

3.0 Needs Assessment and Evaluation Methodology

3.1 Introduction

The Needs Assessment and Evaluation Methodology identifies the problems and opportunities in the Southeast Corridor, verifies the perceived issues through a thorough examination of the existing conditions, and explains how those problems and the community's goals for the study will shape the ways in which alternatives will be evaluated.

3.2 Study Area

This section describes the corridor and affected jurisdictions within the study area. Overall, the southeast corridor is a subset of the Nashville region that offers a diverse mix of land uses that include office parks, suburban and urban neighborhoods, light industrial, strip commercial, airports and large industry.

3.2.1 Study Area Description

The study area known as the Southeast Corridor links the City of Nashville, Davidson County and the cities of LaVergne, Smyrna and Murfreesboro in Rutherford County. Nashville is the second largest city in Tennessee, with a population of approximately 570,000¹. The central business district houses the highest concentration of office employment in the region, which includes State offices and the Capital, as well as Federal and Metropolitan Government offices. Nashville draws approximately 132,000 daily commuters from surrounding counties, about 25,000 of which come from Rutherford County. The Nashville downtown area is also a prominent music and cultural center with venues and activities at the Ryman Auditorium, Frist Art Center, Schermerhorn Symphony Center, Country Music Hall of Fame, the Tennessee Performing Arts Center, the Nashville Convention Center, and the Municipal Auditorium.

In recent years, downtown Nashville has also emerged as a place of sports: the Nashville Predators, an NHL team, play at the Gaylord Entertainment Center; the Nashville Sounds, a minor league baseball team, play at Greer Stadium; and the Tennessee Titans, an NFL team, play at the Coliseum, bringing visitors and fans from across the state and the region.

Murfreesboro is the southernmost terminus of the study corridor and lies about 30 miles southeast of Nashville. It has a population of approximately 75,000 and is home to Middle Tennessee State University (MTSU). MTSU is primarily a commuter-oriented institution that draws students from throughout the region. MTSU has an estimated enrollment of 21,000, of whom about 17,500 live off campus. Between Nashville and Murfreesboro are the City of LaVergne with an approximate population of 22,000, and the Town of Smyrna, with a population of approximately 26,000. LaVergne and Smyrna form a major employment area which is home to a Nissan automobile manufacturing plant, Bridgestone/Firestone, Ingram, and other major employers.

Figure 3-1 shows the general corridor study area. The corridor comprises 357 square miles, representing about 10 percent of the land area of the five county MPO region and containing 30 percent of the region's population. The study area is approximately 30 miles in length from downtown Nashville to just south of Murfreesboro. In downtown Nashville, a three mile radius from the center of downtown has been established as the northern terminus of the study area.

¹ Population data throughout this document is from the 2000 US Census, unless otherwise noted.

This area includes West End Avenue and the Church Street district to the west of downtown which includes Vanderbilt University and Medical Center, Baptist Hospital, and HCA Healthcare. These employers account for nearly 20,000 jobs.

The western border of the study area includes Nolensville Pike and extends southeasterly toward the Davidson County line. In Rutherford County, the western border is approximately three miles west of Interstate 24 (I-24). The southern terminus is approximately six miles south of the city limits of Murfreesboro, capturing the complete corporate and urbanized area of Murfreesboro. The eastern boundary of the study area extends from the three-mile radius of the downtown study area termini and follows I-40 (to the east) toward Nashville International Airport. Just east of the Nashville International Airport, the eastern border of the study area is roughly three miles east of Murfreesboro Road (US-41/70S), traverses Percy Priest Lake to the east and includes the complete corporate and urbanized boundaries of the cities of LaVergne, Smyrna, and Murfreesboro.

The precise study area boundary coincides directly with the boundaries of traffic analysis zones (TAZs) that are used by the MPO to organize population, employment and demographic data for analysis in their regional transportation model. Making the study area boundaries contiguous with TAZ boundaries allows the study area to be defined as an aggregation of TAZs, which facilitates data analysis. The study area boundary may be refined or redefined if transportation needs are identified that would require analysis or solutions outside the present boundary.

The two primary north-south thoroughfares within the corridor are Murfreesboro Road (US-41/70S), and I-24. This corridor experiences significant levels of traffic congestion. The 30-mile segment of I-24 between Nashville and Murfreesboro handles between 64,000 and 176,000 average daily trips. Murfreesboro Road has between 21,000 and 40,000 average daily trips. The estimated corridor population is approximately 331,000. Some of the significant trip attractors/generators along the corridor include Nashville International Airport, MTSU, major employers such as Nissan and Dell Computer and the regional shopping malls, commercial services, office parks, hospitals and downtown Nashville.

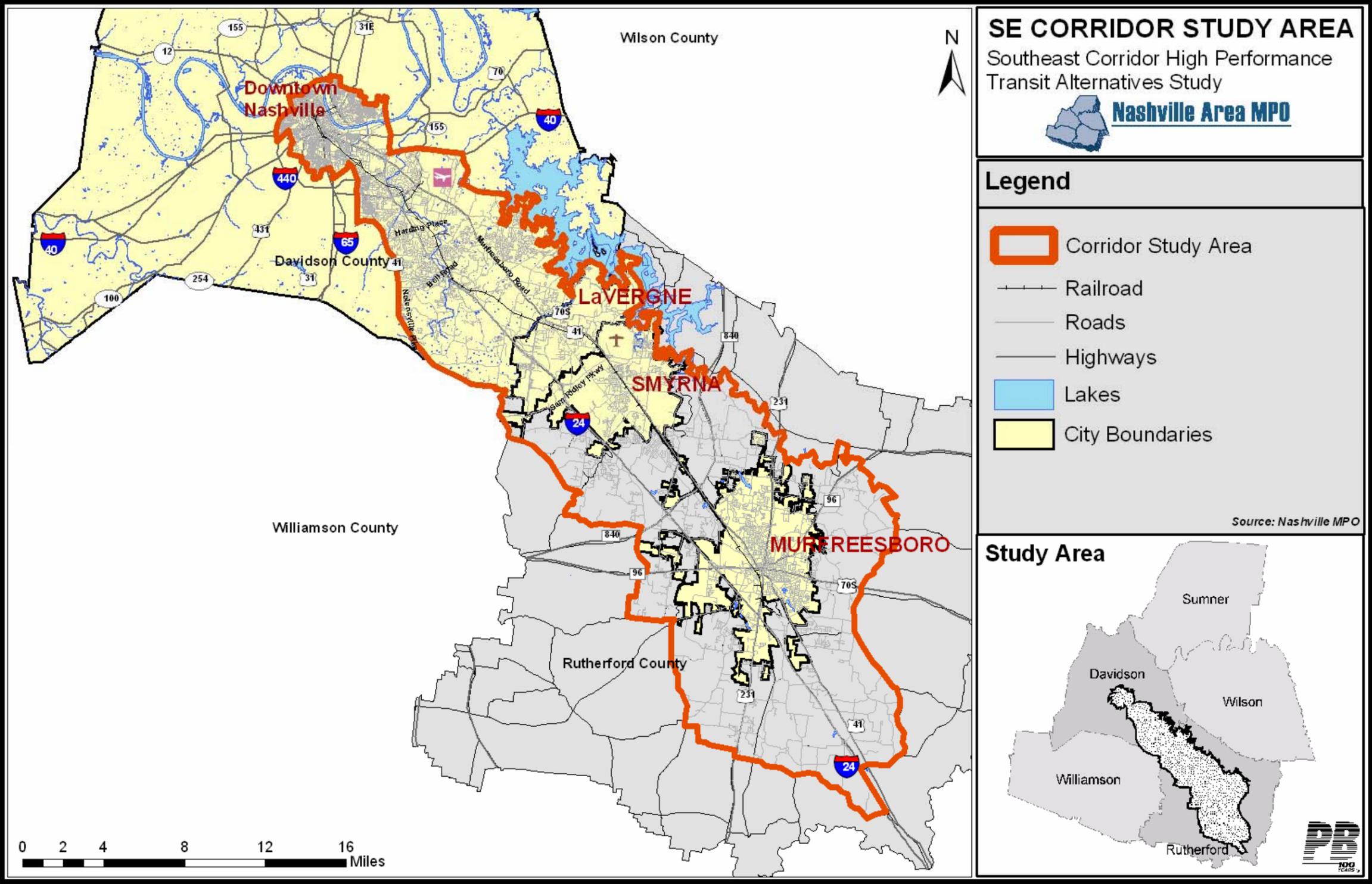
3.2.2 Jurisdictions Affected

The study area includes portions of two counties and three municipalities: Metropolitan Nashville-Davidson County, Rutherford County, and the cities of LaVergne, Smyrna, and Murfreesboro, which are located within Rutherford County.

Nashville and Davidson County is a single form government with its authority encompassing more than a half-million people and 533 square miles. Metropolitan Nashville-Davidson County has operated under its present Metropolitan Charter since 1963. A component of Metropolitan Nashville-Davidson County government is the Metropolitan Transit Authority (MTA), created in 1953 to supervise, regulate, and maintain jurisdiction over public transit in the City of Nashville. With the creation of Metropolitan Government, the service area of MTA was expanded to include all of Davidson County.

Southeast of Nashville-Davidson County, Rutherford County lies at the geographic center of Tennessee and encompasses approximately 612 square miles. The cities of LaVergne, Smyrna, and Murfreesboro are three of four municipalities located in Rutherford County. These cities account for approximately 63 percent of the county's population. Currently, neither Rutherford County nor its municipalities operate, or are served by, local fixed-route transit services.

Figure 3-1
Southeast Corridor Study Area



3.3 Summary of Need and Purpose

The Nashville Area MPO has initiated the Southeast Corridor High Performance Transit Alternatives Study to develop and analyze transit options that address both present and future transportation needs within the corridor. The purpose of the study is to analyze the transportation problems of the corridor and to consider potential transit solutions.

The need for transportation improvements within the study area is based on a number of interacting transportation problems. These include the lack of transit options in the corridor, heavy and worsening traffic congestion on major roadways, land use and development trends that contribute to worsening congestion and make it more difficult to serve the corridor with transit, and environmental concerns associated with increased auto use. If plans are not made now to develop alternative approaches for these transportation problems, they will compound and worsen in the future, threatening the corridor's continued growth and the quality of life of those who live, work, and visit in the corridor.

3.3.1 Transportation Options

Currently, there are few alternatives in the corridor to driving in heavily congested conditions. Options for longer-distance commuters are limited to driving alone; car or vanpools that can use the I-24 HOV lanes; the Regional Transportation Authority (RTA) "Relax-and-Ride" express service that operates during rush hour periods; and MTA routes that operate over shorter segments of the corridor. Ridership on these services is relatively high. None of these transit options operate on facilities that allow them to bypass the heavily congested roadway conditions and there are no other transit services outside Nashville-Davidson County. This includes the City of Murfreesboro, a city of significant size and the site of Middle Tennessee State University.

This lack of mobility options affects many travel markets. Potential commuters that do not have access to private transportation, including reverse commuters, are effectively denied access to jobs in the corridor due to the lack of transit options. In addition, those who depend on public transit for their transportation face limited housing options. Continued economic development could be limited by the lack of access to jobs for transit dependent employees. Students traveling to Nashville from southern areas of the corridor, and students traveling to Murfreesboro from Nashville and areas in the north of the corridor, are also limited in their travel options. Those who are unable or unwilling to drive, or simply prefer to use transit are negatively affected by this lack of transportation options in the corridor. The lack of access to non-drivers of the employment and educational opportunities in much of the corridor is both a social equity and economic development issue. Many disadvantaged persons lack access to jobs and educational opportunities that would allow them to improve their lives. In addition, many employers lack access to workers as a result of this vacuum of transit options.

Identified Transportation Need: Provide transportation alternatives for travelers within the corridor.

3.3.2 Mobility and Traffic Congestion

Growth in traffic volumes is indicative of both population growth and economic vitality. However, growth in travel without growth in the capacity of the transportation system results in traffic congestion. The southeast corridor suffers the worst traffic congestion of the five major transportation corridors in the region. Limited opportunities for roadway expansion exist due to topographic constraints and development adjacent to the right of way. With the rapid growth in the area, congestion along the major roadways is forecast to increase. Traffic volumes rise

annually, with congestion in the corridor showing a consistent increase each year. Traffic congestion wastes resources as well as the time of travelers, and has the potential to reduce economic growth and limit economic development opportunities in the corridor and the region. I-24 and I-40, which converge south of the downtown, is the primary transportation spine of Middle Tennessee, with nearly 176,000 vehicles a day passing to and through the area. I-24, US 41 (Murfreesboro Road) and the CSX rail corridor are the only continuous southeast-to northwest corridors connecting this part of the region to downtown Nashville. I-24 is the only one of these facilities that is a limited-access highway. The terrain and existing development in most of the corridor, especially in areas adjacent to downtown Nashville, constrain adding further capacity or the development of new rights of way. Motorists are beginning to recognize the significance of this congestion with travel speeds nearly 75 percent less than that of the posted speed limit during the morning commute (12 to 13 miles per hour compared to a posted speed of 55 mph).

Identified Transportation Need: Allow economic growth and development in the corridor to continue without overburdening existing roadways. Reduce the negative impacts of congestion on resources, travel times, and mobility.

3.3.3 Land Use Policies / Compact Development

The Nashville region is working to avoid the fate of many other urban areas that are experiencing the negative impacts of sprawl and the deterioration of compact urban centers. Transit can influence, support, and promote more compact land use and development patterns within the corridor. This will allow the corridor to be served by a more efficient mix of transportation options that include walking, cycling, and mass transit. Section 3.4.3 describes land use and development patterns within the corridor in detail. Land use patterns in the area tend to be low-density and pedestrian unfriendly, with uses widely and strictly separated. Existing development is oriented for the convenience of auto travel, as opposed to pedestrians or users of mass transit. Over time, development has occurred with little, if any, consideration for the ways in which public transportation infrastructure and services might serve the travel needs of those who live, work, or travel within the corridor. This has resulted in a development pattern and transportation system that does not meet all the needs of the various users such as pedestrians, cyclists, and transit riders. The current auto-centric transportation network increasingly suffers from traffic congestion, which indicates that the capacity of the system does not meet the demands of drivers. The result is a transportation system, in terms of its capacity and composition of services that lags behind the demand for transportation services. The auto-centric development pattern also represents a significant threat to farmland and open space and has the potential to significantly diminish the quality of life for Nashville area residents by reducing access to a variety of housing, retail and commercial development types, reducing access to open space, and promoting traffic congestion. Over time, this auto-centric focus toward development increases travel times for all users of the transportation system including drivers and bus riders.

Identified Transportation Need: Provide greater emphasis on mixed-use development, traditional urban and village land use patterns, and design standards that support a diverse range of travel options. Promote land uses that are conducive to a more balanced transportation system with key roles for pedestrian and mass transit.

3.3.4 Environmental Concerns

By reducing or stabilizing the rate of auto use in the corridor, transit improvements help alleviate a number of environmental problems, including air, water, and noise pollution. Automobile use

raises a number of environmental concerns ranging from air, noise and visual pollution to depletion of fixed-supply resources to the pollution generated by leaking fuel storage tanks and the decomposition of scrapped vehicles. Traffic congestion adds to a host of environmental problems ranging from lost time to travelers to air quality “hot spots” caused by idling vehicles. Transit can reduce the impacts of these issues, but the development of such a facility should minimize the impacts on property and avoid creating environmental justice impacts on affected populations.

Identified Transportation Need: Transportation alternatives that minimize impacts to the environment and help to improve air quality conditions in the region.

3.4 Planning Context

This section describes the planning context of the study area and provides an overview of previous transportation studies performed in the corridor. These studies have identified assorted transportation problems in the southeast corridor and have recommended various solutions or improvements. Although no one study has recommended a comprehensive program to address all of the transportation needs, the needs identified in these studies offer a starting point for the Southeast Corridor Alternatives Analysis.

The planning context also includes a review of the demographic, socio-economic, land use and natural environments in the corridor. These factors ultimately will drive existing and future demand for transportation services and directly impact the mix of roadway and transit improvements that might address the specific needs of the corridor.

Significant findings of the assessment of the planning context revealed:

- The southeast corridor represents 30 percent of the region’s population while accounting for only 10 percent of the land area in the region.
- Rutherford County is the second fastest growing county in the region with a near 54 percent increase in population since 1990. This trend is projected to continue as Rutherford County is expected to experience a 75 percent increase in population growth by the year 2025.
- Population density within the corridor represents 927 persons per square mile, which is denser than the third largest city in Tennessee – the City of Knoxville, with a population density of 751 persons per square mile.
- Population diversity in the corridor is comparable with that of Davidson County as a whole; however, nearly 68 percent of both Davidson and Rutherford County’s Hispanic population reside within the study area.
- Between 2000 and 2003, nearly 23,000 new residential units were constructed in Davidson and Rutherford Counties. Of the 23,000 units, 60 percent were in Rutherford County.
- Davidson County has the largest employment base in the region with 51 percent of the employment (or 303,000 jobs). Rutherford County has the second largest employment base in the region with just over 100,000 (or 17 percent of the jobs).

- The top 20 largest employers (in terms of number of employees) in the corridor account for over 50,000 jobs and 13 percent of all jobs in Davidson and Rutherford Counties.
- According to the US Census roughly 27 percent (or 25,297) of the residents of Rutherford County traveled to Davidson County in 2000 for employment. This is a 77 percent increase over 1990 commuting trends, which is greater than the 54 percent increase in population that occurred in Rutherford County during the same period.
- Existing local land use policies in the corridor provide limited, if any, compact or transit oriented development (TOD) regulations. Current land use policies throughout the corridor do not significantly promote compressed development, limit suburban sprawl, or encourage walking and mass transit as the primary transportation mode.

For more details of the planning context, including discussion of the transportation and planning studies relevant to the corridor, as well as a detailed analysis of the demographic, socioeconomic, and development context of the corridor, see Appendices 3A through 3C.

3.4.1 Previous Studies

Over the past decade, many regional and sub-regional studies have been conducted in the Nashville MPO area. Several of these studies have focused on the entire region while others have been specific to a particular study area. Most of the studies identify specific transportation problems and needs that include the southeast corridor in some fashion. Studies previously conducted in the corridor include:

Nashville MPO Area High Occupancy Vehicle (HOV) Study – The study was commissioned in 1996 by the Tennessee Department of Transportation (TDOT) to develop a concept for incorporating HOV lanes as a transportation strategy for the regional transportation network. The stated goals of the study included: improving air quality, reducing energy consumption, improving regional mobility, improving the overall efficiency of the highway system, and providing a publicly acceptable HOV system.

The HOV Study recommended HOV lanes for I-24 from downtown Nashville to US-231 in Rutherford County (which is approximately 3 miles north of the southern terminus of the Southeast Corridor study area). To date, a large portion of the study recommendations have been implemented within the Southeast Corridor, including the HOV lanes on I-24 from Harding Place in Davidson County to State Route 840 (SR-840) in Rutherford County. There are, however, critical segments of the I-24 HOV lane system in the Southeast Corridor that are called for in the plan but have yet to be constructed. These include the segments from downtown Nashville to Harding Place (approximately 7 miles) and from SR-840 in Rutherford County to US-231.

Nashville MPO Area Central Business District (CBD) Access Study – This study was commissioned in 1996 by TDOT to investigate improved access into the southern portions of the Nashville Central Business District (CBD) between the Broadway exit on I-40 and the Fesslers Lane exit on I-40. The study identified three sets of distinct transportation problems in the area, each impacting motorists from the southeast portion of the region traveling into and out of the downtown. First, limited access is caused by prohibited movements from 2nd/4th Avenue interchange with I-40. Second, route continuity is affected where three interstate routes

converge (I-24, I-40, and I-65) near the CBD. The third and final problem identified is the weaving of local access and longer-distance traffic on I-40. Each of these problems reduce capacity and cause traffic congestion and other transportation problems on I-24, which is the sole north-south limited access facility in the southeast corridor.

A series of recommendations for this location were proposed, each consisting of significant costs and impacts to motorists, businesses, and surrounding properties. In general, recommended improvements included reconstructing three interchanges, replacing five existing structures that flyover five local roads and two interstates, and doubling existing lanes via ramps and through lanes. To date, none of the study recommendations have been advanced.

Nashville Regional Commuter Rail Evaluation Study – This study was commissioned in 1996 by RTA, the MPO, and MTA to explore the feasibility of commuter rail in the Middle Tennessee region. Five corridors were identified for development of commuter rail service in the 20-year planning horizon. One of these was the southeast corridor, which extended from the Landport in downtown Nashville to SR-96 in Murfreesboro. The southeast corridor was identified as one of two standout corridors in terms of high ridership, low operating deficit per passenger, and favorable emission reductions. The study concluded that commuter rail is a feasible future transportation option in the Nashville region, and warrants incorporation in regional transportation and development planning. To date, the east line, from downtown Nashville to the City of Lebanon, is the only rail line of the five under development, and is scheduled to be operational by 2006.

Nashville Regional Commuter Rail Evaluation: Potential Start-up Segments Study - Commissioned in 1998 by the MTA to explore how to begin implementing the original (1996) study findings of the potential start-up segments. The east line, which began operation in 2006, was selected as the region's initial start-up line due to the amount of available track capacity along the line. For the southeast corridor, the study concluded that double track existed on the current CSX Transportation track from the downtown toward Thompson Lane (just north of the Hickory Hollow Mall) and could be used as part of an initial start-up commuter rail line. The study noted that consideration should be given to extending beyond this initial location to at least the Hickory Hollow Mall area if not all the way to the cities of LaVergne and Smyrna as an initial start up phase. Analysis of a third corridor identified in the study, the northeast corridor from Nashville to Gallatin, began in 2007.

Park-and-Ride Lot Study – A Middle Tennessee Park-and-Ride Lot Study for the region was first conducted in 1993 by RTA and later updated in 1999. The study resulted in an inventory of existing park-and-ride lots, recommendations for improvements to current locations, and a listing of future park-and-ride lots. The vast majority of the recommendations to existing lots included better signage, lighting, and/or creating formal agreements with lots that are currently used under arrangements that are informal in nature. Four future park-and-ride lot locations were identified in the Southeast Corridor study area. The locations included Harding Road in Davidson County (adjacent to the CSX Railroad), the Hickory Hollow area in Davidson County (near the Crossings), the Town of Smyrna (either at the abandoned CSX Depot or near Sam Ridley Parkway), and the City of LaVergne (near Waldron Road). These sites were identified with the notion that three of the four could be used as future commuter rail stations once service was established in the corridor. To date, many of the short-term strategies have been undertaken, and numerous park-and ride lot improvements, particularly signage improvements, have been made throughout the region.

Nashville Urban Core Light Rail Analysis – Commissioned by MTA in 1999 to explore the feasibility of a phased development of light rail transit (LRT) from downtown Nashville to the

West End corridor. The study identified a 4.2 mile system connecting the east bank of the Cumberland River (which is the location of the Tennessee Titans Stadium) via the current downtown transit center (Petway), the Clement Landport (which is the stated location for a future downtown commuter rail station) and eventually down the West End corridor. In addition to pedestrian and bicycle traffic as the primary access to the LRT, the study calls for feeder bus and park-and-ride facilities to support the system. The study documents the importance of the concentration of activities and employment in the downtown to West End corridor and the ability to interconnect potential commuter rail (via the Landport), providing seamless travel from suburban communities, such as those in the Southeast Corridor, to and through the downtown and West End area. To date, no study recommendations have been advanced.

Beating Gridlock Study – Commissioned by the Nashville Area Chamber of Commerce in 1999 as part of a nine-month effort of the Transportation Division of the Chamber. The study in large part relied on the findings of the various plans mentioned in this section articulating the impact of congestion on the region's infrastructure and the lack of rail transit in the region. The study offers support for rail transit in Middle Tennessee and describes the challenge to the region and the role of the Chamber of Commerce in advancing rail transportation in Davidson and surrounding counties.

Nashville Downtown Transportation Plan – This plan was commissioned by Nashville-Davidson County Metropolitan Government in 2000 and outlines policy options and directions in the downtown relative to transportation, land use, and development. The primary focus of the plan is the creation of a regional multimodal transportation system focused on downtown Nashville. Key points of the plan draw on expanding the base bus system for the region along with the trolley system in the downtown, aggressive steps toward greater transportation demand management (TDM) in the downtown, and support for commuter rail, HOV lanes, and intelligent transportation systems (ITS) in the region to improve mobility to and from the downtown area. Several of the plan's recommendations have been implemented in some form or are under various stages of development.

Regional Transit Development Study – This study was commissioned by the MPO in 2003 to identify areas of the region – today and in the future – where transit services would be a reasonable part of the mobility system. Within the southeast corridor study area, recommendations in the short-term included local transit service in the City of Murfreesboro and further expansion of the existing express transit service from Nashville to Murfreesboro as well as to the cities of LaVergne and Smyrna. The study notes that development of the express service is a logical progression to the long term solution of some sort of fixed-guideway transit. Additionally, in the long term, local circulator systems are recommended for the City of LaVergne and the Town of Smyrna.

Five Year Service Improvement Plan – Completed by MTA in March 2004 to provide a detailed outline of how MTA plans to move from its current form of transportation for those without other transportation options, to a network that attracts riders that normally would not have seen transit as a viable option for their travel needs. This plan outlines recommendations for service improvements over the next five years, commencing August of 2004. There are recommendations made for every route that currently operates as well as suggested new routes. Five routes in the southeast corridor study area are slated for increased transit service operations as a result of planned improvements. These routes include Route 11 - Southeast Connector, Route 12 – Nolensville, Route 15 – Murfreesboro, Route 18 - Elm Hill Pike/ Airport, and Route 25 - Midtown.

City of Murfreesboro Transit Feasibility Study – This study was commissioned by the City of Murfreesboro and TDOT in 2001 to evaluate the feasibility of providing local transit service within the city. The study found that the City of Murfreesboro has sufficient population and other characteristics that warrant the development of public transit service with the potential of an annual ridership of 331,000 fixed route trips and 12,000 demand response trips. The city began operating transit service in 2006.

Town of Smyrna Intermodal Transportation Center Study – This study was commissioned by the Town of Smyrna in 2002 to advance the development of an intermodal transportation station that would offer the greatest options for long term transit needs for the area. Key components of the assessment included identifying a facility and site capable of serving park-and-ride lot needs, potential express bus and commuter rail service, and other intermodal functions such as local bus service, and bicycle and pedestrian travel. Seven locations were evaluated with the preferred location being a site located on the northwest portion of Sam Ridley Parkway bordering on the CSX railroad. The study concluded with a master plan for the development of the transit center.

Nashville Area Long Range Transportation Plans – The Nashville Area MPO completes a Long Range Transportation Plan every three years and adopted the 2030 Long Range Transportation Plan in November of 2005. These plans provide a comprehensive assessment of the region's transportation infrastructure and needed improvements to remain competitive in a regional and global market.

Since 1999, the long range plan has identified the southeast corridor as the most congested corridor in the region. One reason for the significant increase in congestion levels is the limited number of north-south roadways serving the communities of LaVergne, Smyrna, Murfreesboro, and Rutherford County and the tremendous amount of development projected within the corridor area. Even with planned roadway improvements in the southeast corridor area over the next twenty years, levels of service on the two major north-south roadways, I-24 and Murfreesboro Road (US-41/70S), are at best likely to achieve a level of service “E”.

The plan states that the region must develop a multimodal transportation system to maintain a relative level of mobility and accessibility in the region. The plan calls for the completion of the HOV lanes along I-24 from US-231 in Murfreesboro to downtown Nashville and the development of a high capacity transit system serving the same geography.

Major Thoroughfare Plans for the Cities of LaVergne, Smyrna, Murfreesboro, and Rutherford County – These plans were commissioned in 2003 by each of the respective jurisdictions in cooperation with the Nashville Area MPO. These plans identify existing and future needs along major roadways throughout their communities. Each plan serves as a comprehensive assessment of transportation needs in the respective community and documents local and regional transportation demands within their geography.

Numerous roadways in these communities are currently classified as congested and are projected to worsen in the future. Important north-south roadways such as I-24 and Murfreesboro Road (US-41/70S) are among some of the most traveled facilities in these communities. Additionally, there are several east-west corridors that are gateways to these communities from I-24 such as Waldron Road, Sam Ridley Parkway, Nissan Drive, SR-96, and US-231 all of which function at levels of service “D” or worse. Each of the studies indicate significant existing and projected future traffic growth along these roadways and indicate that little, if any, congestion relief will be achieved through roadway widening.

3.5 Community Structure

Middle Tennessee and the Nashville Area (which includes Davidson and Rutherford Counties) have experienced significant population and employment growth in the past two decades and forecasts project similar robust growth in the coming decades. The southeast portion of the region from the downtown core of Nashville toward the Cities of LaVergne, Smyrna, and Murfreesboro is the fastest growing area of the region. The southeast corridor has experienced population and employment growth rates that have exceeded those of the region as a whole. This fast rate of growth has brought with it needs for transportation improvements to address traffic congestion, to offer additional transportation options, and to address environmental concerns.

This section discusses population, employment, and land use characteristics of the region and the study area.

3.5.1 Demographics

The Nashville MPO service area, including Nashville-Davidson, Rutherford, Sumner, Williamson and Wilson counties, has a population of over 1.1 million. Population in the region increased 25% between 1990 and 2000, and projects to increase 47% between 2000 and 2025. The region is experiencing a pattern of internal migration, in which new residents are moving to Nashville-Davidson County from other regions, while established Nashville-Davidson County residents are migrating to surrounding counties. Population in the portions of Nashville-Davidson and Rutherford Counties that lie in the project study area with projections to increase by nearly one-third, from 331,000 to 438,000, between 2000 and 2025. The corridor is significantly more densely populated than the rest of the region or the State of Tennessee.

Median household income in Nashville-Davidson County (\$39,800 in 2000) is slightly higher than the median for the state (\$36,400), while the median for Rutherford County (\$46,300) is considerably higher than that of the state or Nashville-Davidson County. The corridor contains pockets of very high income population as well as some high concentrations of poverty, particularly near downtown Nashville and eastern Murfreesboro. The corridor study area contains a higher percentage of minorities, children and young adults than the State of Tennessee or the region as a whole.

3.5.2 Employment and Economic Outcomes

The southeast corridor is, in many ways, the economic engine of the region. Large employers located in the corridor outside downtown Nashville and the Vanderbilt-West End area include Nissan, Dell, Ingram, Bridgestone/Firestone, and Whirlpool, among dozens of others employing significant numbers. Large institutions such as Middle Tennessee State University, Nashville International Airport, the Veterans Administration and other regional medical facilities also employ thousands of residents from throughout the region. Employment has steadily grown and diversified over the past twenty years, with the greatest growth in Rutherford County, and this growth is expected to continue at a rate as great or greater than the rate of population growth in the corridor.

3.5.3 Land Development Patterns and Plans

Land use in the corridor is characterized by older, higher density areas, particularly near the central areas of Nashville and Murfreesboro, and newer, lower density areas in the central and southern areas of the corridor. Much of the new development in the past 30 years has been auto-oriented residential, commercial and industrial developments. A number of higher density

mixed use developments are in various stages of planning or construction. These developments will promote a more balanced transportation system and the use of walking, bicycling and transit as alternatives to driving. However, such developments must become more prominent in the mix of future land use if a more balanced transportation system is to support the future growth of the corridor.

Population and employment growth in the region and in the corridor will place increased pressure on the transportation facilities in the region. The large population and relatively high density in the corridor, and the concentration of younger and lower income residents indicate a future need for improvements to the transit system. It also indicates an approach to addressing the region's transportation needs to include provisions for walking, bicycling, and transit, as well as improvements to the roadway system.

3.5.4 Major Activity Centers

The study area has a large and diverse array of major activity centers almost all of which continually struggle to remain accessible for patrons and employees due to traffic congestion, auto-dependency and limited transportation options. A significant element of this accessibility concerns the ability to satisfy parking needs associated with an overwhelming dependence on automobile access. Satisfying parking demands competes with facility expansion desires and/or leads to development of costly parking structures. Traffic generation and localized congestion tends to be a major source of conflict with neighboring residents and businesses. Improved transit could help address access and parking problems of these major traffic generators and could provide an alternative choice of travel for patrons and staff.

The major activity centers within the study area include:

- Malls - Hickory Hollow Mall and Stones River Mall
- Colleges and Universities - Tennessee State University (downtown campus), Vanderbilt University, Belmont University, Trevecca Nazarene University, Middle Tennessee State University
- Medical Centers – Vanderbilt Hospital, Baptist Hospital, Centennial Hospital, Stonecrest, Alvin C York VA Medical Center, Middle Tennessee Medical Center
- Entertainment Centers - Nashville Convention Center, Gaylord Entertainment Center, Tennessee Titans Stadium, Ryman Auditorium, Country Music Hall of Fame, Schermerhorn Symphony Hall, Starwood Amphitheater
- Other Activities - Downtown Nashville, Music Row, Nashville International Airport, and Smyrna Airport

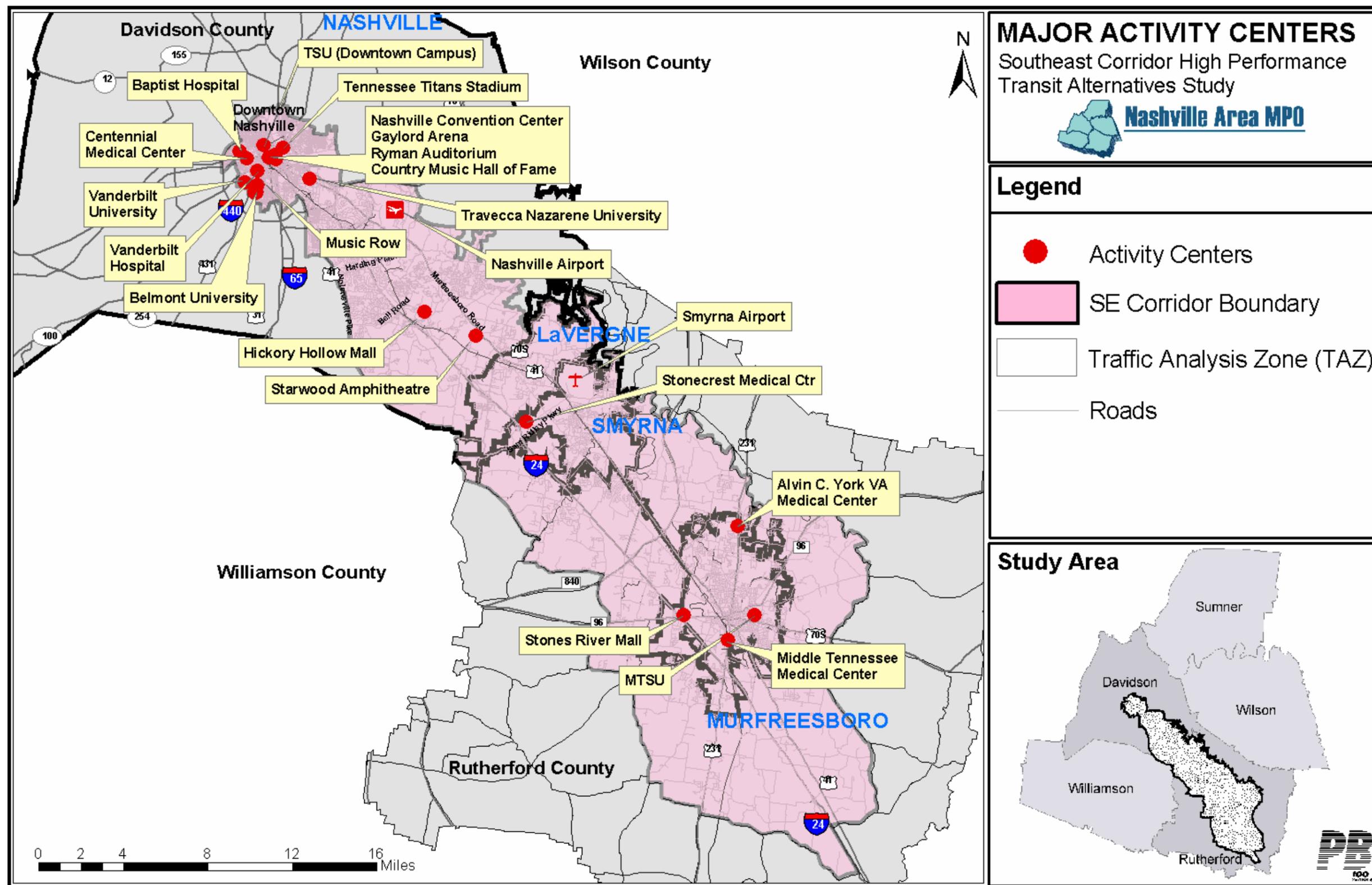
Table 3-1 shows the number of employees and additional information about each of the activity Centers. Figure 3-2 illustrates the location of these major activity centers within the study area.

Table 3-1 Number of Jobs and Other Trip Generating Factors for Activity Centers in the Southeast Corridor Study Area

Activity Center	No. Jobs (2002)	Beds	Seating Capacity	Students	Sq. Feet	Acres
Baptist Hospital	3,100	685				38
Centennial Medical Center	4,500	615				40
Vanderbilt University / Football Stadium	6,400		41,000	11,000		323
Vanderbilt Hospital	7,200	874				
Belmont University	820			4,300		
TSU (Downtown Campus)	200					
Tennessee Titans Stadium	276		68,798			105
Nashville Convention Center					118,675	
Gaylord Entertainment Center			20,000		43,000	
Ryman Auditorium			1,300			
County Music Hall of Fame						
Trevecca Nazarene University	330			2,000		
Nashville Airport	3,100					
Music Row	It is an area with many locations not one location.					
Hickory Hollow Mall	3,600					
Starwood Amphitheatre	200		17,000			
Smyrna Airport	200					
Stonecrest Medical Center	400	75			13,526	
Alvin C York VA Medical Center	1,260	491				
Stones River Mall	1,367					
MTSU / Football Stadium	1,670		15,000	23,000		466
Middle Tennessee Medical Center	1,200	286				
Total	36,673	3,026	163,098	40,300		

Source: Nashville MPO Travel Demand Model

Figure 3-2 Major Activity Centers



3.5.5 Natural Environment

The natural environment of Middle Tennessee is beginning to experience the effects of decades of automobile dominated development patterns and single mode transportation decisions. Land use and development patterns have created communities and neighborhoods that are isolated and dependent upon the automobile for nearly all basic trips (e.g. to work, shop, and for pleasure). In addition, auto dependency in the corridor has generated various types of region-wide, corridor-wide and localized pollution. Tremendous growth in vehicle miles traveled, population growth, and other non-transportation related factors have put the region and its residents at risk. Controlling air pollution in the region is a driving factor in Middle Tennessee's economic prosperity and over all quality of life. The region will begin to see reduced economic growth, increased potential health risks, and less federal funding for roadway projects that improve access to employment centers in the region without a viable solution to automobile dependence. The southeast corridor stands to see the greatest impact from this auto dominated development effect given the projected employment growth of the corridor and the amount of available land for future residential and commercial development.

On April 15, 2004, the Nashville region, which includes the counties of Davidson and Rutherford, was designated non-attainment for 8-hour ozone standards violations. In addition to air quality, within the study area there are several large land areas of key importance to the natural environment. These areas include:

- Cumberland River
- Percy Priest Lake
- Stones River
- Stones River National Battlefield

Development pressures have begun to jeopardize these natural features within the study area. Land availability and the demand from developers for roadway access has created an environment whereby quality of life features such as these are becoming adversely impacted. Any transportation solution must balance travel demands while protecting the natural environment.

3.6 Transportation Infrastructure and Function

This section describes the existing transportation facilities, which includes highways, public transit, freight railroads, and other transportation services. The demographic changes and growth in the corridor have outpaced the capacity and function of the transportation system. Further expected growth will overtax the existing infrastructure and transportation systems, creating demand for new approaches and new types of infrastructure in the future.

3.6.1 Regional Travel Patterns

For the past 50 years, Middle Tennessee, like most portions of the state and nation, has devoted most of its transportation dollars to roads, bridges, and interstate highways. Today, Nashville is one of only six cities in the United States located at the intersection of three interstate highways: I-40, I-24, and I-65.

Over this same time period, the web of interstate highways has helped to fuel the rapid growth of the region's economy. While the region is well served by a complex system of roads ranging from interstates and other freeways to city streets and rural local roads, travel on these roadways has been steadily increasing as the region has grown, causing congestion levels to rise.

The interstate system, which comprises I-24, I-40, and I-65, completely encircles downtown Nashville. There are eight (8) interstate access points into and out of the downtown area from the interstate system. There are three interchange access points to the west of the downtown area via I-40/I-65. These interchanges also provide access to the West End, Church Street, and Charlotte Avenue corridors, which serve the Vanderbilt and medical center area. There is one interchange access point to the south of the downtown area via I-40 providing access into the downtown area from 2nd Avenue and access out of the downtown area from 4th Avenue. Each of these roadways is a one-way facility and the two roads function as a one-way pair. There are three interstate interchanges east of the downtown area providing access points into and out of the downtown to the east. These interchanges also serve the Tennessee Titan Football Stadium (known as The Coliseum) which seats 68,000 people, and one interchange north of the downtown area (8th Avenue North), which provides access to the downtown area and Metro Center office and industrial park.

From southeast of downtown Nashville toward the City of Murfreesboro, along I-24, there are 10 interchanges located in Davidson County providing access to numerous residential, industrial, commercial, and retail concentrations throughout the study area. From the Davidson County line into Rutherford County along I-24 to Epps Mill Road, which is south of US-231 in the City of Murfreesboro, there are seven interchanges providing access to the communities of LaVergne, Smyrna, and Murfreesboro. Several of the interchanges along this section of the study area have high levels of commercial and industrial activity while others are largely undeveloped. These undeveloped portions are slated for future industrial and/or residential development.

Several of the roadways with interchanges on I-24 experience extremely high volumes of traffic which contribute considerably to backups along I-24 and corresponding roadways during peak hours. The most heavily traveled connecting roadways on I-24 in Davidson County are I-40, I-440, and Bell Road (SR-254) with 120,000, 100,000, and 41,000 vehicles respectively interchanging to and from I-24. Within Rutherford County, Sam Ridley Parkway, SR-840, SR-96, and US-231 are the most heavily traveled connecting roadways to I-24, with traffic volumes of 31,000, 35,000, 41,000 and 49,000 respectively. The volumes of these interchanging roadways to and from I-24 contribute to the increased delays and congestion levels experienced along I-24 between downtown Nashville and the City of Murfreesboro.

Table 3-2 Traffic Volumes at I-24 Interchanges, 2004

Interchanges (North to South)	Traffic Volume (2004)
I-65 north of Cumberland River	136,513
I-65 south of 2nd/4th Avenue	114,963
Fesslers Lane	27,366
I-40	120,133
I-440	99,681
Briley Parkway	32,133
Harding Place (SR-255)	37,431
Haywood Lane	25,689
Bell Road (SR-254)	40,722
SR-171	14,650
Waldron Road	19,303
Sam Ridley Parkway	30,655
SR-102	15,622
SR-840	35,143
SR-96	40,806
US-231	49,287

Source: TDOT 2004 ADT Counts

High Occupancy Vehicle (HOV) lanes are currently designated on I-24 North and South between the Harding Road Interchange, several miles south of Downtown Nashville, and SR-840 north of Murfreesboro. These lanes are restricted during high traffic hours inbound (7-9 AM) and outbound (4-6 PM) and are reserved for the exclusive use of vehicles with two or more people, buses, motorcycles, and emergency vehicles. Penalties for single-occupant vehicle drivers abusing the HOV lanes are not severe (the penalty is statutorily limited to \$25) and violations are considered non-moving offenses, like parking violations. Evidence indicates that the HOV lanes are not rigorously enforced.

Data provided by TDOT confirm the lack of enforcement for HOV lanes. While legitimate use of the HOV lanes on I-24 has increased by more than 50% over the past five years, the number of violators has nearly doubled, making it likely that the number of violators—in addition to the lack of through HOV service to downtown Nashville—has suppressed the number of potential legitimate users of the HOV facility.

Congestion on I-24 at the point where the HOV lane ends, south of the Harding Road interchange, is among the most severe of any location in the corridor. Morning peak period congestion at this location is much worse than the general congestion in the area between Bell Road and Briley Parkway where I-24 operates at LOS “D”. The reason for this intense congestion is the introduction of vehicles from the HOV lanes—both those using the HOV lanes legally and illegally—into the reduced number of available travel lanes between Harding Road and the merge with I-40. The congestion generated by the merging of the HOV into the general purpose lanes combined with the HOV lane stopping short of the downtown destinations of most commuters, wipes out much of the travel time savings from which HOVs benefit and greatly reduces the utility of the HOV lanes for transit or carpool use.

Table 3-3 Daily Average HOV Usage on I-24 between Old Hickory Blvd. and Waldron Road, 1999-2005

	1999 AM	1999 PM	2002 AM	2002 PM	2005 AM	2005 PM
Legal HOV Users	475	601	403	535	680	653
HOV Violators	485	575	927	1,059	1,265	914
Total Users	960	1,176	1,330	1,594	1,945	1,567

In addition to the interstate system, there are ten major arterial roadways that serve downtown Nashville. Of these arterial roadways, only one, Murfreesboro Road (US-41/70S), serves the complete southeast corridor area. Congestion occurs regularly on this corridor as well as on I-24 as traffic approaches and exceeds the roadway's operating capacity, and it occurs sporadically on other roads in response to temporary lane blockages. Historically, congestion in the region has been associated with radial commuting patterns leading in and out of the Davidson County and the central business district from surrounding suburban counties.

Along Murfreesboro Road there are numerous crossing streets both signalized and unsignalized. Additionally, there are several grade-separated roadways due to the high volume of traffic along certain cross streets. Focusing on the higher volume crossing streets, there are fourteen signalized intersections with crossing traffic of greater than ten thousand vehicles. At these locations, through traffic along Murfreesboro Road suffers delay due to competing time for green time. The most heavily traveled crossing streets along the corridor in Davidson County are Fesslers Lane, Donelson Pike, and Old Hickory Boulevard, with 27,000, 37,000, and 33,000 vehicles respectively crossing Murfreesboro Road. Within Rutherford County, Thompson Lane, SR-96, and US-231 are the most heavily traveled crossing streets with traffic volumes of 12,000, 42,000, and 26,000 respectively crossing Murfreesboro Road. The volumes of the crossing streets throughout the corridor and at these locations contribute to the increased delays and congestion levels experienced along Murfreesboro Road between downtown Nashville and the City of Murfreesboro.

Table 3-4 Traffic Volumes on Roads Crossing Murfreesboro Road, 2004

Crossing Street (North to South)	Traffic Volume (2004)
Fesslers Lane	27,366
Fosters Avenue	10,562
Thompson Place	12,625
Donelson Pike (SR-255)	37,200
Old Hickory Boulevard (SR-254)	32,800
SR171	15,090
Waldron Road	13,730
Stones River Road	12,210
Enon Springs Road	13,640
Thompson Lane	19,190
North Field Road	17,790
SR-96	42,220
US-231	25,870
Tennessee Boulevard	20,841

Source: TDOT 2004 ADT Counts

Figure 3-3 illustrates commuting patterns between Rutherford and Davidson Counties and other counties within the region. Based on recent U.S. Census data, roughly 27 percent (or 25,000) of the commuters in Rutherford County traveled to Davidson County for work in 2000. In comparison, only 24 percent (or 14,271) of Rutherford County commuters traveled to Davidson County in 1990. While the increase in the proportion of commuters traveling from Rutherford County to Davidson increased by only 3 percent between 1990 and 2000, the actual number of commuters increased by roughly 77 percent due to the 54% increase in population that occurred in Rutherford County during the same period.

Travel data from the MPO's regional model indicate that an estimated 108,000 home based work (HBW) trips come into downtown Nashville and the West End/Church Street area during the weekday from residents of Davidson and Rutherford Counties. In 2025, forecasts indicate the number of HBW trips to these areas to increase to more than 134,000 trips daily. Rutherford County commuters account for nearly 6 percent of these trips today and are projected to account for nearly 12 percent in 2025. This is because the rate of growth in Rutherford County is projected to exceed that of other suburban counties and Nashville-Davidson County.

Other major destinations in the study area include the corridors of Briley Parkway, Harding Road, Bell Road, Interchange City, Sam Ridley, and the City of Murfreesboro, which add to congestion on I-24 and Murfreesboro Road. Figure 3-4 illustrates 2002 and 2025 travel and commuting trends of Davidson and Rutherford County residents to major destinations along the corridor.

Looking more closely at all HBW trips originating from within the study area (with a destination within the study area – not just downtown), significant commuting and travel trends exist between several of the major destinations within the study area corridor. Over 110,000 home-based work trips originate during the weekday within the study area corridor, and over 56,000 (or 51 percent) of those trips are destined for one of nine major destinations within the study area, as depicted in Figure 3-2.

These 56,000 home based work trips are longer distance trips, which traverse one of the two major north-south roadways (I-24 or Murfreesboro Road) within the study area corridor. The remaining 54,000 trips are shorter distance trips, and tend to remain within the area of origination.

The zone areas designated as the City of Murfreesboro and the Bell Road area have the largest concentration of shorter distance trips. The high level of mixed-use development (employment and residential activity) within those zones compared to the other zone areas along the corridor relates to the relatively high number of shorter distance trips (intrazonal trips) within these areas.

Figure 3-3
Commuting Patterns in the Region

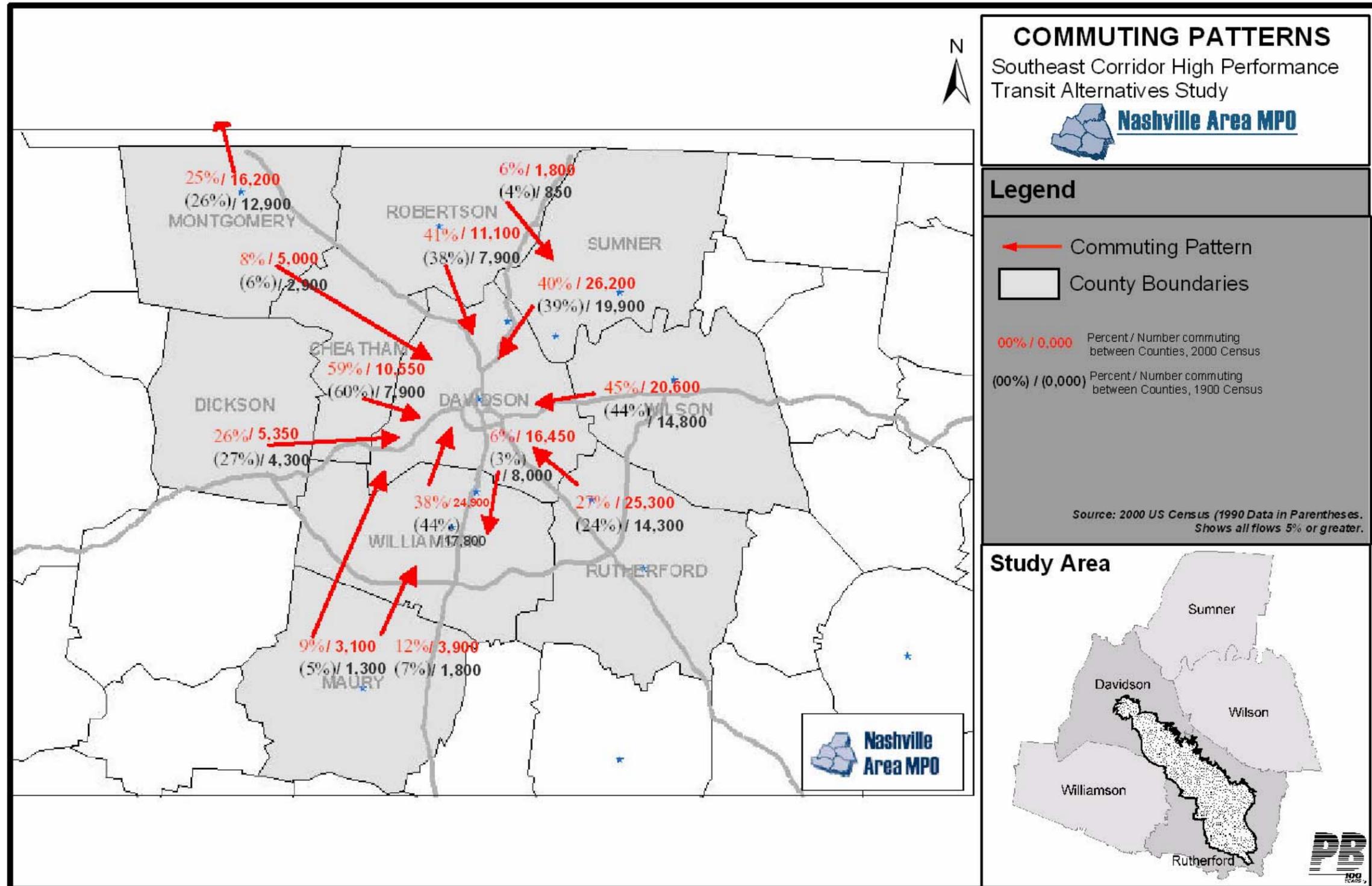
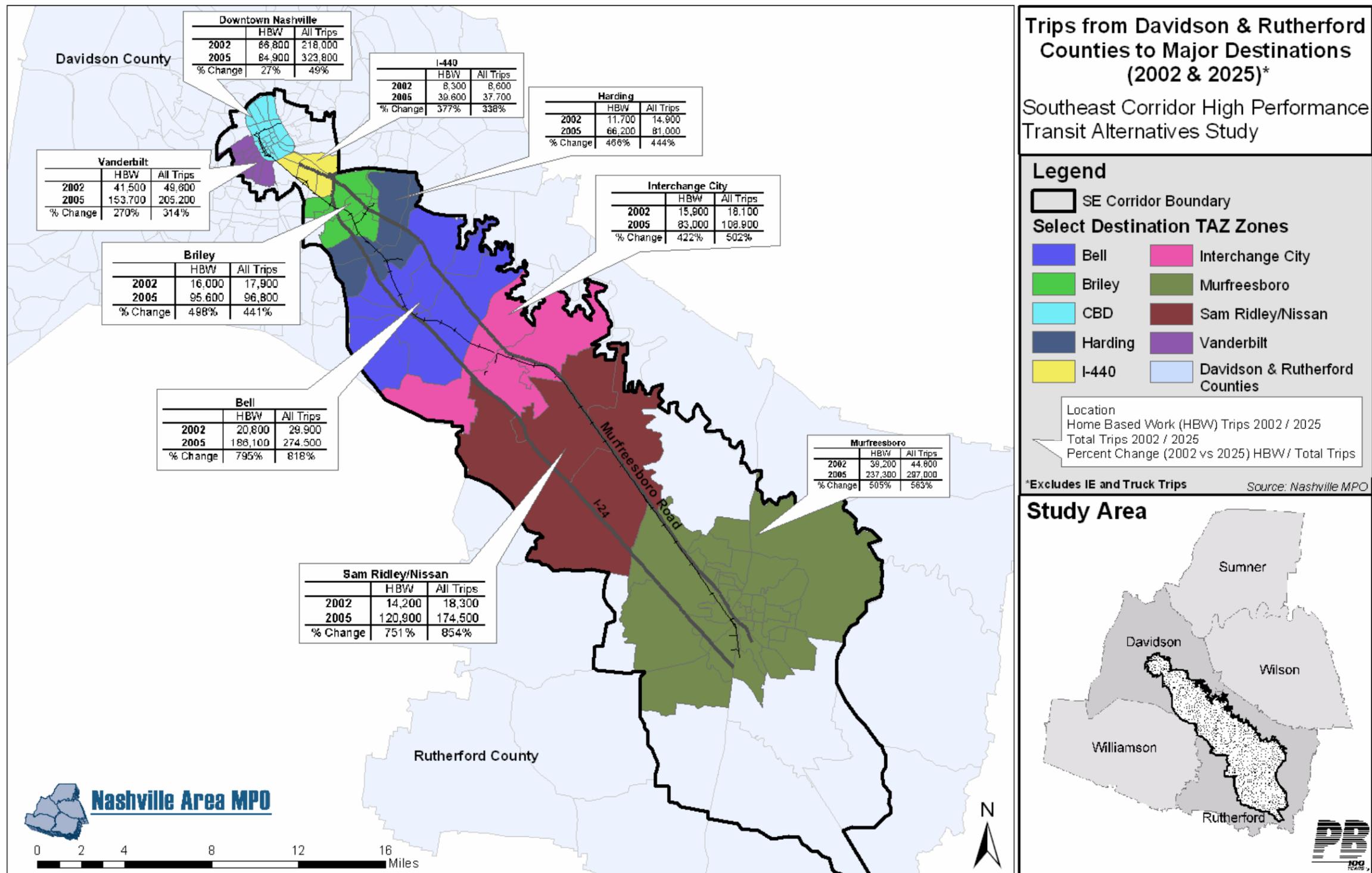


Figure 3-4
Trips from Davidson and Rutherford Counties to Major Destinations within the Study Area (2002 & 2025)



Figures 3-5 through 3-12 and Tables 3-5 through 3-9 depict 2002 and 2025 travel trends for both home based work trips and all trip purposes within the corridor - illustrating both the flows of trips from various concentrations within the study area (such as residential housing) to specific activities destinations within the corridor (such as employment and shopping). The initial graphs in each group compare the interzonal (between zones) and intrazonal (within zones) trips for each type trip destination. The second set shows a breakdown of interzonal trips in each destination zone. Comparing the two sets of graphs allows us to compare all types of trips with home-based work trips (trips between home and work).

Figure 3-5
SE Corridor Interzonal and Intrazonal Trips, All Trip Purposes, 2002

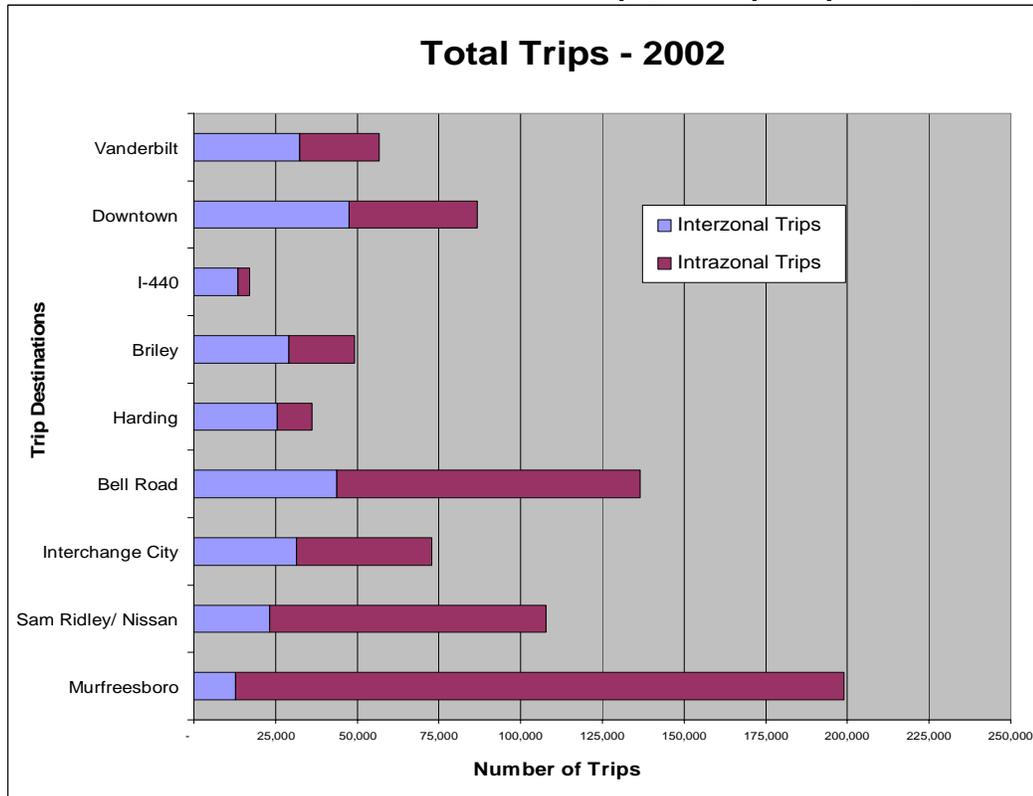
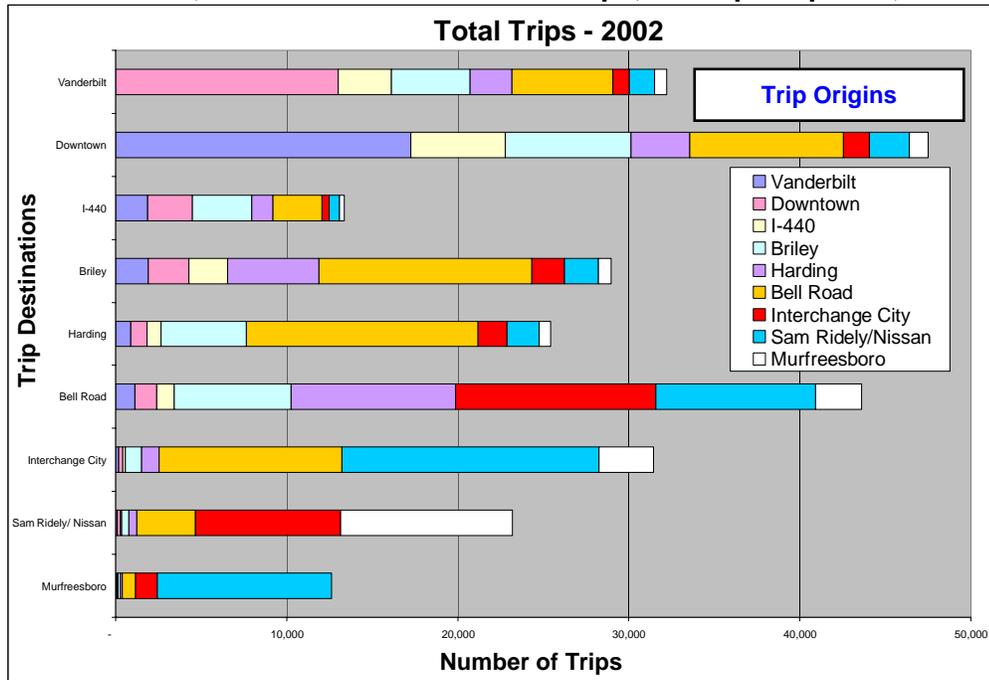


Table 3-5
SE Corridor Distribution of Interzonal Trips, All Trip Purposes, 2002

2002	TO	Vanderbilt	Downtown	I-440	Briley	Harding	Bell Road	Interchange City	Sam Ridley/ Nissan	Murfreesboro	Total 2002 Trips
FROM	Vanderbilt	24,300	17,300	1,900	1,900	900	1,200	200	100	50	47,850
	Downtown	13,000	39,100	2,600	2,400	1,000	1,300	200	150	100	59,850
	I-440	3,100	5,500	3,600	2,300	800	1,000	150	100	50	16,600
	Briley	4,600	7,400	3,500	20,000	5,000	6,800	950	400	150	48,800
	Harding	2,500	3,400	1,300	5,300	10,700	9,600	1,000	500	150	34,450
	Bell Road	5,900	9,000	2,800	12,500	13,600	93,000	10,700	3,400	800	151,700
	Interchange City	1,000	1,500	500	1,900	1,700	11,700	41,400	8,500	1,250	69,450
	Sam Ridley/Nissan	1,500	2,400	600	2,000	1,900	9,300	15,000	84,600	10,200	127,500
	Murfreesboro	700	1,100	250	750	650	2,700	3,200	10,100	186,200	205,650
	Destine Trips	32,300	47,600	13,450	29,050	25,550	43,600	31,400	23,250	12,750	258,950
	Intrazonal Trips	24,300	39,100	3,600	20,000	10,700	93,000	41,400	84,600	186,200	502,900
	Total Trips	56,600	86,700	17,050	49,050	36,250	136,600	72,800	107,850	198,950	761,850

Intrazonal Trips are shorter distance trips within a given zone

**Figure 3-6
SE Corridor, Distribution of Interzonal Trips, All Trip Purposes, 2002**



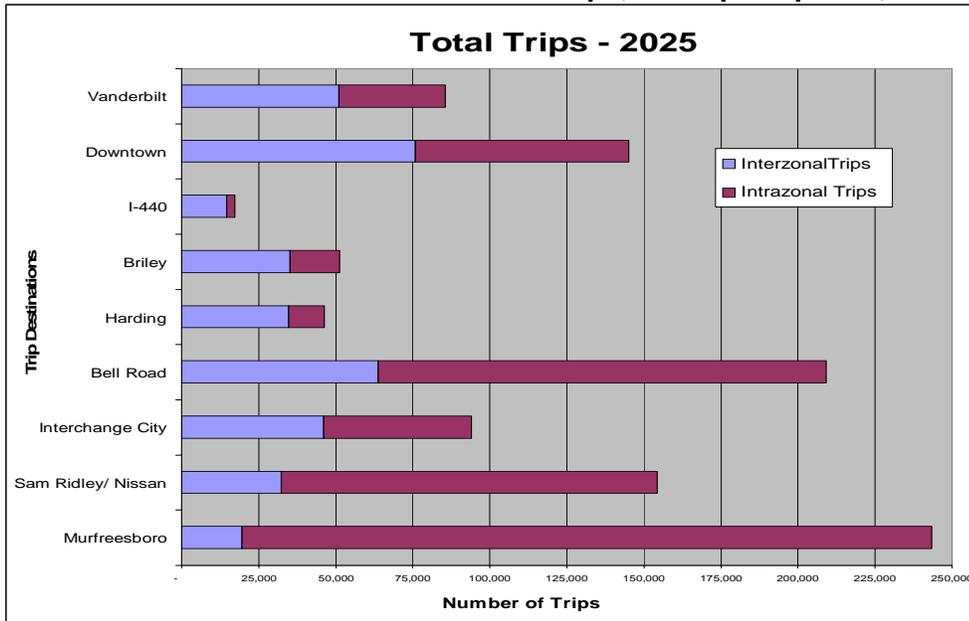
Note: Intrazonal trips, which tend to be shorter distance trips, are not included in the above figure

**Table 3-6
SE Corridor All Trip Purposes – 2002**

2002	TO	Vanderbilt	Downtown	I-440	Briley	Harding	Bell Road	Interchange City	Sam Ridley/Nissan	Murfreesboro	Total 2002 Trips
FROM	Vanderbilt	24,243	17,249	1,861	1,927	882	1,149	190	121	49	47,671
	Downtown	13,000	39,095	2,614	2,342	970	1,273	224	153	65	59,736
	I-440	3,118	5,512	3,597	2,272	812	1,015	150	88	29	16,593
	Briley	4,594	7,376	3,469	19,946	4,960	6,819	945	411	125	48,645
	Harding	2,444	3,409	1,259	5,328	10,715	9,601	1,040	480	131	34,407
	Bell Road	5,915	9,005	2,842	12,460	13,551	93,260	10,684	3,397	782	151,896
	Interchange City	960	1,492	438	1,906	1,715	11,727	41,362	8,504	1,249	69,353
	Sam Ridley/Nissan	1,489	2,356	615	1,989	1,872	9,317	15,016	84,568	10,202	127,424
	Murfreesboro	692	1,083	254	743	645	2,714	3,185	10,057	186,177	205,550
	Destine Trips	32,212	47,482	13,352	28,967	25,407	43,615	31,434	23,211	12,632	258,312
	Intrazonal Trips	24,243	39,095	3,597	19,946	10,715	93,260	41,362	84,568	186,177	502,963
Total Trips	56,455	86,577	16,949	48,913	36,122	136,875	72,796	107,779	198,809	761,275	

Intrazonal Trips are shorter distance trips within a given zone

**Figure 3-7
SE Corridor Interzonal and Intrazonal Trips, All Trip Purposes, 2025**

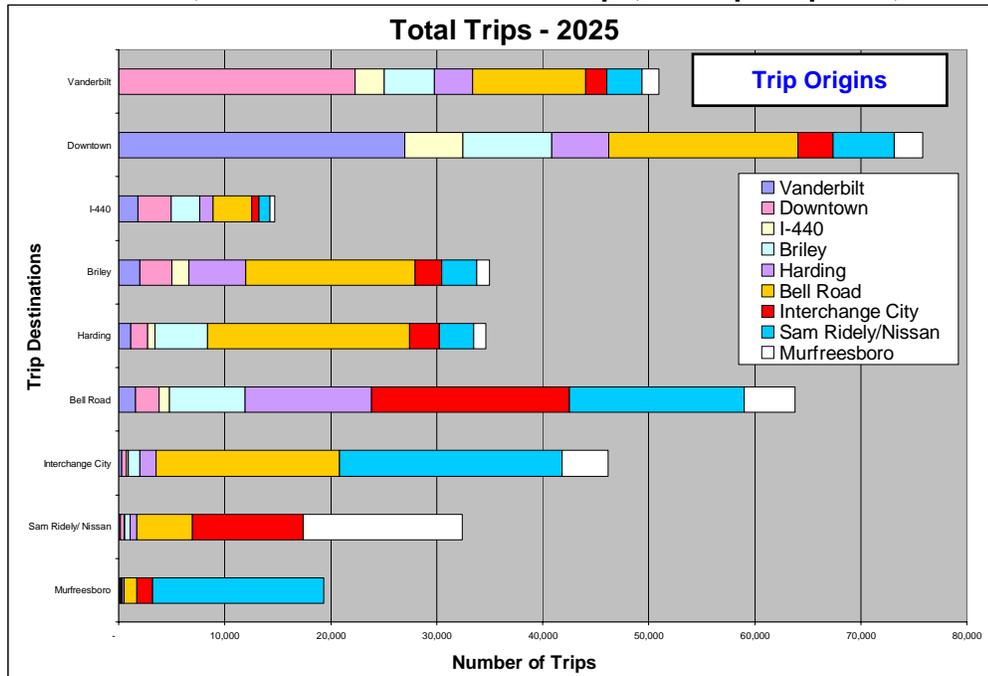


**Table 3-7
SE Corridor All Trip Purposes, 2025**

2025	TO	Vanderbilt	Downtown	I-440	Briley	Harding	Bell Road	Interchange City	Sam Ridley/ Nissan	Murfreesboro	Total 2025 Trips
FROM	Vanderbilt	34,400	27,000	1,800	2,000	1,200	1,600	300	200	100	68,600
	Downtown	22,300	69,200	3,150	3,000	1,550	2,200	450	300	100	102,250
	I-440	2,750	5,500	2,600	1,650	700	1,000	200	100	50	14,550
	Briley	4,800	8,450	2,700	16,250	4,950	7,200	1,100	500	150	46,100
	Harding	3,600	5,300	1,250	5,350	11,700	11,900	1,500	650	200	41,450
	Bell Road	10,700	17,850	3,700	16,000	19,100	145,300	17,300	5,250	1,200	236,400
	Interchange City	2,000	3,350	700	2,550	2,800	18,700	47,900	10,450	1,500	89,950
	Sam Ridley/Nissan	3,400	5,700	1,000	3,300	3,250	16,500	21,000	121,900	16,200	192,250
	Murfreesboro	1,600	2,700	450	1,250	1,150	4,800	4,300	15,000	224,000	255,250
	Destine Trips	51,150	75,850	14,750	35,100	34,700	63,900	46,150	32,450	19,500	373,550
	Intrazonal Trips	34,400	69,200	2,600	16,250	11,700	145,300	47,900	121,900	224,000	673,250
	Total Trips	85,550	145,050	17,350	51,350	46,400	209,200	94,050	154,350	243,500	1,046,800

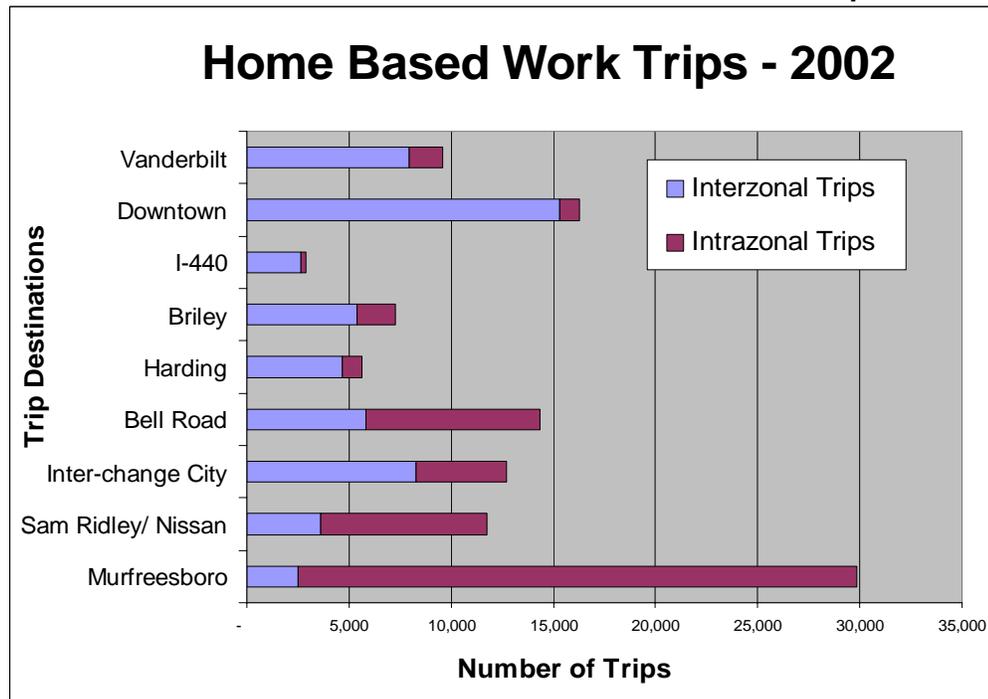
Intrazonal Trips are shorter distance trips within a given zone

Figure 3-8
SE Corridor, Distribution of Interzonal Trips, All Trip Purposes, 2025

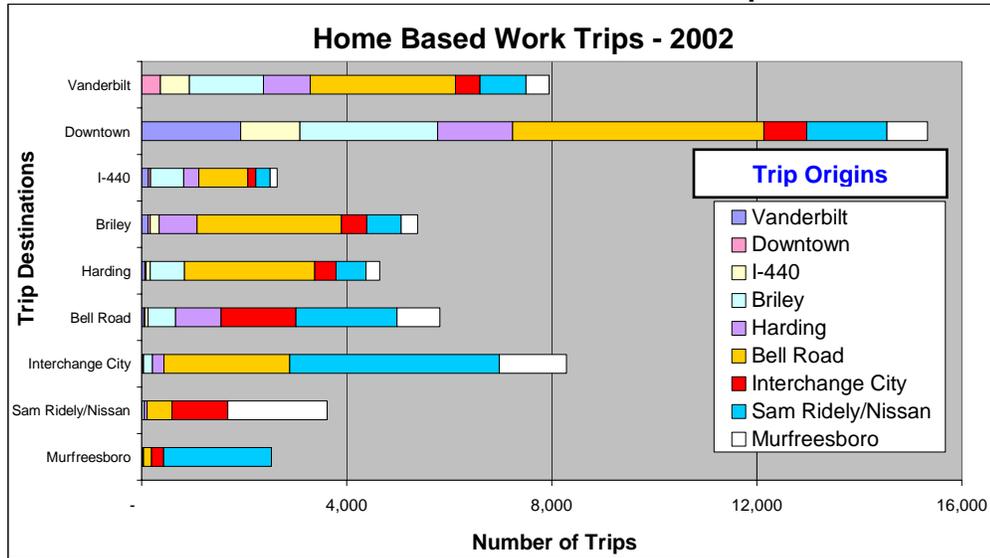


Note: Intrazonal trips, which tend to be shorter distance trips, are not included in the above figure

Figure 3-9
SE Corridor Interzonal and Intrazonal Home Based Work Trips – 2002



**Figure 3-10
SE Corridor Interzonal Home Based Work Trips – 2002**



Note: Intrazonal trips, which tend to be shorter distance trips, are not included in the above figure

**Table 3-8
SE Corridor Home Based Work Trips – 2002**

2002	TO	Vanderbilt	Downtown	I-440	Briley	Harding	Bell Road	Interchange City	Sam Ridley/Nissan	Murfreesboro	Total 2002 Trips
FROM	Vanderbilt	1,650	1,900	150	100	100	50	20	10	-	3,980
	Downtown	400	950	50	50	20	20	10	-	-	1,500
	I-440	600	1,150	250	200	100	50	20	10	10	2,390
	Briley	1,450	2,700	650	1,900	700	550	200	40	20	8,210
	Harding	900	1,500	300	750	1,000	900	200	50	20	5,620
	Bell Road	2,800	4,900	950	2,800	2,550	8,500	2,500	500	150	25,650
	Interchange City	500	850	150	500	400	1,500	4,400	1,100	250	9,650
	Sam Ridley/Nissan	900	1,550	300	700	600	2,000	4,100	8,150	2,100	20,400
	Murfreesboro	450	800	150	300	300	800	1,300	1,900	27,300	33,300
	Destine Trips	8,000	15,350	2,700	5,400	4,770	5,870	8,350	3,610	2,550	56,600
	Intrazonal Trips	1,650	950	250	1,900	1,000	8,500	4,400	8,150	27,300	54,100
	Total Trips	9,650	16,300	2,950	7,300	5,770	14,370	12,750	11,760	29,850	110,700

Intrazonal Trips are shorter distance trips within a given zone

Figure 3-11
SE Corridor Interzonal and Intrazonal Home Based Work Trips – 2025

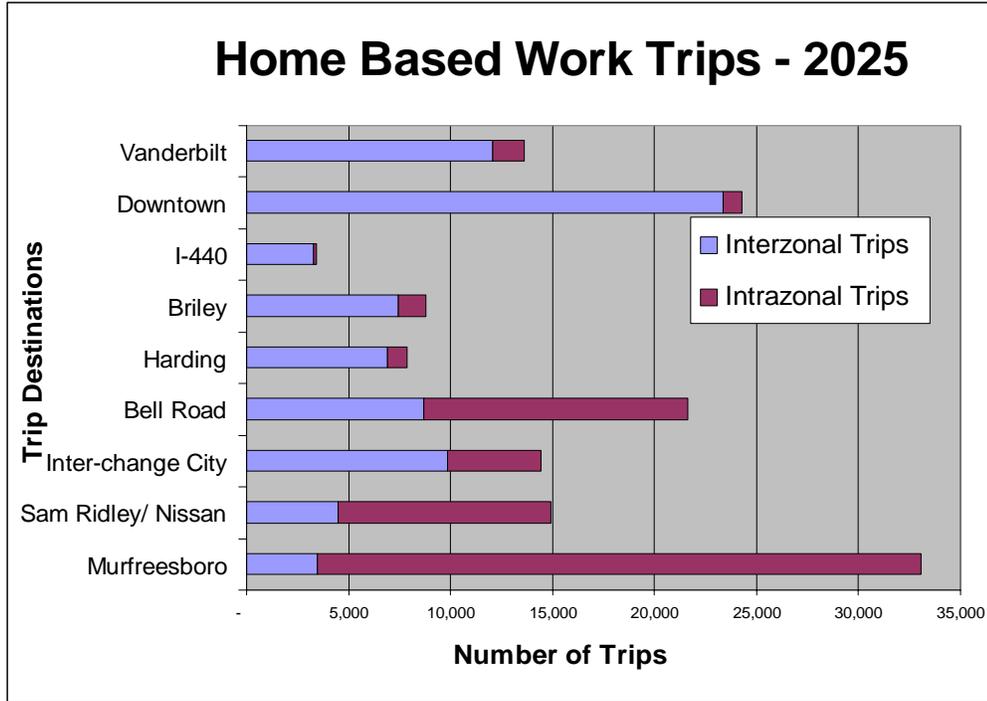
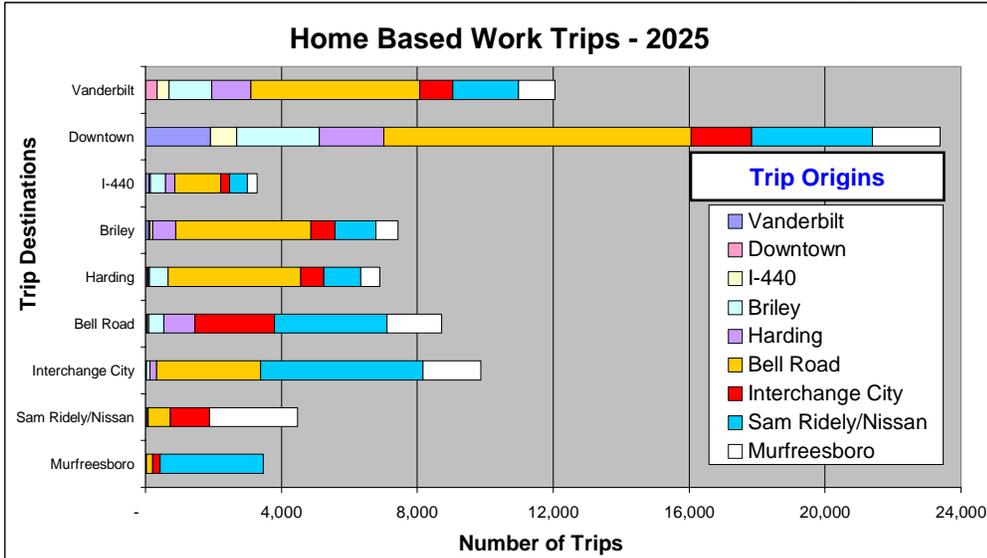


Figure 3-12
SE Corridor Distribution of Interzonal Home Based Work Trips – 2025



Note: Intrazonal trips, which tend to be shorter distance trips, are not included in the above figure

**Table 3-9
SE Corridor Home Based Work Trips – 2025**

2025	TO	Vanderbilt	Downtown	I-440	Briley	Harding	Bell Road	Interchange City	Sam Ridley/Nissan	Murfreesboro	Total 2025 Trips
FROM	Vanderbilt	1,600	1,900	100	100	50	50	10	10	-	3,820
	Downtown	350	900	50	50	20	20	10	-	-	1,400
	I-440	350	800	150	100	50	20	10	10	-	1,490
	Briley	1,250	2,400	450	1,350	550	450	100	50	10	6,610
	Harding	1,200	1,900	300	700	1,000	900	200	50	20	6,270
	Bell Road	5,000	9,000	1,350	3,950	3,900	12,900	3,050	650	200	40,000
	Interchange City	1,000	1,800	250	700	700	2,300	4,600	1,150	200	12,700
	Sam Ridley/Nissan	1,900	3,600	500	1,200	1,100	3,300	4,800	10,500	3,000	29,900
	Murfreesboro	1,100	2,000	300	650	600	1,600	1,700	2,600	29,600	40,150
	Destine Trips	12,150	23,400	3,300	7,450	6,970	8,640	9,880	4,520	3,430	79,740
	Intrazonal Trips	1,600	900	150	1,350	1,000	12,900	4,600	10,500	29,600	62,600
	Total Trips	13,750	24,300	3,450	8,800	7,970	21,540	14,480	15,020	33,030	142,340

Intrazonal Trips are shorter distance trips within a given zone

Travel forecasts for the year 2025 indicate a 42 percent increase in home based work trips (those considered longer distance trips) along the corridor over 2002 travel conditions. Additionally, the longer distance work trips increase from 51 percent to 56 percent of the total HBW trips generated within the study area corridor. Analysis of the interzonal and intrazonal data indicates the need for transportation improvements that will provide improved service for the growing commuter market to downtown Nashville and the Vanderbilt-West End area. The number of intrazonal trips generally exceeds the number of interzonal, even in the case of the home-based work trips, which tend to be longer than average trips. The data for shorter distance trips in the Bell Road area along with Interchange City, Sam Ridley/Nissan Boulevard, and the City of Murfreesboro, rival that of the areas of downtown Nashville and the Vanderbilt area. Downtown Nashville and the growing employment center surrounding Vanderbilt, West End and Music Row will remain the primary destination for transit improvements in the corridor. However, and just as importantly, the data indicates that improvements are needed to facilitate a growing volume of shorter trips, including intrazonal trips and trips between adjacent zones, in the corridor. The conclusion is that transit improvements considered in the corridor must not only provide improved access for commuters to downtown Nashville, but must also be capable of providing viable alternatives for these shorter trips, and trips to strong secondary markets in the corridor including Murfreesboro, LaVergne, Smyrna and Interchange City. This suggests that, in addition to line haul rail or bus improvements, increased feeder bus service and local bus services outside Nashville-Davidson County will be required to meet the future transit needs in the corridor.

3.6.1.1 Level of Service

Consistent with industry standards, traffic operations have been categorized into one of six level of service (LOS) conditions. The volume to capacity ratios used for each LOS are:

- A: 60% of capacity or less
- B: 61 to 70% percent of capacity
- C: 71 to 80% percent of capacity
- D: 81 to 90% percent of capacity
- E: 91 to 100% percent of capacity
- F: Over 100% percent of capacity

The scale sets LOS A as a free-flow traffic condition where motorists experience virtually no obstacles to their movement. Level of service B through E represents gradually declining traffic

operation. LOS F designates a breakdown in traffic flow characterized by bumper to bumper traffic.

In the Nashville area, LOS D is the service level accepted by the MPO as the minimum desired standard. Figure 3-13 illustrates the current and future level of service of I-24 and Murfreesboro Road within the study area.

Tables 3-10 and 3-11 identify the overall travel conditions of I-24 and Murfreesboro Road including the number of lanes, existing traffic counts, and forecasted travel demand. These facilities are the only two radial routes serving the complete length of the southeast area from downtown Nashville to the City of Murfreesboro.

**Table 3-10
I-24 from Downtown to Rutherford/Coffee County Line**

I-24 From I-40 Downtown Nashville to:	2003					2025		
	Average Daily Traffic (ADT)	Level of Service (LOS)	Average AM Peak Speed (MPH)	Average PM Peak Speed (MPH)	Existing Number of Lanes	Traffic Forecasts	Level of Service (LOS)	Future Number of Lanes*
Fesslers Lane	176,000	F	25	31	8	217,000	F	8
Briley Parkway (SR 155)	121,000	D	17	46	8	134,000	E	8
Bell Road	101,000	D	52	60	8	140,000	E	8
Old Hickory Blvd (SR 171)	102,000	D	54	62	8	132,000	E	8
Sam Ridley Pkwy (SR 266)	85,000	C	63	66	8	124,000	E	8
Nissan Drive (SR 102)	84,000	C	67	68	8	104,000	D	8
SR 840	81,000	E	69	67	8	89,000	C	8
SR 96	64,000	E	65	53	4	93,000	C	8
US 231	53,000	D	69	68	4	89,000	C	8
Rutherford/Coffee Co. Line	39,000	C	70	69	4	63,000	E	4

* Based on Nashville Area MPO 2025 Long Range Transportation Plan
 Bold reflects roadways with a LOS of D or worse. Pink reflects a change of one category in LOS and red reflects a change of two categories in LOS (between 2003 and 2025)
 Source: Nashville Area MPO and TDOT

**Table 3-11
Murfreesboro Road from Downtown Nashville to US-231 in Murfreesboro**

Murfreesboro Road From 8th Avenue to:	2003					2025		
	Average Daily Traffic (ADT)	Level of Service (LOS)	Average AM Peak Speed (MPH)	Average PM Peak Speed (MPH)	Existing Number of Lanes	Traffic Forecasts	Level of Service (LOS)	Future Number of Lanes*
Fessler's Lane	29,000	B	21	28	5	27,000	B	5
Thompson Lane	24,000	B	24	28	5	32,000	D	5
Briley Pkwy (SR155)	28,000	A	32	24	7	39,000	B	7
Bell Road	38,000	F	28	31	4	36,000	F	4
OHB/Hobson Pike (SR 171)	22,000	B	32	36	4	65,000	F	4
Sam Ridley Pkwy	23,000	B	37	35	4	51,000	F	4
Nissan Pkwy	22,000	B	36	37	4	30,000	C	4
SR-840	41,000	F	52	53	4	57,000	F	6
SR 96	32,000	D	35	41	4	32,000	A	6
S Church Street (SR 231)	33,000	B	18	22	6	28,000	A	6

* Based on Nashville Area MPO 2025 Long Range Transportation Plan
 Bold reflects roadways with a LOS of D or worse. Pink reflects a change of one category in LOS and red reflects a change of two categories in LOS (between 2003 and 2025)
 Source: Nashville Area MPO and TDOT

Table 3-12 identifies current roadway improvements under construction or planned for I-24 and Murfreesboro Road.

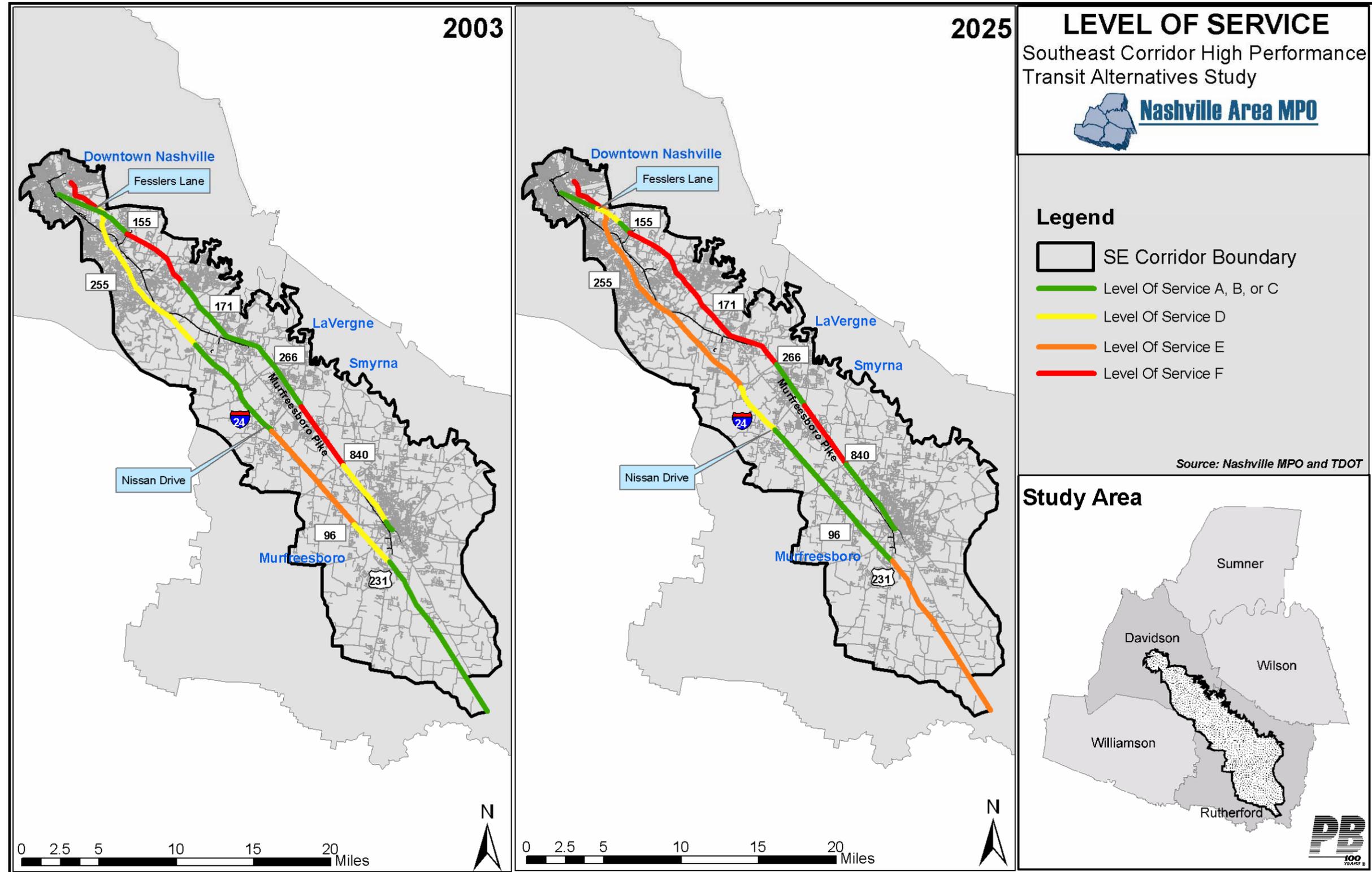
**Table 3-12
Current Planned Roadway Improvements**

Location	Type Improvement	Schedule/Activity
I-24 at Manson Pike	New Interchange	Completed July 2005
I-24 from SR-840 to east of SR-96	Widening from 4 to 8 lanes/2 of which are HOV	Completed September 2005
I-24 from SR-96 to east of US231	Widening from 4 to 8 lanes/2 of which are HOV	Projected Completion June 2008
I-24 at SR-99	New Interchange	Projected Completion June 2008
US-41/70S @ Memorial Ave. (SR-10) & Old Fort Parkway (SR-96)	New Interchange	Under Development

Source: TDOT

The southeast corridor continues to experience tremendous increases in both traffic volumes and congestion. This primarily results from the growing population and employment base of the corridor as well as the overall growth in the public's propensity to travel. Even with currently planned roadway improvements, travel demand will continue to exceed the available capacity of the roadway network. Additional improvements will be required to address these problems.

Figure 3-13
Highway Level of Service (2003 & 2025)



3.6.2 Public Transportation

The study area for the Southeast Corridor Alternatives Analysis includes several local, express and commuter bus routes, however, there are a number of gaps in the public transit offerings throughout the corridor. Particularly, there are limitations in terms of geographic coverage, service availability by time of day and day of week, and other issues that affect access to transit. Because of these gaps, many of the transportation markets identified earlier in this report are not served with the existing transit system. Ridership increases on the services that do exist in the corridor indicate an interest and demonstrate a need for improved transit services in the corridor.

MTA

The Metropolitan Transit Authority (MTA) has a charter to provide bus service within Nashville-Davidson County. The network of transit service operated by MTA is illustrated in Figure 3-14. The Regional Transportation Authority (RTA) contracts with MTA to operate a commuter bus service ("Relax-and-Ride") to the communities of LaVergne, Smyrna, and Murfreesboro. The study area currently supports parts of five local bus routes, parts of four express bus routes and a commuter bus route. In Table 3-13, the MTA bus routes serving the study area are listed by route number and name and includes the hours and headways for each route.

MTA is a component unit of the Metropolitan Government and was created in 1953 to supervise, regulate and maintain jurisdiction over public transit in the City of Nashville. MTA is governed by a five-member board appointed by the Mayor and approved by the Council. The Metropolitan Government partially funds MTA's annual operating and capital budgets. MTA currently employs an active fleet of approximately 140 buses, vans and trolleys serving approximately seven million riders annually.

In July 2004, MTA and Vanderbilt University implemented a new ridership program for the university's faculty and staff. Under the program, a Vanderbilt employee can use his or her university identification card in the bus farebox for free fare; for which MTA then invoices the university. In the first month, the program generated nearly 15,000 boardings, with primary ridership generated from routes within the southeast corridor and the West End Boulevard and Hillsboro Road corridors. In January 2006 ridership on this program had reached approximately 35,000 per month.

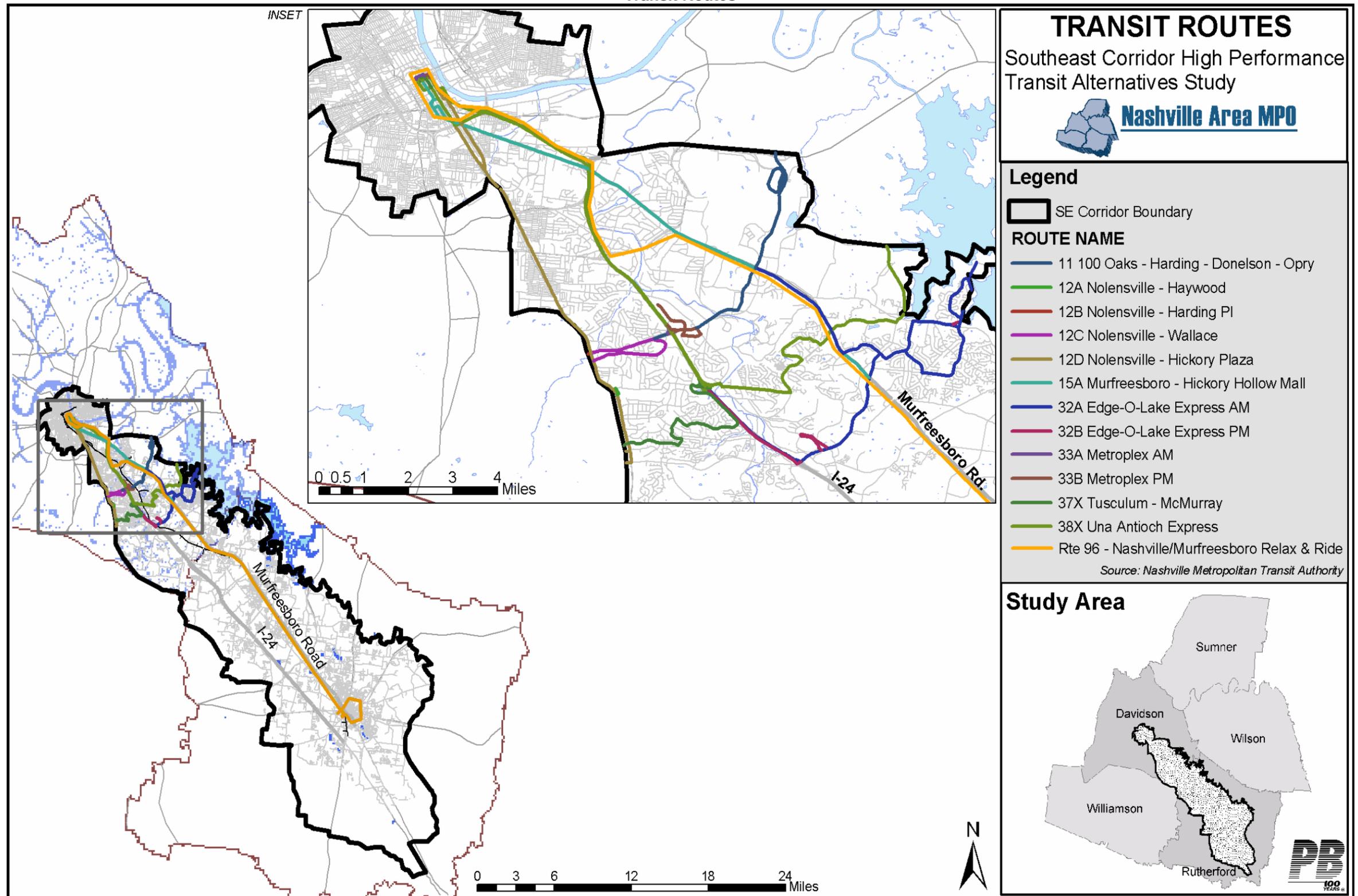
The MTA also operates Access Ride, which is a paratransit service for those with mobility impairments who cannot use fixed-route service. Access Ride provides curb-to-curb service in lift equipped vehicles. The service is required to be equivalent to non-commuter, fixed-route service and is offered within 1 1/2 miles on either side of every fixed-route during the same service hours. Customers beyond this service area are provided trips based on availability. The service is provided from origin to destination on a curb-to-curb basis. Customers are able to make reservations up to the day before their trip, but no more than 7 days in advance.

RTA

Created by state statute in 1990, the Regional Transportation Authority (RTA) is a nine-county regional agency in the Nashville metropolitan area whose mission is to plan and develop a regional transit system including developing a region-wide commuter rail system.

RTA also administers the region's carpool and vanpool program. This program is described further in Section 3.5.7. RTA collaborates with MTA to deliver a number of other commuter and employment related transportation services. MTA operates three regional commuter bus routes

Figure 3-14
Transit Routes



**Table 3-13
Study Area Transit Routes & Service**

Route No.	Route Name	Area Served	Days of Service	Service Headways (min.) or No. of Express Trips		
				Peak	Off-Peak	Weekend
Local Routes						
11	Southeast Connector	Crosstown Route connecting 100 Oaks Mall, International Airport and Opry Mills Shopping Center	Weekday	40 min.	40 min.	N/A
12	Nolensville	Along Nolensville Road to Old Hickory Road	Weekday, Saturday and Sunday	15 min.	20/30 min.	40/60 min. (40 typ.)
15	Murfreesboro	Murfreesboro Road to Hickory Hollow Mall	Weekday, Saturday and Sunday	17/20 min.	20 min.	30/60 min. (60 typ.)
18	Elm Hill Pike/ Airport	Elm Hill Pike, Donelson Pike and Airport	Weekday, Saturday and Sunday	60/70 min.	65/75 min.	60 min.
25	Midtown	Loop service along Deaderick St., Charlotte Ave., Patterson St., 20/21 Sts., Edgehill Ave., Ch.Davis Blvd., Hermitage Ave., and 4/5 Sts.	Weekday, Saturday and Sunday	30 min.	60 min.	60 min.
Express and Commuter Routes						
32X	Edge-O-Lake Express	I-40 and Bell Road to Edge-O-Lake neighborhood.	Weekday	8 am/pm peak trips	3 off-peak trips	N/A
33X	Hickory Hollow Mall/ Old Hickory Express	I-24 and Bell Road to Hickory Hollow Mall and Hickory Plaza.	Weekday	6 am/pm peak trips	2 off-peak trips	N/A
37X	Tusculum/ McMurray Express	I-24 or I-40 depending on am or pm trip. Service along Old Hickory Blvd., Edmonson Pike, McMurray Rd., Ocala Ave., and Apache Trl.	Weekday	7 am/pm trips	2 off-peak trips	N/A
38X	Una Antioch Express	I-24 or I-40 depending on am or pm trip. Service along Richards Blvd., Una-Antioch Pike and Bell Rd.	Weekday	6 am/pm trips	2 off-peak trips	N/A
96	Nashville/ Murfreesboro Relax and Ride	Murfreesboro Road to Murfreesboro and Middle TN State University	Weekday	9 am/pm trips	None	N/A

Source: MTA

under contract with RTA that deliver commuter services between downtown Nashville and Murfreesboro, Hendersonville, and Mount Juliet. These routes serve various park and ride locations in outlying counties and are supported by a guaranteed ride home program. Recent ridership on these routes is more than 50,000 rides annually.

The collaboration of the two agencies extends to the delivery of several services funded by RTA's Job Access grant. These services include extension of regular bus routes to employment sites to meet specific work shift needs during the day. It also includes RTA funding the weekend operation of MTA's night owl service. This is an after midnight service offered on a demand response basis that provides riders a trip from the downtown transit center to bus stop locations within a limited area of central Nashville. These services have been valuable in solving the transportation issues many employees face in reaching employment opportunities. The Job Access funding has provided an estimated 46,000 rides annually the past few years.

3.6.2.1 *Operating Characteristics*

The MTA transit system operates regular weekday service, Monday through Friday, and weekend service, with different Saturday and Sunday schedules. Hours of service and headways vary among the routes depending on service periods and weekday and weekends. On a typical day most local routes operate with 15 to 30 minute peak-period headways, 20 to 45 minute mid-day headways, and late evening hourly service. A summary of the days of operation and typical headways for the routes throughout the study area is in Table 3-13 above.

In the MTA system, the express and commuter bus routes share many common characteristics with regard to their schedules and service. They both provide a limited, primarily peak hour service during weekdays; no weekend service; faster service at higher travel speeds to outlying neighborhoods and communities; and have less frequent stops than local bus service. The express bus routes make more frequent stops in the outlying neighborhoods and stay within Davidson County. Many of the passengers on these routes are public school students attending various magnet schools within the county. The commuter bus routes provide more limited stop service, focusing on picking up commuters at park and ride lots in larger communities and cities outside of Davidson County.

3.6.2.2 *Level of Service*

Transit level of service (LOS) is a qualitative assessment of transit service from the user's point of view. The Transit Capacity and Quality of Service Manual (TCQSM) provides six designated ranges of values for a particular service measure, graded from "A" (best) to "F" (worst) based on a transit passenger's perception of a particular aspect of transit service. The LOS of existing public transportation services within the study area can be based on a number of service measures as defined by the TCQSM. These are:

- Service frequency
- Hours of service
- Service coverage
- Passenger loads
- Reliability
- Transit/auto travel time difference

Focusing on the main travel route along Murfreesboro Road in the study area, the LOS of existing service can be quantified using the transit routes that serve these streets. The area is served primarily by bus routes 15 and 96. Route 96 is a commuter express route, which provides limited peak-period service on weekdays to the city of Murfreesboro, while route 15 is a local route that travels along Murfreesboro Road as far south as Bell Road and Hickory Hollow Mall.

For the section of Murfreesboro Road served by route 15, the service frequency LOS (based on headway only) would range between LOS C during peak periods and LOS B to E during off-peak periods. This is based on the route's operating headway which ranges from 17 to 60 minutes during peak and off-peak hours. The LOS is B based on the hours of service criteria. This is a result of the route providing a minimum of hourly service until midnight. The TCQSM identifies LOS B as service being available from 17-18 hours per day.

For the sections of Murfreesboro Road south of Bell Road that are served only by limited, peak-hour route 96, the LOS measures are lower. Based on the operating headways, which range from 57 to 105 minutes, the existing LOS for service for the city of Murfreesboro ranges

between E and F. Service to the town of Smyrna is more frequent, ranging from 26 to 95 minutes, which establishes existing LOS ranges between D and F.

Travel times on route 15 along Murfreesboro Road vary between the peak, mid-day and evening periods. Based on the schedule, the peak period travel times vary between 48 and 62 minutes from Hickory Hollow Mall to the Deaderick Street Mall in downtown Nashville. During mid-day, the same route is scheduled to take 50 minutes and the evening service is scheduled to take 39 minutes. Travel times on route 96, from the Smyrna K-Mart park and ride lot to the Deaderick Street Mall, vary from 50 to 61 minutes according to the schedule during the am and pm peak period service. From Murfreesboro to the Deaderick Street Mall, the scheduled travel times vary between 82 and 88 minutes during the peak period.

Service reliability is another measure of service for public transit. Existing transit service reliability, in terms of on-time performance and headway adherence, can be negatively affected by several variables. These variables include school zones along the roadway, accidents, and traffic flow delays. As the previous discussions of traffic congestion indicate, there are a number of locations along Murfreesboro Road where drivers experience congested conditions on a daily basis, exacerbated by accidents and other temporary disruptions. These conditions negatively impact bus schedule adherence and service reliability on the bus system. Service reliability in congested conditions can only be achieved by using bus priority treatments such as dedicated lanes or signals, or by providing additional right of way for transit vehicles over some or all of the right of way. These will be key considerations in developing transit alternatives along both Murfreesboro Road and I-24.

Passenger loadings—the peak number of people on board the bus at a given time period—are another indicator of transit system performance. Information provided by MTA suggests that portions of route 15 (Murfreesboro Road), route 12 (Nolensville Road) and route 18 (Elm Hill Pike/Airport) experience standing loads (more passengers on board than there are seats) during the morning and evening peak periods. This is further indication that additional transit capacity, in the form of more frequent transit service, is required in the corridor to meet existing demand. Travel demand analysis to be performed in the development of alternatives will be used to estimate future demand for transit and recommend an optimum level of transit service to meet this demand in the corridor.

3.6.2.3 Fare Structure

The MTA has a number of fare options associated with use of the current transit system. Their fare options include the following:

- Local Service \$1.45
- Transfer \$0.10
- Elderly and Disabled \$0.70
- Youth \$0.90
- Express Service \$1.75 to \$2.25

An extensive set of fare pass options are available including:

- 20 Ride Local \$24.85
- 7 Day Pass \$14.70
- 31 Day Pass \$48.00
- 20 Ride express \$30.90 to \$40.50

The fare structure for the Access Ride service is \$1.75 for eligible customers with attendants riding for free.

3.6.2.4 Ridership

Average monthly ridership, during the period from September 2003 through May 2004, for the existing transit routes within the study area is summarized in Table 3-14. As identified in the table, average monthly ridership on the local routes is highest on route 15 Murfreesboro, at 43,154 trips. For Relax and Ride route 96, which provides service to the communities of LaVergne, Smyrna, and Murfreesboro, the average monthly ridership for this period was 2,247 trips. Ridership spiked approximately 20 percent on route 96 during June and July 2004; and has the potential for further increases with the re-location of two park and ride lots to more accessible locations in LaVergne and Smyrna.

3.6.2.5 Revenues and Costs

In 2002, the MTA operated a total of 8,878,818 annual vehicle revenue miles of service and 629,327 annual vehicle revenue hours. Operating service costs for the year were \$54 million. The operating expense per bus revenue hour was \$66.26 and per bus passenger trip was \$2.60.

**Table 3-14
Average Monthly Ridership (September 2003 through May 2004)**

Route No.	Route Name	Average Monthly Ridership	Passengers per Revenue Hour	Passengers per Revenue Mile
Local Routes				
11	Southeast Connector	1,071	3.1	0.2
12	Nolensville	23,937	24.3	1.8
15	Murfreesboro	43,154	27.3	1.8
18	Elm Hill Pike/ Airport	8,433	20.5	1.3
25	Midtown	11,722	13.2	1.0
Express and Commuter Routes				
32X	Edge-O-Lake Express	4,785	16.0	0.8
33X	Hickory Hollow Mall/ Old Hickory Express	2,593	20.0	1.1
37X	Tusculum/ McMurray Express	3,121	19.8	1.1
38X	Una Antioch Express	3,192	20.6	1.1
96	Nashville/ Murfreesboro Relax and Ride	2,247	11.1	0.4

Source: MTA

3.6.2.6 Planned Service Improvements

The current Five Year Service Improvement Plan for MTA, adopted in March of 2004, calls for service improvements for nearly all MTA routes over the next five years. Table 3-15 illustrates the various service improvements for the transit routes serving the southeast corridor area.

**Table 3-15
Current Planned Transit Service Route Improvements**

Route No.	Route Name	5-Year Plan Recommendations
11	Southeast Connector	<ul style="list-style-type: none"> • Years 1-3 - No changes • Year 4 - 60 minute service during mid-day • Year 5 - Same as Year 4 but adds 60 minute service on Saturday till 6:15pm
12	Nolensville	<ul style="list-style-type: none"> • Year 1 - Addition of 11:15 am weekday trip • Year 2 - 20 minute midday headway • Year 3 - Route operates to Hickory Plaza every trip; Service to Wallace & Harding Loops reallocated; 10 minute peak service; and 20 minute midday service • Year 4 - 30 minute weekday service until 8:15 pm; 20 minute Saturday service until 6:15 pm; 30 minute Sunday service until 6:15 pm • Year 5 – No Changes
15	Murfreesboro	<ul style="list-style-type: none"> • Year 1 - Create a split headway on this route, Alternating service between Hickory Hollow Mall and the Wal-Mart Supercenter on Murfreesboro, past Bell Road; 10 minute headway during peak periods • Year 2 - Reallocation of Vultee deviation to new Route 5 • Year 3 - 20 minute service from 6:15 pm to 8:15 pm; 30 minute service from 8:15 pm • Year 4 - 20 minute service until 6:15 pm on Saturday; 30 minute service until 6:15 pm on Sunday • Year 5 - No changes
18	Elm Hill Pike/ Airport	<ul style="list-style-type: none"> • Year 1 - No changes • Year 2 - Split current routing into two routes: one that operates local to and from the airport via Elm Hill Pike, and one that operates express from the Airport to Downtown via I-40; 20 minute peak service; 30 minute off peak service until 8:15 pm; 60 minute Saturday service until 8:15 pm; 60 minute Sunday service until 6:15 pm • Years 3 through 5 - No changes
25	Midtown	<ul style="list-style-type: none"> • Year 1 - 30 minute service all day until 6:15 pm; All trips to MTA from 8:15 am until 3:45 pm • Year 2 - 20 minute peak service • Year 3 - 20 minute service via Jo Johnson until 8:15 pm ;40 minute service to Hart until 8:15 pm • Years 4 through 5 - No change
32X	Edge-O-Lake Express	<ul style="list-style-type: none"> • Years 1 through 4 - No change • Year 5 - 1 extra am and pm trip
33X	Hickory Hollow Mall/ Old Hickory Express	<ul style="list-style-type: none"> • Years 1 through 4 - No change • Year 5 - 1 extra am and pm trip
37X	Tusculum/ McMurray Express	<ul style="list-style-type: none"> • Years 1 through 4 - No change • Year 5 - 1 extra am and pm trip
38X	Una Antioch Express	<ul style="list-style-type: none"> • Years 1-4 - No changes • Year - 5 - 1 extra am and pm trip
96	Nashville/ Murfreesboro Relax and Ride	<ul style="list-style-type: none"> • Years 1 through 5 – No Changes

Source: MTA 2004

Despite service improvements within Davidson County, there are currently no additional transit service improvements planned within LaVergne, Smyrna or Rutherford County over the next five years. Murfreesboro however began operating local service in 2006.

3.6.3 Park and Ride Lots

Within the study area, there are 16 existing park-and-ride lots, of which six are formal lots and ten are considered informal lots. Of the 16 park-and-ride lots in this corridor, 14 of them are

located outside of Davidson County in the communities of LaVergne, Smyrna, Murfreesboro, and Rutherford County.

It is the goal of the RTA and MTA to improve the condition and accessibility of the park and ride lots throughout the system. Many of the lots have poor pedestrian access and limited or no amenities, such as bus shelters or benches. At many park and ride lots, there is an absence of sidewalks within the facility leading to nearby neighborhoods or alongside the road. The Nashville Area MPO has set aside funds to assist with improvements to these facilities.

Table 3-16 identifies the location and capacity of the existing park-and-ride locations within the corridor.

**Table 3-16
Existing Park and Ride Lots**

	Location	County	Formal- Informal	Spaces	Shared- Separate
1	Edge-O-Lake Dr/US-41 (Plaza)	Davidson	Informal	24	Shared
2	Hickory Hollow Cinemas	Davidson	Formal	267	Shared
3	Stones River/Murfreesboro Rd	Rutherford	Informal	20	Shared
4	I-24E at Waldron Road	Rutherford	Formal	36	Separate
5	I-24 at Sam Ridley Blvd	Rutherford	Formal	31	Separate
6	US-41 near Sam Ridley Blvd	Rutherford	Formal	17	Shared
7	I-24 at SR-102 Lee Victory Pkwy	Rutherford	Informal	12	Separate
8	SR-840 at US-41	Rutherford	Formal	215	Separate
9	US-41 at Georgetown Square	Rutherford	Informal	20	Shared
10	SR-96 Agricultural Center	Rutherford	Formal	129	Shared
11	US-41 at Jackson Heights Shop-Center	Rutherford	Informal	30	Shared
12	I-24E at SR-96 (Chevron)	Rutherford	Informal	10	Shared
13	US-41/Cannonsburgh	Rutherford	Informal	20	Shared
14	I-24 at US-231	Rutherford	Informal	20	Shared
15	Mercury Plaza (Murfreesboro)	Rutherford	Informal	25	Shared
16	I-24 and Buchanan Road	Rutherford	Informal	10	Shared

Source: Regional Transportation Authority

The Nashville Regional Commuter Rail Evaluation, conducted in April of 1996, recommended seven commuter rail stations in the Southeast Corridor (see section 3.3.2). The Park-and-Ride Study reassessed the potential locations for functionality and viability as a potential park-and-ride lot, which later could be converted to a commuter rail station. Of the seven locations only three were recommended:

- Crossings/Hickory Hollow Area – Nashville-Davidson County
- US-41/70S and Front Street – Smyrna
- Waldon Road/Murfreesboro Road – LaVergne

Considerable investment has gone into development of the existing park-and-ride share program. This system of facilities provides an excellent opportunity for consideration of various transit alternatives within the study area.

3.6.4 Railroads

This section describes the rail transportation system within the Nashville area and the study area. Rail transport is predominately freight for the region with passenger rail service planned by 2006 for populations east of downtown Nashville (known as the east line to the cities of Mount Juliet and Lebanon).

The Surface Transportation Board (STB) separates railroad companies into three classes based on revenues for each of the railroads. The largest railroad systems are classified as Class I railroads, followed by Class II railroads, which are mid-to-small sized companies (also known as short-line railroads), and Class III railroads, which are small sized companies. In the study area there is one Class I Railroad, one Short-line Railroad, and one planned commuter passenger rail service.

Class I Railroad – CSX Transportation The freight rail network serving Nashville is an important rail hub for the region; at least one hundred trains per day are handled through the main lines and yard facilities in Nashville where extensive swapping of blocks (multi-car segments of freight trains) are accomplished. All of the main lines, which are currently owned by CSX Transportation (CSX) and feed this hub, are single track and already have capacity constraints.

CSX operates 23,357 miles of track in 23 states in the eastern United States. In Tennessee, CSX operates 1,137 miles of track. CSX operates lines from Nashville southward to Birmingham, Alabama, and from Nashville westward to Jackson and on to Memphis. CSX also operates a north-south line from Jellico, Tennessee, at the Kentucky border, southerly to Knoxville and on to Ocoee, Tennessee, near the Georgia border. CSX has approximately 35,000 employees nationwide and 2,600 employees in Tennessee.

Within the study area, the CSX rail line from Nashville to Chattanooga traverses the entire length of the corridor connecting downtown Nashville to LaVergne, Smyrna, and Murfreesboro. This rail line sustains a relatively high level of freight traffic with 30 to 35 trains per day.

CSX is capable of running full double stack clearances through all of Tennessee and the company does not currently have any bridge clearance problems in the state. Along this rail line, CSX routes trains from Cincinnati to Atlanta through Louisville and Nashville. CSX also routes trains from Atlanta to Chattanooga and then to Nashville.

Short-Line Railroads - Nashville and Eastern Railroad

The Nashville and Eastern Railroad is classified as a short-line and operates 95 miles of main line and 15 miles of branch line in Davidson, Wilson, Smith, and Putnam counties. The railroad's principal connection is to CSX Transportation in Nashville. The line runs from Nashville eastward to Monterey, Tennessee. The Nashville and Eastern Railroad employs 27 full-time staff members and has an annual payroll of \$1.3 million. The railroad provides service to 35 shippers.

Within the study area, the Nashville and Eastern Railroad serves downtown Nashville but leaves the study area just east of I-24/I-40 and extends easterly toward Wilson County.

Passenger Rail – East Commuter Rail

In 1996, the MTA and RTA initiated a study to explore the potential of commuter rail in the Nashville region. From this study, six corridors were considered for further evaluation. A 1998 study analyzed the capital costs for the three most promising corridors. This analysis is discussed in Section 3.3.2. Based on the results of these studies and efforts of the Nashville Area Commuter Rail Task Force—which included the Nashville Chamber of Commerce, area business leaders, the MPO, MTA, RTA, TDOT, CSX, the Nashville and Eastern Rail Authority, and a Nashville Congressional delegation—the East Corridor was selected as the first corridor to be implemented in the Nashville Area Commuter Rail System.

The Nashville MPO included the East Corridor commuter rail project in its fiscally constrained long range transportation plan in 1999. FTA approved the project to advance into preliminary

engineering (during which time an environmental assessment was undertaken) in late 1999. The East Line became operational in 2006 with service from downtown Nashville at the Cumberland River, to the City of Lebanon, which is approximately 35 miles from downtown Nashville.

3.6.5 Aviation

Within the study area, there are three airports, one commercial and two General Aviation (GA) airports. The large amount of employment, commercial, and manufacturing within this area of the region has benefited from relatively convenient access to airport facilities, be it for business travel, product or supply shipping, or pleasure.

Commercial Air Service

The southeast corridor is the focus of commercial air service in the region. Nashville International Airport (NIA), which lies at the northeastern edge of the corridor, is a major regional and corridor traffic generator. Travelers and airport employees, as well as the employees of business located near the airport for various reasons, make the airport area a major employment center and major transportation destination. Smyrna Airport and its surrounding area also is developing as a major regional employment destination.

Nashville International Airport is one of six commercial airports in Tennessee and is located southeast of downtown with direct access to I-40, serving as an important asset to the regional business community. Non-stop jet service to forty-five markets is provided to mid-state businesses and travelers by eleven air carriers, making the airport a major traffic generator.

Nashville International has the highest origination numbers compared to any other airport in Tennessee. (Origination numbers are the number of passengers originating their flight from the Nashville airport.) One of the reasons for this is the low-fare carrier, Southwest Airlines, which makes it attractive for passengers to drive to Nashville from all parts of the State and even from the State of Kentucky. Nashville International is also the second busiest airport in Tennessee in terms of enplanements, or departing passengers, just behind the Memphis Airport. NIA has an average of 4 million enplanements per year.

The Nashville International Airport provides commercial air service to the metropolitan area and all of Middle Tennessee through major commercial carriers. The airport is served by Air Canada, American, American Eagle, Comair, Continental, Corporate Express, Delta, Delta Express, Mesa, Northwest, Skyway, Southwest, Trans States, TWA, United, United Express, US Airways, and US Airways Express. With 400 arrivals and departures daily, the Nashville International Airport serves 96 major markets throughout the country. The airport is nearly adjacent to Rutherford County, just eight miles from LaVergne.

Surface transportation to the airport includes private automobiles and rental cars, taxis and shuttle buses, limousines, charter buses, and MTA transit.

General Aviation (GA) Airports

There are 32 GA airports in Middle Tennessee, two of which are in the study area - the Smyrna Airport and the Murfreesboro Municipal Airport. The Tennessee Statewide Aviation System adopted in 2001 ranked the Smyrna Airport third and the Murfreesboro Municipal Airport fourth in Middle Tennessee relative to business development opportunities. These airports are premier business airports and are anticipated to continue to play a major role in the commercial growth of its market. In addition, they generate business activity in surrounding areas due to their desirability to businesses, such as air freight, that require proximity to a large general aviation airport.

The Murfreesboro Municipal Airport serves both public and private clients, and has one 3,900-foot runway that can be used for smaller jet aircraft. The airport benefits from its location in Murfreesboro but is constrained in its growth by its residential access and surroundings. However, the proximity to Nashville and I-24 are positive factors that are expected to exert continued pressure on the airport's capacity. Taxi and rental car transportation are available.

The Smyrna Airport serves both public and private clients, and has one 5,500-foot runway and one 8,037-foot runway. The geographic location of the Smyrna Airport with direct access to I-24 via Sam Ridely Parkway and relative proximity to Nashville International make it among the top ranked GA airports in Middle Tennessee. Smyrna Airport also has the majority of the design features that are required for a regional service airport and is in the midst of a major expansion to carry international freight and passengers. Courtesy car and rental car services are available.

There are five industrial parks in Rutherford County fostering positive development opportunity for both the Murfreesboro Municipal Airport and the Smyrna Airport. These industrial parks are:

- South Park Distribution Center - a 160 acre industrial park with roughly 70 acres available for future development
- Smyrna Industrial Airpark - a 180 acre industrial park with roughly 140 acres available for future development
- Interchange City - a 50 acre industrial park which is fully developed
- Stevenson Property - a 50 acre industrial park with nearly 50 acres available for future development
- Murfreesboro property - a 430 acre municipal park located off Murfreesboro Road south of SR-840 which has availability for future development

The success of these airport facilities is relative to their geographic location and proximity to numerous employment and residential communities. Any transit alternative within the study area must consider these trip generators and the economic benefits from continued intermodal connectivity and access.

3.6.6 Transportation System Management

In the Nashville area, the Tennessee Department of Transportation (TDOT) has recently installed an intelligent transportation system (ITS) to assist motorist and emergency and law enforcement officials in responding to highway incidences. Dozens of dynamic message signs, as well as radar detectors and video cameras, are being installed on the interstates in Nashville-Davidson County. Within the study area, I-24/I-40 has two dynamic message signs, radar detectors, and video cameras. This initial system is part of a larger regional ITS program that is to be developed in the region over the next 20 years.

Local jurisdictions are using ITS technology to achieve better signal coordination along important arterial routes, and to establish traffic management centers where data is collected and analyzed. Over the long term, the local and state efforts are coordinated through a plan known as the ITS Regional Architecture. This plan spells out what types of data are being collected by each agency, what will be shared, and the compatibility needs for equipment.

Davidson County has operated a combination of direct connect and closed loop traffic signal systems since the 1980s. These systems directly manage approximately 65% of the traffic

signals in the county. The direct connect traffic control and monitoring system was upgraded in 2005 using federal funds. Major signal retiming began in 2005, using CMAQ funds and continued in 2006 using local funds. An ITS master plan is currently being developed, and will use federal funding sources for both its planning and for implementation, with additional funding required to complete implementation. There are also major efforts underway in the areas of wayfinding, bus priority systems (which allow buses to bypass congested intersections), emergency vehicle preemption, and signal equipment upgrades using a combination of federal and local funding. Additional funding sources will be required to facilitate full implementation of these programs.

In addition to the ITS system being deployed by TDOT, the State of Tennessee also operates a freeway service patrol which covers all of the interstates within Davidson County. Interstate 24 is patrolled by the local service patrol, which provides assistance to stranded motorists and also playing a major role in mitigating congestion as a result of incidents (a stalled vehicle blocking the travel lane, wrecks, etc.).

While these services have reduced non-reoccurring traffic congestion (collisions, etc.) within the study area, the services are at present limited to Nashville-Davidson County. As the program grows, motorists traveling within Rutherford County will also see the benefit of these services.

3.6.7 Travel Demand Management

Two programs, while not exclusive to the southeast corridor, offer travel demand management options for travelers within the study area. These programs include:

Carpool and Vanpool RideShare Matching Program - In partnership with the RTA, MTA provides assistance with starting a commuter benefits or ridesharing program. RTA maintains a regional database of active carpools and vanpools where individuals can find suitable matches for commuting, including bus routes. Corporations can have a database developed just for their employees. Currently, with 100 vanpools in operation, the program is one of the largest in the southeastern United States. Drawing from a customer base primarily from the outlying counties surrounding Davidson County, downtown Nashville is the destination of a majority of vanpool customers, although many other destinations are served including the hospitals and Vanderbilt University in West End, and the Opryland Hotel and Convention Center. The agency administers a carpool database to complement the vanpool program. Carpools and vanpools are particularly well suited to longer distance travel, such as many of the home based work trips being made in this corridor, and as such will be a key component of providing future services in this corridor.

Guaranteed Ride Home Program - The Guaranteed Ride Home service is intended to provide free emergency rides home for regular commuters who travel in Davidson, Rutherford, Sumner, Williamson or Wilson counties, who cannot ride home with their normal carpool, vanpool or express bus. Commuters must be pre-registered in the program and will receive a voucher for a taxi or rental car to take you home. Guaranteed ride home programs are an important complement to vanpool, carpool, and commuter transit services, providing users of those services with an emergency trip home in the midday in the event of a family emergency, or in the evenings for people who miss the last available bus or train to their destination.

The largest number of vanpools are destined for downtown Nashville. Participation in these programs is voluntary and range in participation from corridor to corridor and year to year, fluctuating in response to changes in employment levels, fuel prices and other variables.

3.6.8 Transportation Funding Overview

Taxpayer funding for transportation projects at the Federal, state and local levels is limited and must be expended prudently. The Southeast Corridor High-Performance Transit Alternatives Study must identify improvements that can achieve local consensus, meet state and Federal funding guidelines and demonstrate that they are an efficient use of taxpayer funds. The FTA Section 5309 New Starts Program Funding Process or other Federal Programs could provide up to 80% of the capital funding for design and construction of a qualified major transit project -- though funding at this level is unusual under current Federal Funding conditions. In most cases, Federal funds will not provide more than 50% of the capital and construction costs. The remainder of capital funds for a major transit investment, and all of the operating funding, must generate at the local or state levels.

FTA must approve the project at various points through the planning process. The key to this approval is the development of a locally-preferred alternative (LPA) that represents the region's consensus on a project that best meets the transportation needs in a given corridor. The LPA must represent a local consensus and be capable of gaining support for the level of local funding required to build and maintain the project over the long term. For FTA to approve the project beyond the alternatives analysis level the project must demonstrably meet a significant transportation need as identified by the alternatives analysis study and meet various external measures of efficiency compared to other projects of its type from around the country. FTA is also increasingly requiring projects to demonstrate that they will be, or are already, supported by changes in regional land use patterns that help to ensure the long-term success of the transit investment.

3.7 Project Statement of Purpose and Need, Goals and Objectives

The statement of purpose and need is one of the most important outcomes of this analysis and has been derived from:

- input from the public
- discussions with public officials throughout the corridor
- an analysis of the data as provided in this report

The statement of purpose and need defines the transportation problems and issues within a corridor. These problems are complex and involve facets beyond transportation such as land-use and development patterns. The problem must first be stated so that analysis of all reasonable information can take place and all transportation issues can be successfully addressed. In addition, information from local elected officials, transportation professionals, and the public is vital in determining what types of needs exist and what should be considered for a solution. This statement of purpose and need, including the goals and objectives, will guide the development and assessment of alternative approaches for best meeting the needs of the corridor. It is important to consider that as additional information and public input accumulates over the course of the study, elements of the statement and/or goals and objectives may be modified to meet other identified needs or goals.

The steering committee of the Nashville Southeast Corridor High-Performance Transit Alternatives Study developed the following statement of purpose and need:

- **Provide Transportation Options**
Provide transportation alternatives for travelers within the corridor.

- **Improve Mobility**
Allow economic growth and development in the corridor to continue without overburdening existing roadways. Reduce the negative impacts of congestion on resources, travel times, and mobility.
- **Establish Efficient Land Use Policies / Compact Development**
Provide greater emphasis on mixed-use development, traditional urban and village land use patterns, and design standards that support a diverse range of travel options. Promote land uses that are conducive to a more balanced transportation system with key roles for pedestrian and mass transit.
- **Address Environmental Concerns**
Provide transportation choices that minimize impacts to the environment and help to improve air quality conditions in the region.
- **Use Limited Transportation Funding Efficiently**
Provide a cost effective investment in the transportation network that results in more transportation options, improved mobility, and supports compact development.

The following goals and objectives have been identified to fulfill the purpose and address the needs of the corridor:

Goal 1: Provide longer-distance travelers in the southeastern corridor with alternatives to driving private vehicles in heavily-congested traffic conditions.

Objectives:

1. Provide transit options serving longer-distance trips (primarily more than 3 miles in length) in the corridor that are competitive with, or ideally superior to, driving a private automobile, in terms of trip time, convenience (in the context of specific time-of-day and day-of-week trips), safety, cost (to the individual user) and comfort.
2. Provide enhanced multi-modal access to home, jobs, services and other activity centers for corridor residents, workers, and visitors.
3. Increase utilization of public transit in the corridor for all trip purposes.
4. Provide transportation options that serve both work and non-work trips.
5. Provide improved transit opportunities for reverse-commuters traveling from the northern areas of the corridor and other parts of the Nashville region to workplaces in suburban areas of the corridor.
6. Improve access to mass transit in areas of the corridor outside central Nashville.
7. Provide greater diversity of transportation options in the corridor by providing improved conditions for pedestrians, bicyclists, and other non-automotive users.

Goal 2: Promote efficient land use and development patterns in Nashville/Davidson County and the Rutherford County communities in the southeast corridor study area.

Objectives:

1. Promote compact transit-accessible land development in Nashville, Murfreesboro, LaVergne, Smyrna and other communities in the southeast corridor study area.
2. Concentrate employment and other activity centers within existing and planned transit corridors (fully considering the relationship of transit and parking availability, as associated with such activity centers).
3. Maintain and promote downtown Nashville, other existing established activity centers, including Interchange City, and downtown Murfreesboro as the main employment and activity centers in the corridor.

4. Preserve farmland and open space in existing rural areas of the corridor.
5. Promote development that re-uses existing sites and buildings, and that efficiently uses existing infrastructure and public services.
6. Promote multi-use development combining many activities including commercial, retail, education, recreation, and housing.

Goal 3: Improve and enhance economic development and employment opportunities and expand access to jobs.

Objectives:

1. Promote sustainable economic growth throughout the corridor by providing improved access and optional transportation modes.
2. Provide improved access to housing opportunities throughout the corridor by providing improved transportation access and options.
3. Provide improved access to employment centers throughout the corridor by providing improved transportation access and options.
4. Provide high quality transit access to Nashville International Airport from downtown Nashville, Murfreesboro and other areas within the corridor.
5. Enhance reverse commute options providing access for Nashville residents to job opportunities in other areas of the corridor.
6. Provide improved access to special events and other destinations in the study corridor.

Goal 4: Preserve the natural and social environment.

Objectives:

1. Improve air quality.
2. Minimize transportation-related noise impacts.
3. Protect and, where possible, enhance environmentally sensitive areas.
4. Minimize community and neighborhood disruption.
5. Minimize negative aesthetic impacts of transportation investments and, where possible, design systems that add to the aesthetic environment.
6. Address environmental justice concerns by carefully assessing disproportionate impacts and providing improvements that benefit members of socially disadvantaged groups.
7. Promote land use and development policies, and transportation strategies that are consistent and mutually supportive.

Goal 5: Develop a cost-effective transportation system improvement strategy that maximizes community consensus and institutional support.

Objectives:

1. Assure that total benefits of the preferred transportation investment strategy recommended by the study warrant their total costs.
2. Achieve public consensus and institutional support, including the support of public agencies, local governmental entities and public officials, for the preferred transportation investment strategy recommended by the study.
3. Ensure that the costs and benefits are shared equitably among citizens and governmental entities throughout the region.
4. Maximize the leverage of local funds in obtaining State and Federal funds to support transportation investments in the corridor.

Goal 6: Develop a strategic part of a multi-modal transportation system that would facilitate the development of an integrated regional multi-modal system

Objectives:

1. Develop alternatives and strategies that complement, rather than conflict with, regional plans for development of a multi-modal system.
2. Develop alternatives that are consistent with the transportation and development goals of the region as identified in the Nashville Area MPO's Long Range Transportation Plan and other regional planning documents.
3. Avoid alternatives that might have the affect of precluding the development of other transportation modes or options to serve other corridors of the region.

3.7.1 Performance Criteria and Evaluation Measures

A series of detailed performance criteria and evaluation measures were developed based on the above listed transportation goals and objectives to effectively evaluate potential alternatives that meet the need and purpose for high-performance transit service within the southeast corridor study area. For each goal and objective, a measure or series of measures has been identified by which the alternatives can be compared. These evaluation measures are discussed in Section 3.9.

3.8 Needs Assessment Conclusions

The southeast corridor has experienced tremendous population growth in recent years and is expected to continue growing at a rapid pace. This increase in population and employment has generated traffic growth that exceeds the growth in capacity of the transportation system. This traffic is expected to increase in the future, generating additional congestion and delays for travelers, as well as other socio-economic and environmental impacts related to congestion.

- Significant congestion occurs within the corridor in both the AM and PM peak hours as commuters traverse from the outer areas of Davidson County and the communities of Rutherford County into downtown Nashville.
- Of the 32 miles of I-24 between downtown Nashville and Murfreesboro, currently 24 miles (or 75% percent) operate at levels of service (LOS) D or worse during peak periods. By 2025, nearly 80 percent of the corridor will operate at LOS D or worse, even after significant road widening of I-24 during this period.
- Portions of Murfreesboro Road are forecast to increase in traffic by 30,000 vehicles per day, with nearly 80 percent of the corridor (or 25 miles) operating at levels of service D or worse during peak periods.
- Limited transit services exist within the corridor leaving vast areas and populations un-served by public transportation. Within the corridor there are 10 bus routes providing service. Of these routes only two serve north-south movements and of these two routes, only one provides service over the complete length of the corridor.

The data presented in this study indicate a steady worsening of congestion. If present trends continue, traffic congestion and the lack of mobility options will threaten the long-term growth of the southeast corridor. The southeast corridor is effectively the engine of economic growth in the Nashville region, therefore the costs of not planning today will be more than just higher financial costs for solving these problems tomorrow; they will include costs to the quality of life

of all who live, work and visit in the corridor. As this report 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.

The Nashville region is working to avoid the fate of many other urban areas that are experiencing the negative impacts of sprawl and the deterioration of compact urban centers. Transit can influence, support, and promote more compact land use and development patterns within the corridor. This will allow the corridor to be served by a more efficient mix of transportation options that include walking, cycling, and mass transit. Land use patterns in the area tend to be low-density and pedestrian unfriendly with various uses strictly separated. Existing development is oriented for the convenience of auto travel, as opposed to pedestrians or users of mass transit. Over time, development has occurred with little, if any, consideration for the ways in which public transportation infrastructure and services might serve the travel needs of those who live, work, or travel within the corridor. This has resulted in a development pattern and transportation system that does not meet all the needs of the various users such as pedestrians, cyclists, and transit riders. The current auto-centric transportation network increasingly suffers from traffic congestion, which indicates that the capacity of the system does not meet the demands of drivers. The result is a transportation system, in terms of its capacity and composition of services that lags behind the demand for transportation services.

This development pattern represents a significant threat to farmland and open space and has the potential to significantly diminish the quality of life for Nashville area residents by reducing access to a variety of housing, retail and commercial development types, reducing access to open space, and promoting traffic congestion. Over time, this auto-centric focus toward development increases travel times for all users of the transportation system including drivers and bus riders.

For the region to remain competitive and continue to enjoy increased development opportunities, additional mobility options such as high performance transit are warranted. High performance transit is capable of providing reliable, affordable, and relatively flexible travel within the corridor. Findings of this needs assessment demonstrate a viable role for public transportation in the corridor as a means for

- addressing existing and forecasted congestions levels
- accommodating significant projected increases in population and employment growth over the next twenty years
- and influencing land use and development decisions

Cost effective transportation solutions such as mass transit are capable of facilitating continued economic growth in the corridor while balancing desired mobility needs with that of an ever-fragile physical and social environment. Given the current lack of public transportation in the corridor, the projected increase in population and employment, and the likely benefits from increased mobility options, further development of transit alternatives is warranted.

3.9 Evaluation Methodology

3.9.1 Introduction

The intention of this planning process is to methodically evaluate the alternatives against the purpose, need, goals and objectives, and to use that analysis to identify the transit solution that best satisfies the needs of the region. The results of each stage of screening will be

documented in future reports/chapters dedicated to describing the development and analysis of each round of alternatives. At each stage of the screening process, results of analysis will be presented by the consultants to the Steering Committee, which will develop the alternatives to be carried forward to the next stage of analysis and screening. The results of each stage will be presented to stakeholders and to the general public to solicit their input, and this public and stakeholder input will be considered by the Steering Committee before the analysis moves forward to the next stage.

3.9.2 Evaluation Methodology

The evaluation methodology consists of multiple goals and objectives; performance measures associated with those goals; and a mechanism to apply the performance measures to the alternatives. This section provides an overview of each of these elements.

3.9.2.1 Goals

The following goals have been established to guide the evaluation and development of a preferred transportation alternative as part of this analysis. The goals reflect coordination, cooperation, and participation among members of the Steering Committee, stakeholders and citizens within the study area. The stated goals of this effort are:

- Goal 1: Provide longer-distance travelers (those making trips three miles or longer) in the southeastern corridor with alternatives to driving private vehicles in heavily congested traffic conditions.
- Goal 2: Promote efficient land use and development patterns in Nashville/Davidson County and the Rutherford County communities in the Southeast Corridor Study Area.
- Goal 3: Improve and Enhance Economic Development and Employment Opportunities and Expand Access to Jobs.
- Goal 4: Preserve the natural and social environment.
- Goal 5: Develop a cost-effective transportation system improvement strategy that maximizes community consensus and institutional support.
- Goal 6: Develop a strategic part of a multi-modal transportation system that would facilitate the development of an integrated regional multi-modal system.

The goals and objectives in part reflect the evaluation criteria established by the FTA for potential projects eligible for funding under the Section 5309 New Starts process. This is a competitive process whereby communities across the country compete for federal assistance in starting a new transit project. The Federal criteria and measures related to justifying the project are listed below:

Table 3.17 FTA Project Justification Criteria and Measures

New Starts Criteria	Measures
Mobility Improvements	<ul style="list-style-type: none"> • Travel Time Saving • Low Income Households Served
Environmental Benefits	<ul style="list-style-type: none"> • Change in Regional Pollutant Emissions • Change in Regional Energy Consumption • EPA Air Quality Designation
Operating Efficiencies	<ul style="list-style-type: none"> • Operating Cost per Passenger Mile
Cost Effectiveness	<ul style="list-style-type: none"> • Incremental Cost per New Rider
Transit-Supportive Land Use and Future Patterns	<ul style="list-style-type: none"> • Existing Land Use • Containment of Sprawl • Transit-Supportive Corridor Policies • Supportive Zoning Regulations • Tools to Implement Land Use Policies • Performance of Land Use Policies • Other Land Use Factors
Other Factors	<ul style="list-style-type: none"> • Technical Capacity • Project benefits not reflected by other New Starts Criteria

Source: *New Starts: An Introduction to FTA's Capital Investment Program*. US Department of Transportation, Federal Transit Administration.

In addition to the criteria above, the FTA considers the community's capacity to finance the proposed project. FTA has established a number of measures that help them to assess financial capacity, including:

- Stability and Reliability of Capital Financing Plan
- Stability and Reliability of Operating Financing Plan
- Local Share of Proposed Costs

The issue of financial capacity is not directly applicable to the evaluation of specific alternatives and ranking one alternative above another. However, it underscores the importance, as expressed in the project justification criteria related to operating efficiency and cost effectiveness, to minimize the costs of the alternatives relative to the transportation benefits they provide to the region.

For each of the goals established for this project, there are a series of corresponding objectives, which are intended to address the purpose and need and goals of the project. A listing of each objective and the respective goal is provided in Section 3.9.3 of this report.

3.9.2.2 *Process of Evaluation*

The alternatives proposed for the Southeast Corridor High-Performance Transit Alternatives Study will be evaluated in three stages that lead to selection of a Locally Preferred Alternative (LPA). The evaluation measures are designed to apply various criteria in a cost-effective manner to identify the option that best meets the goals.

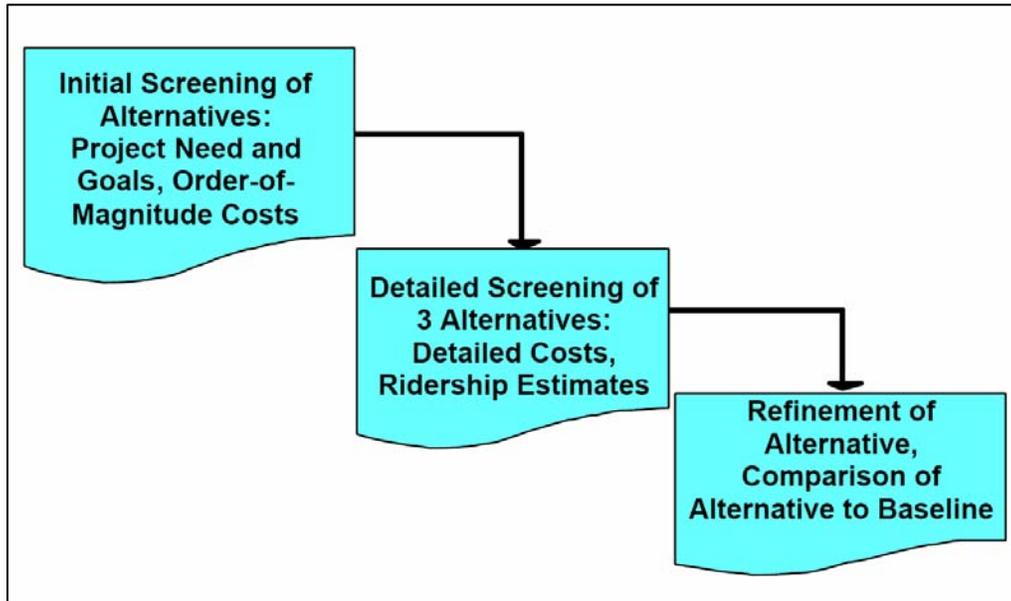
Each phase of the evaluation process is summarized below and illustrated in Figure 3-15.

Stage 1 - the **Initial Screening** process evaluates each of the transit types and alignments suggested during the Scoping process. The initial screening will eliminate the least-promising alternatives from further consideration and thereby develop three alternatives with the most potential for meeting the goals and objectives. These three alternatives will be moved into a second and more detailed screening. The evaluation measures used as part of the initial screening are generally more qualitative than quantitative. The initial screening will also include a comparison of capital costs between transit alternatives and the completion of the HOV lanes on I-24 from Briley Parkway to downtown Nashville. The screening will be performed in a charette in which consultants facilitate discussion and decision-making by members of the Steering Committee. The screening will develop three alternatives to be carried forward into Stage 2 Detailed Screening. These alternatives will be based upon the outcome of the scoring related to the Stage 1 Screening related to the goals and objectives, as well as the desires of the Steering Committee to test a range of alternate alignments, transit modes, and operational options in the Detailed Screening.

Stage 2 - the **Detailed Screening** evaluates the refined list of three alternatives as well as a no-build alternative (consisting of the existing-plus-committed system) and a No-Build or TSM ("Low Cost") alternative using more in-depth analysis. This includes quantitative measures where possible, including the first ridership estimates and detailed operating cost estimates. The transit-based alternatives will also be compared in terms of relative cost to an alternative extending the I-24 HOV lanes from their terminus near Harding Road to downtown Nashville. The Detailed Screening step will further narrow the alignment and design options to a single alternative that best meets the project goals and objectives and best satisfies the purpose and need for the project. The Steering Committee will develop a single final alternative as an outcome to the detailed screening.

Stage 3 - the **Final Screening** evaluates a single alternative that emerges from the Detailed Screening as it compares to both the No-Build and TSM scenarios. This alternative could include portions of one or more of the three alternatives identified in the second phase, or could include phased, "implementable" shorter operative segments of fixed-guideway (rail or busway) from one or more of the alternatives. This final screening process will provide the basis for selecting a locally preferred alternative (LPA).

Figure 3-15
Three Step Evaluation Process



3.9.2.3 Objectives and Measures of Effectiveness

The transportation goals for the study were translated into objectives and measures of effectiveness in order to evaluate the performance of each of the proposed alternatives. Many of the goals and objectives are related to the New Starts criteria and measures. For each goal, a measure (or series of measures) is used to compare the alternatives against each other. These measures may be qualitative (yes-no, or descriptive) or quantitative (expressed numerically, such as estimates of transit ridership or costs). These goals and objectives may be modified as the alternatives analysis proceeds, based on the availability of data, the concerns of the Steering Committee, and comments from Stakeholders, members of the public, and regulatory agencies.

Goal 1: Provide longer-distance travelers in the southeastern corridor with alternatives to driving private vehicles in heavily-congested traffic conditions.

This goal relates to several of the measures under the New Starts Criteria “Mobility Improvements,” including Time Savings and Low Income Households Served.

Objectives:

1. Provide transit options serving longer-distance trips (primarily more than 3 miles in length) in the corridor that are competitive with, or ideally superior to, driving a private automobile, in terms of trip time, convenience (in the context of specific time-of-day and day-of week trips), safety, cost (to the individual user) and comfort.

In the initial screening, the analysis of this objective will focus on the mode, with alternatives that are transit based and serving longer trips being favored over roadway-based or shorter distance alternatives. For the detailed and final screening of alternatives, the alternatives will be compared to one another according to the actual transit ridership for longer-distance trips and the overall travel time savings as compared to no-build on the transit network as predicted by the regional transportation model. This objective relates to Time Savings, a New Starts Measure.

2. Provide enhanced multi-modal access to home, jobs, services and other activity centers for corridor residents, workers, and visitors.

The objective is analyzed similarly to the first objective, through comparison of ridership and travel time savings as predicted by the regional transportation model. This is based on the assumption that alternatives that provide the greatest multi-modal access for those traveling in the corridor will increase transit use and reduce overall travel time on the transportation network. This objective relates to several New Starts Measures including Time Savings and Low Income Households Served.

3. Increase utilization of public transit in the corridor for all trip purposes.

The alternatives will be compared in terms of system-wide transit ridership, and ridership on the corridor-specific major improvements (such as a rail or bus line) that are the primary transit services in the alternative. This comparison will be based on the ridership estimates developed using the regional transportation model.

4. Provide transportation options that serve both work and non-work trips.

The members of the project Steering Committee will initially compare the likely relative performance of each of the alternatives in terms of their ability to provide for both work and non-work trips according to their collective professional judgment. For example, an alternative that provides service only or primarily during peak travel periods might be judged to provide poor service to non-work trips. In the more detailed phases of the screening, the ridership estimates for each alternative will be disaggregated into home based work, home based other and non home based trips. Alternatives that offer the most balanced performance between these three categories of trips will rate higher on this objective.

5. Provide improved transit opportunities for reverse-commuters traveling from the northern areas of the corridor and other parts of the Nashville region to workplaces in suburban areas of the corridor.

Initially, the Steering Committee will judge the prospects for each alternative to provide improved transit service for reverse commuters based on their collective professional judgment. For example, alternatives that provide less service in a reverse-commute direction would be judged as less effective for serving reverse commuters than alternatives offering a more balanced schedule of services in the peak and off-peak directions. Detailed analysis will focus on the actual number of reverse commute trips (trips opposite the prevailing direction of peak period travel) for each alternative, as predicted by the regional transportation model. This objective relates to the New Starts Measure Low Income Households Served.

6. Improve access to mass transit in areas of the corridor outside central Nashville.

This objective will be measured using ridership estimates provided by the regional transportation model.

7. Provide greater diversity of transportation options in the corridor by providing improved conditions for pedestrians, bicyclists, and other non-automotive users.

Alternatives will be compared under this objective by comparing the number of residents who live within ½ mile of transit stations or stops under each alternative. This is based on the assumption that transit improvements are more conducive to favorable pedestrian and bicycling conditions than highway or roadway improvements, and that the greater the number of residents who reside within areas served by transit stations, the greater the number who will benefit from the pedestrian and bicycle improvements that should follow these transit improvements.

Goal 2: Promote efficient land use and development patterns in Nashville/Davidson County and the Rutherford County communities in the southeast corridor study area.

This goal and the objectives related to it applies to measures under the New Starts Criteria “Transit Supportive Land Use and Future Patterns”

Objectives:

1. Promote compact transit-accessible land development in Nashville, Murfreesboro, LaVergne, Smyrna and other communities in the southeastern corridor study area.

The initial screening based on this objective will simply favor transit alternatives over non-transit alternatives. The detailed screening will measure the absolute distance of transit stops to a select list of employment and activity centers in the corridor. Alternatives where existing activity centers are located a short distance from transit stations are seen as being more promising in terms of promoting transit-accessible future land development, and would be seen more favorably than those where activity centers are further away from stations.

2. Concentrate employment and other activity centers within existing and planned transit corridors (fully considering the relationship of transit and parking availability, as associated with such activity centers).

Scoring on this objective is based on the number of major employment and activity centers within 5 miles of a transit station and is based on the same reasoning as the analysis under objective 1, alternatives that place stations closer to existing centers would be more successful at concentrating future development.

3. Maintain and promote downtown Nashville, other existing established activity centers, including Interchange City, and downtown Murfreesboro as the main employment and activity centers in the corridor.

The alternatives would be compared on this objective based on the Steering Committee’s qualitative assessment of the ability of the alternative to provide access to employment and activity centers in the corridor. For example, the Steering Committee might consider the proximity of stations to the activity centers, the track record of the transit mode for supporting development, and other characteristics of the alternative.

4. Preserve farmland and open space in existing rural areas of the corridor.

The analysis of the alternatives based on this objective will be based on the Steering Committee’s qualitative assessment of the alternative’s capacity to support farmland and open space preservation. Alternatives that avoid rural land, that tend to concentrate development around stations, or that bypass agricultural land would be considered positively under this objective.

5. Promote development that re-uses existing sites and buildings, and that efficiently uses existing infrastructure and public services.

Initial screening based on this objective will consist of the Steering Committee's qualitative assessment of the relative capacity of each alternative to promote re use of existing sites and buildings, particularly the corridor's existing core areas. For example, alternatives that use existing rights of way or makes use of existing buildings as transit stations would be preferred over those that would require significant new right-of-way or infrastructure, or would threaten existing buildings. The number of acres of land within 5 miles of transit stations under each alternative will be used as a qualitative measure of this objective under the detailed alternatives, based on the assumption that this land would increase in value were the alternative to be built.

6. Promote multi-use development combining many activities including commercial, retail, education, recreation, and housing.

The Steering Committee will consider qualitatively the potential for each alternative to promote multi-use development.

Goal 3: Improve and enhance economic development and employment opportunities and expand access to jobs.

Objectives:

1. Promote sustainable economic growth throughout the corridor by providing improved access and optional transportation modes.

This objective will be measured in the initial screening qualitatively, with the Steering Committee comparing the relative development potential for each mode and alignment. For example, alternatives that provide a higher level of service, particularly in both the peak and reverse-commute directions, would be seen as preferable to those that provide a lower frequency of service or operate only in the peak direction. The detailed screening will calculate the total population residing within 5 miles of the station sites, and the number of jobs within ½ mile of station sites. Increased population and employment within close proximity to stations correlates with improved sustainable access for employees, which in turn helps sustain economic growth in the corridor.

2. Provide improved access to housing opportunities throughout the corridor by providing improved transportation access and options.

Under this objective, the initial screening will be qualitative, based on the Steering Committee's professional judgment as to the quality of access to housing under each alternative. The Steering Committee would consider their knowledge of the location of housing developments, access to the developments by roadway and transit connections, and other aspects of the alternatives and the development surrounding the alignments. In the detailed screening, the assessment will analyze the population within 5 miles of the station sites, since access to housing depends on the distance of housing to the station sites. A distance of five miles is a standard distance for the service area of a park-and-ride lot.

3. Provide improved access to employment centers throughout the corridor by providing improved transportation access and options.

In the initial screening, the Steering Committee will make a qualitative comparison between the alternatives in terms of their ability to improve access to a number of key employment centers, including downtown Nashville, Vanderbilt/West End, Interchange City, Nissan, Dell, downtown Murfreesboro, and MTSU. This initial screening analysis will take into account the proximity of the stations and alignments to the activity centers, the character of the access to the sites by roadway and pedestrian connections, and other factors. The detailed screening will compare the combined distance of these sites from transit stations under each alternative.

4. Provide high quality transit access to Nashville International Airport from downtown Nashville, Murfreesboro and other areas within the corridor.

The comparison between alternatives under this objective will calculate the travel time to the airport from downtown Nashville and downtown Murfreesboro under each alternative.

5. Enhance reverse commute options providing access for Nashville residents to job opportunities in other areas of the corridor.

Detailed analysis will calculate the actual number of reverse commute trips (trips opposite the prevailing direction of peak period travel) for each alternative, as predicted by the regional transportation model. This measure is the same as used under Goal 1, Objective 5. This objective relates to the New Starts Measure Low Income Households Served.

6. Provide improved access to special events and other destinations in the study corridor.

For the initial screening the Steering Committee will qualitatively assess how the alternatives improve access to special events and other destinations. The Steering Committee will consider the distance of stations and alignments to the special event sites, characterize the auto and pedestrian access to the sites, and will consider other factors. The detailed screening will be based on the distance of stations to special travel generators (major employment centers, shopping and entertainment centers, sports arenas, colleges, etc.)

Goal 4: Preserve the natural and social environment.

Objectives under this goal relate to measures under the New Starts Criteria Environmental Benefits.

Objectives:

1. Improve air quality.

Detailed screening will calculate the change in vehicle miles traveled (VMT) and vehicle hours traveled (VHT) on the entire travel network under each alternative, as predicted by the regional transportation model. VMT and VHT are inputs to air quality models and are a standard surrogate for measuring the relative air quality impact of changes to the transportation system.

2. Minimize transportation-related noise impacts.

Noise measurement estimates will be conducted for each alignment and mode and will be compared as part of the project environmental analysis.

3. Protect and, where possible, enhance environmentally sensitive areas.

In the initial screening, the alternatives will be assessed based on this objective by comparing the number of parks, schools, bodies of water, and other sensitive sites and areas are within ¼ miles of the proposed alignment. Alternatives that affect more of these sensitive sites will be scored lower in terms of this objective. For the detailed screening, a literature search of State and Federal databases of environmentally sensitive areas will be consulted, and the number of sensitive sites affected by each alternative will be documented.

4. Minimize community and neighborhood disruption.

The initial screening related to this objective will identify the number of sensitive community and neighborhood sites, such as schools, libraries, churches, community centers, and parks or playgrounds, within ¼ mile of the alignment (as in the previous objective). A second tier initial screening will be based on whether the improvements proposed in the alternative cross or lie adjacent to any part of the Stones River National Battle Field. In the detailed screening, environmental specialists from the consultant team will conduct and document a windshield survey of the alignments and will use this information to supplement that collected in the initial screening.

5. Minimize negative aesthetic impacts of transportation investments and, where possible, design systems that add to the aesthetic environment.

The performance of the alternatives on this objective will not be addressed in the alternatives analysis, and will be addressed at later stages in the project development process. The alternatives are assumed to be designed to function efficiently while fitting in well with the character of the neighborhood.

6. Address environmental justice concerns by carefully assessing disproportionate impacts and providing improvements that benefit members of socially disadvantaged groups.

The alternatives will be analyzed according to this objective by comparing the number of low income and minority households within a five mile radius of each station and within ¼ mile of the right of way. The five mile radius identifies minority and low income populations served by the alternative, while the number within ¼ miles of the right of way identifies the number impacted by the alternative. This objective is related to both the Environmental Benefits and Mobility Improvements criteria under New Starts.

7. Promote land use and development policies, and transportation strategies that are consistent and mutually supportive.

To address this objective, the consultants will analyze existing land use in the corridor and compare the proposed alignment and station locations for each alternative and characterize the compatibility of the existing or proposed land use with the proposed transit improvements.

Goal 5: Develop a cost-effective transportation system improvement strategy that maximizes community consensus and institutional support.

Objectives under this goal are related to the Operating Efficiencies, Cost Effectiveness, and Local Financial Commitment criteria under New Starts.

Objectives:

1. Assure that total benefits of the preferred transportation investment strategy recommended by the study warrant their total costs.

For the initial screening, capital and operating costs will be developed at a unit-cost level of detail. In the detailed screening, alternatives will be compared using capital costs developed at a higher level of detail, based on engineering quantities, and operating costs will be developed based on transportation model outputs. These costs will be converted to annualized costs according to FTA guidelines.

2. Achieve public consensus and institutional support, including the support of public agencies, local governmental entities and public officials, for the preferred transportation investment strategy recommended by the study.

Public consensus on a locally-preferred alternative will be based on the outcome of public and stakeholder meetings and the decision-making processes of the Steering Committee, the MPO Transportation and Policy Boards and TDOT.

3. Ensure that the costs and benefits are shared equitably among citizens and governmental entities throughout the region.
4. Maximize the leverage of local funds in obtaining State and Federal funds to support transportation investments in the corridor.

These two objectives will not be considered as part of screening, but rather are objectives that a locally preferred alternative are meant to achieve.

Goal 6: Develop a strategic part of a multi-modal transportation system that would facilitate the development of an integrated regional multi-modal system

Objectives:

1. Develop alternatives and strategies that complement, rather than conflict with, regional plans for development of a multi-modal system.

The alternatives will be compared according to their consistency with the regional transportation plan and other applicable transportation planning documents. The locally preferred alternative may be adopted as part of an update or amendment to the regional long range transportation plan. In the final screening, the potential amount of investment in the locally preferred alternative that might be applicable to other transit lines will be documented.

2. Develop alternatives that are consistent with the transportation and development goals of the region as identified in the Nashville Area MPO's Long Range Transportation Plan and other regional planning documents.

The alternatives will be compared in terms of their consistency with existing or proposed local land use plans.

3. Avoid alternatives that might negatively affect the development of other transportation modes or options to serve other corridors of the region.

This objective will be analyzed qualitatively based on a consensus of the professional opinion of the Steering Committee. Those alternatives that would hinder or preclude potential development of other transit lines serving the region will rate lower. For example, an alternative that recommended a downtown terminal or alignment that would make it more difficult for an alternative in another corridor to use a different transit mode would perform poorly on this objective.