7 million and \$4.6 million per car. The new historic looking cars are currently selling for \$1 million and rebuilt cars either modern, art deco or historic can be purchased for between \$.75 and 1.25 million each depending upon the type of car and level of rebuild.

**Stations/Stops:** Car stops can vary greatly depending upon location and purpose. The amenities can be as simple as a concrete or bricked waiting area with a bench and an overhead shelter to a major stop with a waiting room, electronic signing showing the wait to the next streetcar and a ticket booth.

**Electrification System:** The overhead wire system proposed for this project would be a very simple system consisting of a single 4-0 copper wire suspended between a single pole using a pipe arm. The system is extremely safe with the powered wire suspended a minimum of 18' above the roadway and using the track for a grounded return.

Power is provided from the standard Nashville power grid using a transformer to change the voltage to 600 volts and a rectifier to change the current from AC (alternating current) to DC (direct current). It is expected that for the initial system, three substations with a footprint of approximately 80 square feet will be required within the project area. A smaller station would be placed inside the car barn for maintenance.

**Car Barn:** A 30,000 square foot car barn is proposed that will serve as a storage and maintenance facility for the streetcars as well as a public space for meetings and viewing areas. A small gift shop might be included that would sell streetcar memorabilia and books. The working shop would be separated from the viewing area with a glass or Plexiglas wall that would allow spectators to watch repairs and renovations without being exposed to any safety hazards. The building would also include public restrooms, office space, storage for parts inventory and parking.

**Methods of Propulsion:** Traditionally, streetcars have been powered by overhead 600 volt DC electric using single wire. Power is furnished through the standard electric grid to a transformer and rectifier that changes the standard AC power to DC for the streetcar and adjusts the voltage. This unit, called a sub-station, usually is supplied as an enclosed pre-packaged unit which has a footprint approximately eight feet square. Nashville will need to power their cars with the overhead electric because Nashville streetcars will travel a long distance, will

have extreme grades to traverse, will require heated and air conditioned cars and will operate in extreme temperatures.

### ***Urban Design & Pedestrian Considerations***

As urban designers and planners will tell you, elements of an urban environment that blend into and enhance the street experience are key to creating a pedestrian friendly place where people want to be, a place of choice.

That is why streetcars are so appealing. They do not require the massive infrastructure of big stations, structures, bus bays, turn around areas or exclusive rights of way. Consequently, these systems are a particularly effective tool to connect and shape neighborhoods because they become an enhancement to the neighborhood streetscape. Streetcars are considered as circulators, and thus tend to have frequent stops for passengers, usually no more than a couple of blocks apart. These stops are designed to fit attractively into the urban space they occupy, yet must be signed to allow easy visibility, as well as to permit arriving passengers to find their way easily to nearby destinations.

The amenities provided at the various stops will be largely determined by the urban context of the stop. Some locations will need little more than way-finding signage, others may require more significant landscaping and perhaps benches or a shelter. The cost figures presented herein assume an average level of amenity which would allow a range of different stop designs.

Recent streetcar systems are completely compliant with the requirements of the Americans with Disabilities Act. Modern cars are generally low floor design and heritage type cars have an incorporated lift mechanism. They can also be boarded using a high block boarding platform. One of the advantages of the streetcar is that it can share the street with auto traffic and act as a traffic calming mechanism in neighborhoods.

Streetcars move at the pace of traffic, and have performance characteristics which allow them to flow with urban traffic. Thus, there is usually little need for special signaling or traffic pre-empt devices. The exception occurs where the streetcar must turn across one or more lanes of traffic at an intersection, such as the fork in the road where Broadway meets West End Avenue. Similarly, because the street grades are not adversely impacted under normal conditions, street drainage can be handled by normal design methods. This results in opportunities for the street and sidewalk designs to be enhanced for pedestrians. Streetcars are also very pedestrian-friendly because they are non-threatening to pedestrians.

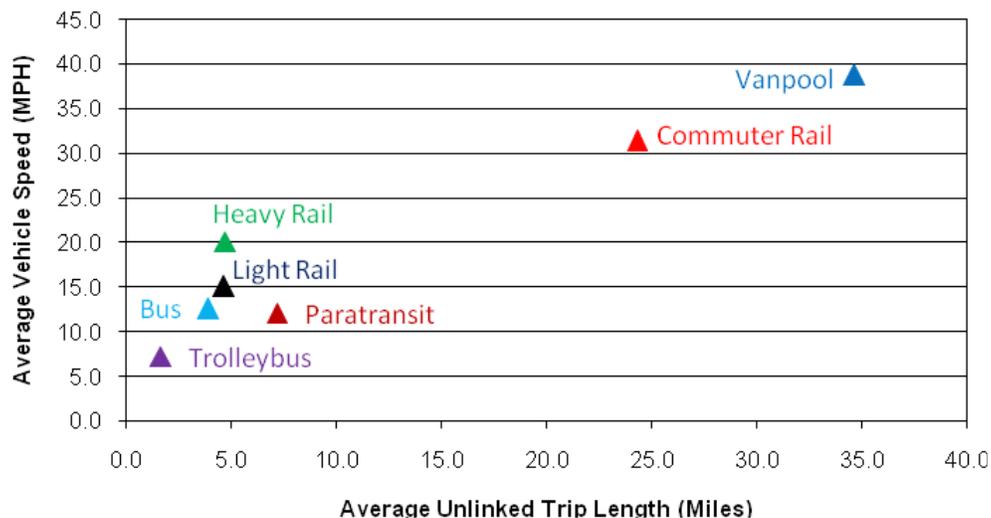
As the streetcar system for Nashville moves forward, attention should be paid to a number of urban design related areas, including:

- Stop locations,
- Streetlight locations,
- Sidewalk widths, pedestrian signage, and crossing areas,
- Street drainage,
- Intersection visibility & signage,
- Waiting area capacities,
- Waiting area shelter design (size, type, lighting),
- ADA compatibility,
- Service frequency & traffic flow impacts.

## 5.7 Regional Vanpool Program

Vanpools are a successful and efficient Transportation Demand Management strategy to move long-distance, intercity commuters. Currently, the vanpools managed and operated by The TMA Group on behalf of the Regional Transportation Authority and Williamson County eliminate 1,654 single vehicle trips daily. Existing vanpools reduce annual vehicle miles traveled by more than twelve million miles and reduce annual mobile emissions by over 38,000 pounds and save more than 600,000 gallons of fuel. Our air quality is improved by the removal of 21 thousand tons of ozone pollutants. Sharing a commute through a vanpool reduces parking and fuel costs, allows access to HOV lanes, consumes fewer resources and is often cheaper, more flexible, and faster than other mass transit choices.

**Figure 5: Vehicle Speed vs. Trip Length by Mode**



The average cost to start up a vanpool, including the cost of the vehicle is \$36,000. Riders in the regional program pay according to miles traveled at the rate of \$.431 per mile. Almost 60 percent of annual operating and vehicle replacement costs are covered by the vanpool riders' fares. Bus transit recovers almost 25% of operating costs and no vehicle replacement costs through fares and advertising.

- The region is currently working to develop a Comprehensive Marketing Plan for the regional vanpool program. Research results will be used to:
  - Develop a prototype of person(s) in Middle Tennessee mostly likely to choose vanpooling as their commute choice;
  - Identify where these persons are most likely to commute from in Middle Tennessee;
  - Identify marketplace forces affecting each audiences' actions, i.e., demographics, lifestyle, social and cultural; health, environmental trends, economic, competition; and
  - Identify the motivations behind why residents in the identified target markets choose to vanpool while others do not.

Based upon the findings, the Vanpool program partners (e.g., RTA, The TMA Group) will develop a customizable and audience-centered marketing campaign. The plan will include a brand, theme, and message(s).

### ***Vanpool Program Recommendations:***

- Implement the Vanpool Marketing Plan, evaluate its effectiveness, and update as needed.

- Expand Vanpool Service throughout the region. The goal is to increase the regional vanpool network by forty percent per year for the next five years, but the goal may be adjusted based upon the size of the market identified through the market research.
- Provide Emergency Ride Home options (including car-sharing).
- Make vanpool seat subsidies available, as needed.
- Provide ridematching services for vanpools, carpools, and special events
- Streamline the reporting and payment procedures required of program administrators and vanpool drivers through the procurement of a vanpool management system that will improve efficiency of vanpool services by automating manually-intensive National Transit Database (NTD) reporting tasks. The system will also provide a social network approach to vanpool formation and real-time information regarding upcoming stops and riders.
- Add a school-pool option to the vanpool program for middle schools in Middle Tennessee. A school-pool is a group of parents who take turns carpooling their children to school.