

## **4.0 Phase I Screening of Alternatives**

### **4.1 Introduction**

The region's vision for a multi-county transit system to enhance mobility and provide a safe and efficient multimodal network is illustrated in both the 2025 and 2030 Nashville Area Long Range Transportation Plans. The assessment of existing conditions in Chapter 3 indicated a need to develop transportation strategies that would provide transportation alternatives to driving in the increasingly congested corridor conditions; provide transit options to travel in the corridor; and provide for a range of environmental improvements and social benefits.

This chapter describes the development and assessment of a broad range of alternatives that could potentially meet the transportation needs identified in Chapter 3. The process is guided by the project goals and the empirical analysis that is contained in that chapter, and provides the initial assessment of the potential costs and benefits of improvements in the corridor. The outcome provides a strong basis for developing a more detailed and more viable set of alternatives in a second round, that more closely meet the transportation needs and goals of the project.

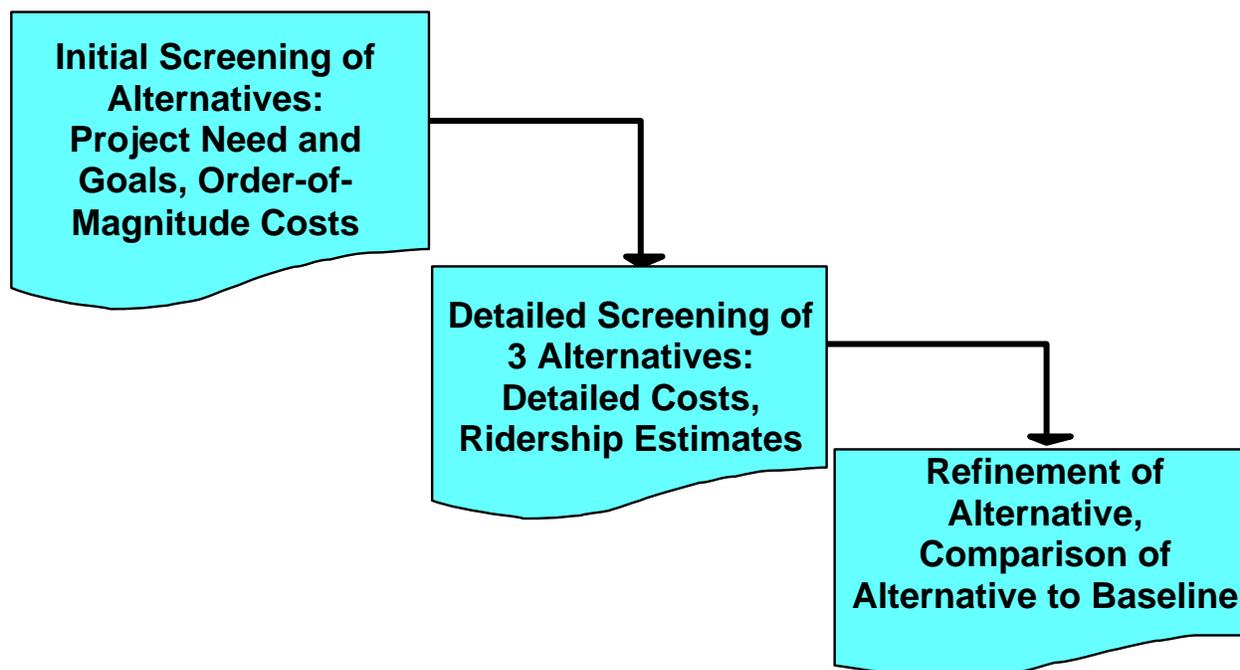
### **4.2 Alternatives Development and Evaluation Process**

This task report describes alternatives that could potentially meet the transportation needs identified in Chapter 3, the Needs Assessment. The need for transportation improvements in the southeast corridor has been addressed in several studies over the past decade. The southeast corridor was selected to undergo the next phase of transit corridor planning because:

- The southeast corridor suffers the worst traffic congestion of the five major transportation corridors in the region.
- The corridor has experienced the highest rate of population growth of the five major corridors. (The study area accounts for 10 percent of the region's land area but contains more than 30 percent of the region's population.)
- The corridor contains a substantial concentration of trip origins and destinations
- The corridor includes one of the highest transit ridership routes in the region
- The corridor has a strategic position and role in the region as home to many of the areas largest employers, including Nissan and Dell Computer, which makes transportation access in the corridor vital to the region's continued economic success.

The evaluation methodology for the study is outlined in Section 3.9. In that section of the report, the purpose and need and goals and objectives described in Chapter 3 are used to develop screening criteria, and an initial range of options is identified. This chapter documents the development and screening of these initial alternatives. Subsequent chapters will document the development and screening of detailed alternatives together with the Baseline (Transportation System Management (TSM) or "No-Build" alternatives) and the development and refinement of a Locally Preferred Alternative (LPA). The evaluation process is shown in the following diagram.

**Figure 4-1 Three Step Evaluation Process**



In the initial screening, various transit types (such as Bus, Bus Rapid Transit, Light Rail and Commuter Rail) are combined with approximate potential alignments to form a long list of alternatives for comparison in terms of each alternative's feasibility, potential to meet the project purpose and need and study goals, order of magnitude costs and impacts. In this phase, the precise alignment and station location is less important than the general perception of the alternative's ability to serve the transportation need at a reasonable financial and environmental cost.

The detailed screening takes the most promising elements of the Phase I alternatives and combines them to form a short list of alternatives (3-5) and performs a detailed analysis, including detailed estimates of ridership, capital and operating costs, and compares the alternatives to one another and to the No-Build and TSM alternatives. The best-performing alternative in the detailed screening phase is then further refined and compared once again to the No-Build and TSM alternatives before one is selected as the Locally Preferred Alternative strategy to meet the transportation needs of the corridor.

### **4.3 Initial Range of Alternatives**

The following section details the potential route alternatives and the transit modes, or types of transit service, that were considered.

#### **4.3.1 Transportation Markets**

The southeast corridor connects downtown Nashville at the northwest end of the corridor with Murfreesboro and Rutherford County at the southeast end. Between the end points are numerous major regional trip generators including the Nashville International Airport and surrounding area, Hickory Hollow regional mall, the cities of LaVergne and Smyrna, and major

employers (Dell, Bridgestone/Firestone and Nissan). The study area includes many commercial centers and residential areas, ranging from low to high density. The study area is intersected by a number of major highway routes, including US-231, SR-840, Sam Ridley Parkway, Waldron Road, Bell Road, Harding Place, Briley Parkway, and I-440.

The southeast corridor supports a mix of north-south travel markets. The needs assessment in Chapter 3 indicated a wide variety of short-and long-distance travel patterns in the corridor. Commuters to downtown Nashville and the Vanderbilt-West End area are a key travel market, but do not represent the majority of trips in the corridor. Other important travel markets include:

- Work and non-work-based travelers within Nashville-Davidson County, Smyrna, LaVergne, Rutherford County, and Murfreesboro.
- Travelers between Smyrna, LaVergne, Rutherford County, and Murfreesboro, and within those communities.
- Travelers from throughout the corridor who do not drive or lack access to a vehicle, including many younger, older and disabled people who live, work, shop or study in the corridor.
- Reverse-commuters to the many regional employment sites outside downtown Nashville, such as Dell and Nissan.
- Travelers to Nashville International Airport, including those working at the airport and those using it for air travel.
- Students traveling north to Vanderbilt, TSU, Treveca Nazarene and other educational opportunities in Nashville-Davidson County, and south to MTSU in Murfreesboro.
- Travelers to sporting and entertainment events in downtown Nashville, the Vanderbilt-West End area, and at Starwood Ampitheater.
- Shoppers from throughout the region traveling to retail areas such as Hickory Hollow Mall and other shopping areas in the corridor.

Other travel markets exist in the corridor. Transit alternatives are best suited to accommodating commuter markets to downtown Nashville and the West End area. These trips are concentrated by destination and time, with many people traveling to a single dense area (downtown Nashville and the adjacent Vanderbilt-West End area) during a relatively short period of time (the morning and evening rush hour periods). Commuter trips are the most likely to be delayed by congested traffic conditions and to contribute to traffic congestion. Offering a more convenient or faster alternative that attracts commuters to transit is perhaps the most effective use of transit to reduce traffic congestion and increase transportation system capacity. Commuter trips into the downtown area are also the most likely to be affected by parking costs.

However, while commuter trips are an important market for transit, they represent only a minority of trips in the corridor. An effective transportation strategy for the corridor must provide for a variety of travel markets, including shorter trips within the corridor, reverse-commute trips, connections for students to educational opportunities, and trips to special events like Titans and Predators games. The development of alternatives was guided by the need to provide fast and convenient service to commuters while also providing service for the range of travel markets in the corridor.

### **4.3.2 Potential Alignments**

The initial examination of the corridor focused on three parallel existing rights-of-way as possible locations for improved transit service:

1. Interstate 24,
2. CSX Railroad
3. Murfreesboro Road (US-41 and 70 S).

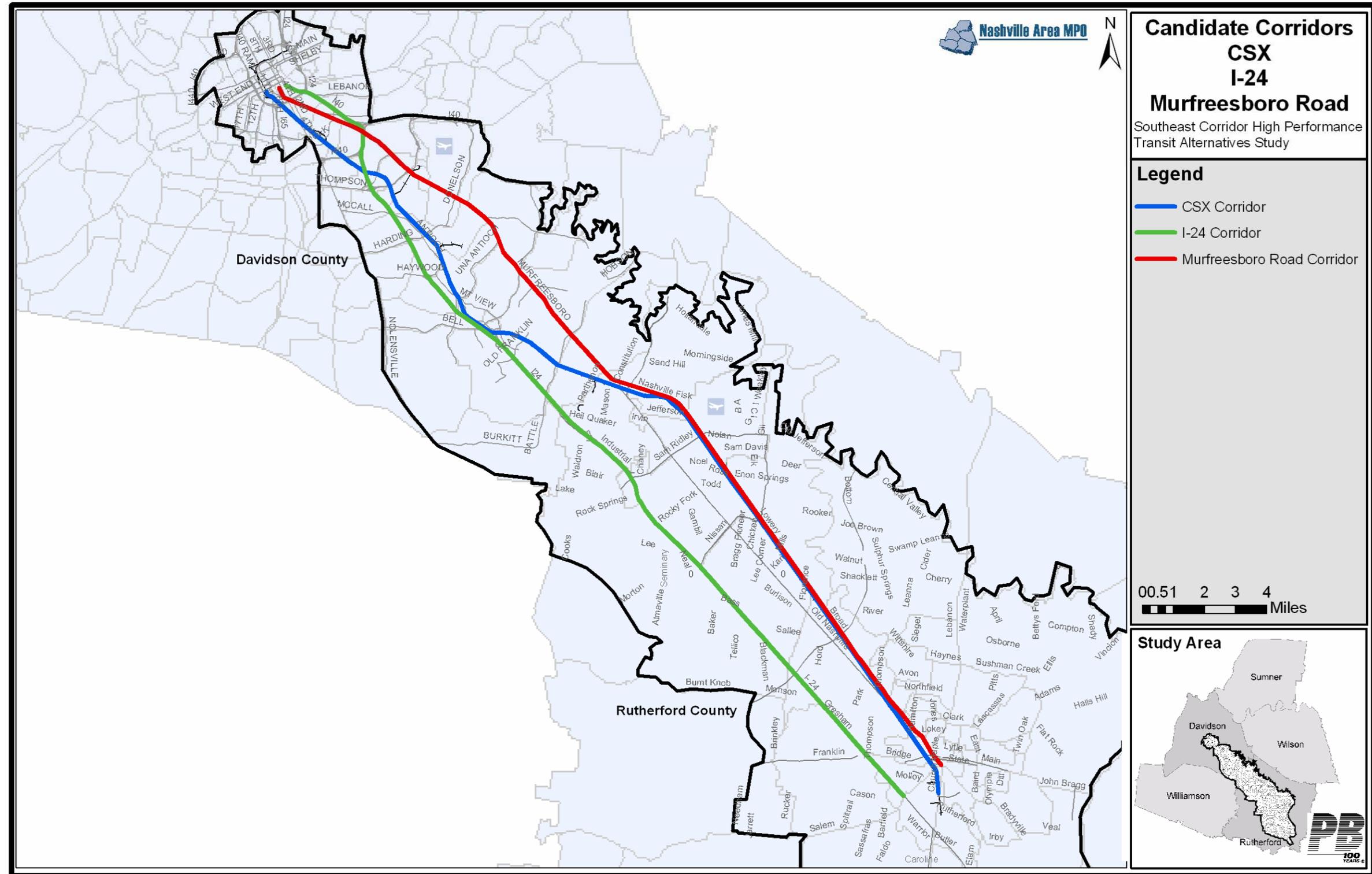
Figure 4-2 shows the location of the three major alignments.

Interstate 24 (I-24) connects major urban areas from St. Louis to Atlanta. Within Tennessee, the highway connects Nashville to Chattanooga and locally the highway forms the transportation spine in the southeast segment of the Middle Tennessee region. Eight lanes (four in each direction) have been built from downtown Nashville to State Route 840 (SR-840) in Rutherford County, approximately 27 miles. Beginning at the Harding Place interchange southeast to SR-840, the far left lanes in each direction are designated as High Occupancy Vehicle (HOV) lanes. These lanes are restricted to use by vehicles carrying two or more persons, or transit vehicles, during the two hour peak period, in the peak direction, on weekdays. South of the SR-840 interchange, I-24 is being widened to provide two additional lanes, for a total of six lanes to continue the HOV lanes to the approximate south end of the corridor. The current program also includes building two new interchanges in the Murfreesboro area, at Manson Pike and at SR-99.

I-24 often experiences heavy congestion in the peak direction and during the peak period. HOV lanes now are available throughout the corridor south of Harding Road. The sudden withdrawal of the HOV lane at Harding Road results in traffic backups as HOVs merge with other traffic. The region's long range transportation plan includes the eventual widening of the northern segment to provide HOV lanes—which also could be used by transit services. However, the improvements have not been programmed or funded and remain a long range improvement.

The CSX rail line operating through the corridor is part of the Chattanooga Subdivision of the railroad. The rail line operates through downtown Nashville via a double-track mainline and side tracks in the 11th Avenue "gulch area." The Landport structure, planned as a downtown commuter rail station and MTA bus transfer center, the former primary intercity train station (Union Station) and the Kayne yards and a small train storage area all are located in the gulch area south of Broadway. The CSX rail line continues south and east from downtown through LaVergne, Smyrna, Murfreesboro, and south to Chattanooga and Atlanta.

Figure 4-2  
Candidate Alignments



Key operating characteristics of the CSX facilities in the southeast corridor include active use of the Kayne Street storage yard, very heavy freight traffic (more than 100 trains per day) from downtown to Chestnut Street where some trains turn south to Radnor Yards, heavy freight traffic (up to 35 trains per day) throughout the remainder of the southeast corridor and heavy freight traffic into and out of the Nissan plant in Smyrna. Right-of-way restrictions (narrow width and extensive cut and fill track sections) are more prevalent in the north segment of the corridor while periodic industrial sidings are scattered along the length of the corridor. The most restrictive conditions are in the Polk Avenue area, where two CSX tracks are at the bottom of a cut section approximately 20 feet deep. South of Polk Avenue the track cross sections are less restrictive. In this area, some sections are in cut and fill conditions while others are adjacent to level ground. In the Smyrna portion of the corridor the CSX tracks run parallel to Murfreesboro Road at approximately the same level. In some areas in the south of the corridor the CSX right of way is immediately adjacent to Murfreesboro Road.

Murfreesboro Road (US-41/70S) is a typical federal highway that formed the backbone of the pre-interstate highway system across the nation. Since the construction of I-24, it has become a regional arterial linking downtown Nashville with the developing suburbs in Davidson and Rutherford counties. A variety of improvements exist along its course: four and six lane urban sections lined with businesses, urban sections with a grass median, semi-rural settings with faster posted speed limits and separate urbanized suburban enclaves with commercial buildings in proximity to the roadway pavement. A limited number of intersections with major arterials and highways have been grade separated, but the predominate conditions in the corridor are represented by signalized grade intersections with primary streets and more numerous minor street intersections with traffic controls on the side streets.

Key operating characteristics of Murfreesboro Road include periodic roadway segments susceptible to heavy peak-hour traffic congestion, numerous traffic signals, periodic school zones and speed restrictions in urbanized areas.

### **4.3.3 Potential Types of Transit**

The project Steering Committee initially considered a broad range of transit types. Some transit types clearly oriented to longer distance inter-city travel such as magnetic levitation rail (Maglev), and types oriented to very short trips such as automated guideway transit (AGT) also known as “people movers”, and personal rapid transit (PRT), were not considered. Additional information about the types of transit considered can be found in Chapter 6, the Technology Assessment.

Roadway widening to provide additional general purpose lanes also was not considered. Providing additional general purpose lanes to the existing facilities or on new right of way was thought by some members of the project Steering Committee to be inconsistent with the project’s purpose, to provide alternatives to driving in congested conditions. Additional general purpose lanes also would not support project goals related to preserving the natural and social environment, supporting existing development and compact land use, and other project goals that are advanced primarily by the provision of transit services and improvements.

The types of transit considered for the corridor follows.

Commuter Rail (CR) Commuter rail operations are typically in the morning and evening peak periods with a possible small amount of reverse commute and mid-day service. Commuter rail

uses two types of equipment: 1) conventional diesel railroad engines and passenger cars running in a “push-pull” configuration; or 2) diesel multiple units (DMUs) or self-propelled diesel passenger cars that comply with Federal Railroad Administration (FRA) safety standards for operating in freight rail environments. Passenger rail service in the CSX right-of-way will be subject to a negotiated agreement with the railroad, and high platform stations may be prohibited in the freight railroad environment.

Light Rail Transit (LRT) vehicles are modernized descendants of the early twentieth century street cars. Modern LRT vehicles can operate rapidly in exclusive rights-of-way or can operate on city streets in mixed urban traffic. They typically are powered by an overhead electric feed and have a passenger capacity several times that of buses. Non-FRA compatible DMU vehicles can operate similarly to LRTs and are sometimes referred to as Diesel LRTs. Diesel LRTs starting and stopping characteristics result in a somewhat slower travel time than the electric powered vehicles. LRT systems typically operate at high frequencies all-day rather than only during the peak-period.

Bus Rapid Transit (BRT) is a bus based system that uses infrastructure and technological improvements to significantly speed up the operating environment for the bus units compared to local bus operations. Top-of-the-line BRT systems employ separate pavements dedicated to bus-only use to allow buses to bypass auto traffic and travel undisturbed between stations or in an express mode to major destinations such as downtown Nashville. Many BRT systems use special bus fleets to provide higher capacity and a higher level of amenities than typical buses, and to help differentiate the BRT service from standard bus service. Electrically powered, hybrid or alternative fuel vehicles can be used. BRT systems provide considerable operational flexibility by allowing buses to circulate as local service in neighborhoods, for example, and then enter the busway as an express route directly to its destination or to multiple destinations within a small area. During such a trip, the passenger saves time by avoiding transfers between buses. Other buses operate from station to station on the BRT alignment in the same manner as an LRT system. BRT, like LRT, can provide all-day transit service as well as express or commuter service. BRT systems typically cost much less to implement than LRT systems and can more easily be implemented in multiple stages as funding and right of way become available. In areas where projected passenger loads are very high, LRT may be more efficient in terms of operating costs per passenger carried, because a light rail train with a single operator can carry many times the number of passengers as a single bus. However, if anticipated passenger loads are light, BRT can be an efficient option.

Bus Rapid Transit Light (BRTL) employs some of the same operating concepts as BRT, but does not include long sections of exclusive busway. Instead, BRTL uses existing HOV lanes and employs low-cost traffic engineering based solutions to bypass congested areas, such as queue jump lanes or signal priority systems. BRTL will not operate as fast and efficiently as BRT but can provide an improvement in terms of travel time and speed as compared to standard buses operating on city streets. Because BRTL does not include high cost dedicated busways, it is a low cost alternative to conventional BRT.

Heavy Rail/Subway is a very high capacity transit system featuring exclusive operating environments and is found in many large U.S. cities. For example, in Atlanta, the MARTA system utilizes underground alignments (subway), at grade alignments along highways and freight tracks and aerial guideway to achieve its separate operating path. Heavy rail delivers electric power to the train by a “hot” third rail. This requires that the tracks be completely isolated from the adjoining community. Because heavy rail is suited for large cities with heavy

transit ridership, it is not applicable to communities in the size category of Nashville, Charlotte, Memphis, Raleigh, and Louisville.

Monorail is a unique variation of aerial mass transit that has been present in the U.S. for thirty or more years. The system employs an elevated guideway beam supported by a row of columns. The train cars straddle the beam and carry passengers from station to station. In the U.S. it is primarily used in amusement resort parks where large volumes of passengers are moved through a controlled environment that requires minimum operating procedures such as switching trains between alternative tracks. Monorail is undergoing its initial urban application in Las Vegas where it is expected to carry large volumes of visitor traffic between the major hotel attractions and the nearby airport. Monorail is not applicable to the 30-mile Southeast Corridor for the following reasons: its aerial structural system and aerial stations are expensive on a per mile basis compared to at-grade transit service, its track record in providing urban/suburban transit service has not been demonstrated, and monorail is not applicable for express service when compared to proven bus and commuter rail modes.

High Speed Rail is an inter-city rail system that has been the subject of numerous studies throughout the US and abroad over the past 30 years. To date, none of the feasibility studies of high speed rail conducted in the US have proceeded into engineering design or construction. Most have been stopped or significantly delayed due to financial reasons or conflicts with scheduled airline service. Passenger rail service in the nation's northeast corridor has been incrementally improved over the years, but still lacks the operating features of a high speed system. The primary goal of high speed rail is to move passengers between major destinations at speeds comparable to airline trips between the same destinations. Within a major urban area it is possible that a high speed rail line may provide service to two or more stations in a corridor as part of larger intercity service patterns. It is unlikely, however, to have frequently spaced stations and to provide anything beyond express service from a central city stop to one or two suburban stations. This type of configuration would be unlikely to satisfy the transportation needs of the southeast corridor.

#### **4.3.4 Pre-Screening of Combined Alignments and Transit Types**

Table 4-1 shows the potential combination of transit types and alignments that were initially identified to serve the corridor. The Steering Committee performed a pre-screening of these corridors and transit types as the initial step in the screening of alternatives, and based on this pre-screening identified the six alternatives considered in the Phase I Initial Screening. The purpose of this pre-screening was to remove potential alignments or transit types that were clearly infeasible or not applicable to the transit needs of the corridor, so that study time and resources could be applied to alternatives with better prospects for implementation.

For the purposes of this pre-screening, which did not emphasize differences in operating characteristics, LRT and BRT were considered to be equivalent and indistinguishable modes. Both LRT and BRT require a similar footprint; both would occupy a linear corridor of 40 to 52 feet in width when in an exclusive operating alignment and would require similarly sized and functioning stations. Similarly, because commuter rail, which must operate on an exclusive rail right of way, and BRTL, which operates primarily in mixed traffic on public roads, are so different from each other and from LRT/BRT systems in space and operating characteristics that they are treated as distinct alternatives. Transit types and alignments that have been judged to be inappropriate for any alignment or application in the southeast corridor are described as “does not apply” in Table 4-1.

**Table 4-1 Transit Type/Corridor Matrix**

<b>Type of Transit</b>	<b>Interstate 24:</b>	<b>CSX Railroad:</b>	<b>Murfreesboro Road:</b>
<i>Commuter Rail: Railroad Equipment or DMUs</i>	Does not apply	<b>Appropriate</b>	Does not apply
<i>Light Rail/DMU or BRT</i>	<b>Appropriate</b>	<b>Appropriate</b>	<b>Appropriate</b>
<i>BRTL</i>	<b>Appropriate</b>	Does not apply	<b>Appropriate</b>
<i>Heavy Rail/Subway</i>	Does not apply	Does not apply	Does not apply
<i>Monorail</i>	Does not apply	Does not apply	Does not apply
<i>High Speed Rail</i>	Does not apply	Does not apply	Does not apply

This pre-screening of mode and alignment combinations left the following alternatives to be considered in the next step of screening. These alternatives were analyzed in the Phase I screening of alternatives:

**Alternative 1:** I-24 Alignment, LRT/DMU or BRT

**Alternative 2:** I-24 Alignment, BRTL

**Alternative 3:** CSX Alignment, Commuter Rail, Conventional Railroad Equipment or FRA-Compatible DMU

**Alternative 4:** CSX Alignment, LRT/DMU or BRT

**Alternative 5:** Murfreesboro Road Alignment, LRT/DMU or BRT

**Alternative 6:** Murfreesboro Road Alignment, BRTL

#### **4.3.5 Description of Phase I Screening Alternatives**

The alternatives identified in this phase of analysis describe transit types (Commuter Rail, LRT, BRT, or BRTL) operating on the three available alignments in the corridor. Each alternative operates primarily on one of the three corridors (I-24, the CSX rail line and Murfreesboro Road) but each alternative has differing end points in downtown Nashville and Murfreesboro. The alternatives are described below.

The six alternatives developed for this initial phase of analysis are all “build” alternatives, consisting of significant LRT, Commuter Rail or BRT services. Several of the alternative include options referred to as “BRT Light,” which consist of expanded bus service supported by only minor physical improvements. These “BRT light” options might be considered versions of a transportation management systems (TSM) alternative. However, this phase of analysis did not include a formal comparison of the alternatives with either a TSM or No-Build baseline alternative. The alternatives developed in the next, detailed phase of analysis and in subsequent phases will be compared to the No-Build and to a TSM alternative. See Chapter 5 for more information.

Operational details such as service frequencies or fare policies were not considered in this initial phase of development and are assumed to be equivalent across alternatives. A number of alignments for operating LRT/DMU or BRT service into downtown Nashville north of Gateway Boulevard have been identified by the study team and are depicted in the maps describing the alternatives. However, in this initial phase of screening, the precise alignment of BRT or LRT service downtown is irrelevant in differentiating between the alternatives. Downtown alignment options and station locations are described in these alternatives for illustrative purposes and for

the purposes of analysis, but will be analyzed in greater detail in the second, detailed phase of analysis in this study. Further, issues such as the availability of right of way, impacts on downtown traffic, engineering and environmental challenges and other factors that will not be analyzed in detail in the study could result in the relocation of downtown alignment and station locations during phases of the project development process after the completion of the study.

### **Alternative 1: I-24 Alignment, LRT/DMU or BRT**

This alternative consists of an all-day LRT/DMU or BRT service in the alignment of I-24. The alternatives would operate in exclusive guideways from downtown Nashville to Murfreesboro and MTSU. As noted earlier, LRT can be either electrically-powered by overhead wires, or could use DMU technologies. The basic alignment for the alternative begins at the MTA Central Station (Music City Central) in downtown Nashville. This facility will be located on the north side of Charlotte Street between Fourth and Fifth Avenues, and is not part of the Southeast Corridor project. Various combinations of north and south one-way street pairs could be considered as possible north south routes for the alignment within the downtown area. These will be determined further in the detailed phase of analysis. For the purposes of the initial screening the alignment for this alternative was assumed to be southbound on Fourth Street and northbound on Fifth Street.

The alignment options under Alternative 1 are shown in the map in Figure 4-3. Under Alternative 1, from Gateway Boulevard, the BRT or LRT alternative could proceed east to First Avenue and south on Hermitage to the vicinity of Fairfield where transit would transition to the west side of I-24 by using an aerial structure. Following the western edge of the I-24 right-of-way, the transit guideway would fly over major cross streets. At the southern end of the corridor, the guideway would exit I-24 north of SR-96 and then travel south and east following Tennessee Boulevard to the end of the corridor at the MTSU Station. However, the alternative could follow multiple alignments in the Murfreesboro area and could terminate at various points in the corridor.

The LRT/DMU alignment would require exclusive tracks in the curb lane of city streets or along the outer edge of the interstate right-of-way. The north and southbound tracks would be located on opposite sides of city streets but on the same side of the interstate to minimize construction costs and facilitate operation of stations. On the interstate, a right-of-way width for the rail cars (LRT or DMU) between stations is assumed to be 40 feet (24 feet for the dynamic envelope surrounding the two tracks and eight feet outside the tracks on both sides to accommodate track drainage and emergency evacuation routes). At the stations a center platform between the tracks is assumed with a desired width of 24 feet and a minimum width of 18 feet. Depending on the availability of equipment, an LRT platform would likely be designed to accommodate a low-floor vehicle (approximately 14 inches in height), whereas the DMU platform may have to accommodate a high-floor vehicle with a high platform (approximately 36 to 40 inches above track height).

The BRT alignment would follow the same routing as the LRT/DMU option described above. The minimum right-of-way for the BRT guideway between stations along the interstate is assumed to be 52 feet (two lanes at 12 feet each, a center shoulder/buffer lane of 14 feet and eight feet for roadway drainage on each side of the busway). Stations with center platforms and the same minimum widths as the rail platforms would likely be designed to accommodate low-floor vehicles (approximately 14 inches above grade).

Station Locations: Assuming street running operation on the outside (curb) lanes of Fourth and Fifth Avenues downtown (northbound on Fifth and southbound on Fourth), street-running stations/stops in the downtown area could be located as follows:

1. MTA Music City Central, located in downtown Nashville on Charlotte Street between Fourth and Fifth Avenues.
2. Church Street, sidewalk station/stops would be on northbound Fifth at Church and southbound Fourth one block to the east on Church.
3. Broadway, a split station is assumed with the northbound station on Fifth Avenue and the southbound station on Fourth Avenue, both in the curb lanes on the south side of Broadway.

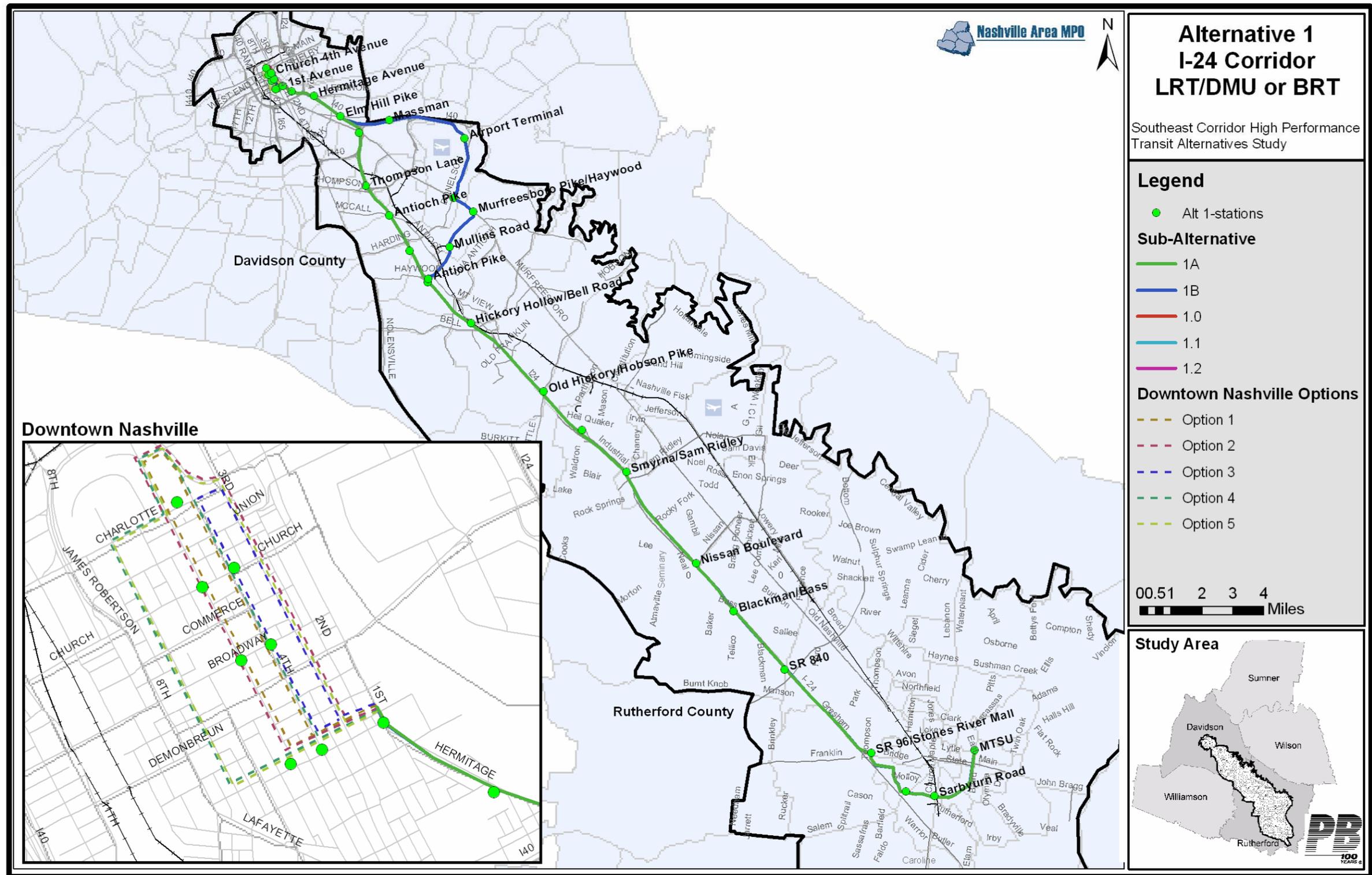
The outside-lane running configuration would continue on Gateway, First and Hermitage Avenues.

1. Gateway Boulevard, like Broadway, split stations on both Fourth and Fifth Avenues north of Gateway Boulevard, or on Gateway Boulevard in the vicinity of Fourth and Fifth Avenues.
2. First Avenue, a split station on Gateway Boulevard at First Avenue or on First near Gateway Boulevard.
3. Rolling Mill Hill, a station located to serve the proposed residential redevelopment project and to provide access to nearby destinations including the Metro offices at Lindsley Avenue.
4. Hermitage Avenue, this station would be located near the intersection of Fairfield Avenue.

The alignment previously described is the alternative 1A alignment between Murfreesboro Road and Haywood Lane. An alternate alignment through this area, Alternative 1B, is described below. Both alternative alignments are shown on the map in Figure 4-2.

1. Elm Hill Pike, the initial interstate station would be an aerial station spanning Elm Hill Pike adjacent to the I-24 ROW.
2. Murfreesboro Road, an aerial station on the west side of the interstate.
3. Thompson Lane, an aerial station on the west side of the interstate.
4. Antioch Pike, an aerial or at grade station on the west side of the interstate.
5. Harding Place, this aerial or at-grade station would be accessed from Apache Drive immediately south of the Harding Place/I-24 interchange on the west side of the highway.
6. Haywood Lane, this aerial or at-grade station would be accessed from Apache Drive immediately south of the Haywood Lane/I-24 interchange on the west side of the highway.
7. Hickory Hollow/Bell Road, this station would be located on Antioch Pike/Hickory Hollow Parkway on the east side of the interstate and north of the Bell Road.
8. Southeast Arterial or Old Hickory/Hobson Pike, a station would be at the new planned southeast arterial interchange or at the existing Old Hickory/Hobson Pike interchange with I-24.

Figure 4-3  
Alternative 1: I-24 Alignment, LRT/DMU or BRT



9. LaVergne/Waldron Road, this first station in Rutherford County would be accessed from Industrial/Enterprise Boulevard on the east side of the interstate.
10. Smyrna/Sam Ridley, an at-grade station would be accessed from Industrial Boulevard.
11. Nissan Boulevard, this station at the Nissan Boulevard interchange would be on the east side of the interstate.
12. Blackman/Bass, a station on the west side of the interstate served by Blackman Road.
13. SR-840, a station would be located on Florence Road in the west quadrant of the interchange between the I-24 and SR-840. Provisions for direct access from the interchange ramps to park-and-ride facilities at the station would be developed, if possible.
14. SR-96/Stones River Mall, this station would be accessed from either Old Ford Road or Thompson Road on the east side of the interchange.

Street running stations in Murfreesboro would begin immediately south of the SR-96/Stones River Mall station and would utilize an alignment on Tennessee Boulevard. Each of these stations could function as a terminus of the system if engineering, right-of-way, or other issues prevent development of the system further south and west.

1. SR-99/New Salem Road, an at-grade station on Tennessee Boulevard with parking facilities intended to serve I-24 patrons living south of Murfreesboro.
2. Church Street, an at-grade station on Tennessee at Church Street (US-231).
3. MTSU, an at-grade station on the east side of the university on Tennessee Boulevard.

Station/stops in the downtown could be in the curb lanes or as part of an improved sidewalk. Stations in the I-24 right-of-way would be fully developed, as needed, with a platform, parking, feeder bus, and pedestrian sidewalk connections to the adjoining community.

Sub Alternative 1B – This sub-alternative at the north end of the corridor would be arranged to serve the Nashville International Airport by exiting the I-24 guideway south of the Haywood Lane Station to follow an alternate path to downtown Nashville via the airport. The Haywood Lane Station would be relocated to a point near the intersection of Haywood and Antioch Pike. From that point the guideway would follow the planned Haywood Lane extension to the north to a station at Mullins Road and a second new station at Murfreesboro Road. The guideway would turn west on Murfreesboro Road, north on Donelson Pike and enter an elevated airport station in the vicinity of the east end of the existing parking garage. Exiting the terminal area, the guideway would follow an elevated path across the long term parking and vehicular circulation roadways to follow a path along the south limits of I-40 to the west. A station would be located at Massman Drive adjacent to the I-40 right-of-way before the guideway reentered the I-24 right-of-way at the Elm Hill Pike Station. North of Elm Hill Pike, the guideway would follow the previously defined base alignment for Alternative 1.

The Sub-Alternative 1B alignment would substitute stations at Mullins Drive, Murfreesboro Road (near Donelson Pike), The Nashville Airport, and Massman Drive for stations on Alternative 1

where the following roads cross the path of the interstate: Harding Place (Apache Drive), Antioch Pike, Thompson Lane and Murfreesboro Road.

### **Alternative 2 – I-24 Alignment, BRTL**

Alternative 2 also focuses on transit opportunities associated with I-24. The alignment for Alternative 2 (2A) proposes BRTL using the I-24 HOV lanes from near the south end of the corridor (SR-96) to Donelson Pike. At this point the interstate would be widened to permit buses to enter a bus-only aerial structure that would shift the BRTL to a busway on the east side of the CSX where the BRTL would run for a distance of about one and three quarters miles to the vicinity of Haywood Lane and Antioch Pike. At this point the busway would follow the planned route of the Haywood Lane extension northeast to Murfreesboro Road and proceed into downtown Nashville. BRTL units operating on Murfreesboro Road would receive preferential treatment to speed their travel time. A variety of traffic engineering techniques would be utilized to favor the bus operations, but no dedicated lanes would be constructed. This alignment is shown in the map in Figure 4-4.

At SR-96, the south end of the corridor in Murfreesboro, the guideway would exit I-24 to follow a new guideway alignment to SR-99 and then use Tennessee Boulevard to the end station at the MTSU campus.

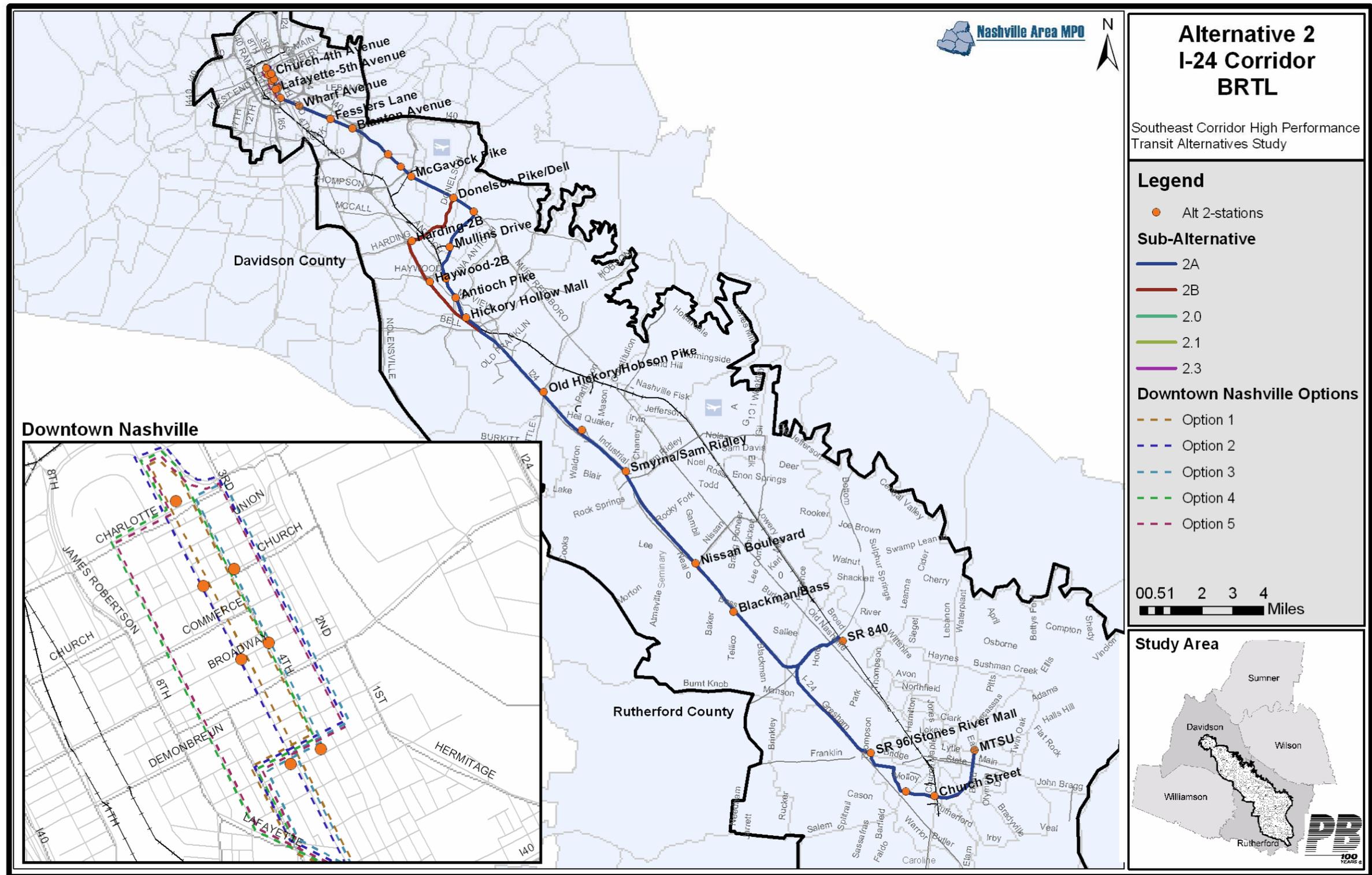
Operating plans for the BRTL would call for some through buses to exit the interstate to serve the station, or the station would be served by local buses that would then enter the HOV lanes as express service. Once in the HOV lane, express buses would not exit to serve additional line stations, but would continue non-stop to their planned destination.

*Station Locations:* Station/stops for the BRTL option would use improved sidewalks with pedestrian street-crossing signals, as needed. On the short busway segment along the CSX, the stations would resemble those in Alternative 1 with a platform, parking and pedestrian walk connections to the adjoining community. In the I-24 segment of the corridor, the BRTL bus units would operate in the center HOV lanes and gain access to and exit the HOV lanes by crossing the general purpose lanes to the existing interchanges. At the interchanges designated for stations, improvements would consist of station platforms, local/feeder bus facilities and park-and-ride facilities in the vicinity of the interchanges.

Assuming a Fourth-Fifth Avenue alignment downtown and the location of the MTA Transfer Center on the north side of Charlotte Street, street-running stations in the downtown area would be located along Fourth and Fifth Avenues from the MTA Transfer Center to Lafayette.

1. MTA Music City Central, located in downtown Nashville between Fourth and Fifth Avenues.
2. Church Street, sidewalk station/stops would be on northbound Fifth at Church and southbound Fourth one block to the east on Church.
3. Broadway, a split station is assumed with the northbound station on Fifth Avenue and the southbound station on Fourth Avenue, both in the curb lanes on the south side of Broadway.
4. Gateway Boulevard, like Broadway, split stations on both Fourth and Fifth Avenues north of Gateway Boulevard, or on Gateway Boulevard in the vicinity of Fourth and Fifth Avenues.
5. Lafayette Street, this station would have station/stops on both sides of Lafayette at Fourth Avenue.

Figure 4-4  
Alternative 2 – I-24 Alignment, BRTL



6. Wharf Avenue, this split station would place platforms in the curb lanes on opposite sides of Lafayette Street/Murfreesboro Road.
7. Fessler's Lane, a split platform station at Fessler's Lane.
8. Blanton Avenue, a split station would be located immediately north of the I-24 interchange at Blanton Avenue.
9. Thompson Lane, this split station would serve residential areas on both sides of Murfreesboro Road.
10. Glengarry Drive, a split station would serve residential areas on both sides of Murfreesboro Road.
11. McGavock Pike, a split platform station would be built at this location.
12. Donelson Pike/Dell, a split platform station would be built at this location.
13. Haywood Lane Extended, a split platform station would be built at this location on Murfreesboro Road.
14. Mullins Drive, a split platform station would be built at this location along the extension of Haywood Lane.

South of the Mullins Drive station the BRTL would enter a short busway section on the east side of the CSX the right-of-way

1. Richards Road, a two-platform station would serve area residents and park-and-ride customers.
2. Antioch Pike, a two-platform station would serve area residents and park-and-ride customers.
3. Hickory Hollow Mall, a two-platform station would serve employers, area residents and park-and-ride customers. Feeder/shuttle bus connections would play an important role in this station's function.

Immediately south of the Hickory Hollow Mall Station an aerial flyover structure would carry buses into the center HOV lanes.

1. Southeast Arterial or Old Hickory/Hobson Pike, a station would be at the new planned southeast arterial interchange or at the existing Old Hickory/Hobson Pike interchange with I-24.
2. LaVergne/Waldron Road, the first station in Rutherford County would be accessed from Industrial/Enterprise Boulevard on the east side of the interstate.
3. Smyrna/Sam Ridley, an at-grade station would be accessed from Industrial Boulevard.
4. Nissan Boulevard, this station at the Nissan Boulevard interchange would be on the east side of the interstate.
5. Blackman/Bass, on the west side of the interstate served by Blackman Road.
6. SR-840, located on Florence Road in the west quadrant of the interchange between I-24 and SR-840. Provisions to provide direct access from the interchange ramps to park-and-ride facilities at the station would be developed, if possible.

7. SR-96/Stones River Mall, accessed from either Old Ford Road or Thompson Road on the east side of the interchange.

Street running stations in the Murfreesboro area would begin immediately south of the SR-96/Stones River Mall station and likely would utilize a curbside alignment on Tennessee Boulevard. As in Alternative 1, any of these stations might serve as a terminal station depending on availability of right of way, costs and other factors.

1. SR-99/New Salem Road, an at-grade station on Tennessee Boulevard with parking facilities intended to serve I-24 patrons living south of Murfreesboro.
2. Church Street, an at-grade station on Tennessee Boulevard at Church Street.
3. MTSU, an at-grade station on the east side of the university on Tennessee Boulevard.

### **Sub Alternative 2B – BRT Light via I-24 and Murfreesboro Road**

An alternate alignment, designated 2B on the map, would operate in mixed traffic along Donelson Pike between I-24 and Murfreesboro Road. A truly “light” BRT option, this option would eliminate the likely flyover ramps, highway widening along I-24 and the development of a new alignment alongside the CSX rail line. These improvements would most likely generate high capital costs and would create significant impacts. However, without these improvements the service would operate at slower speeds, increasing the running time of bus services operating in the corridor.

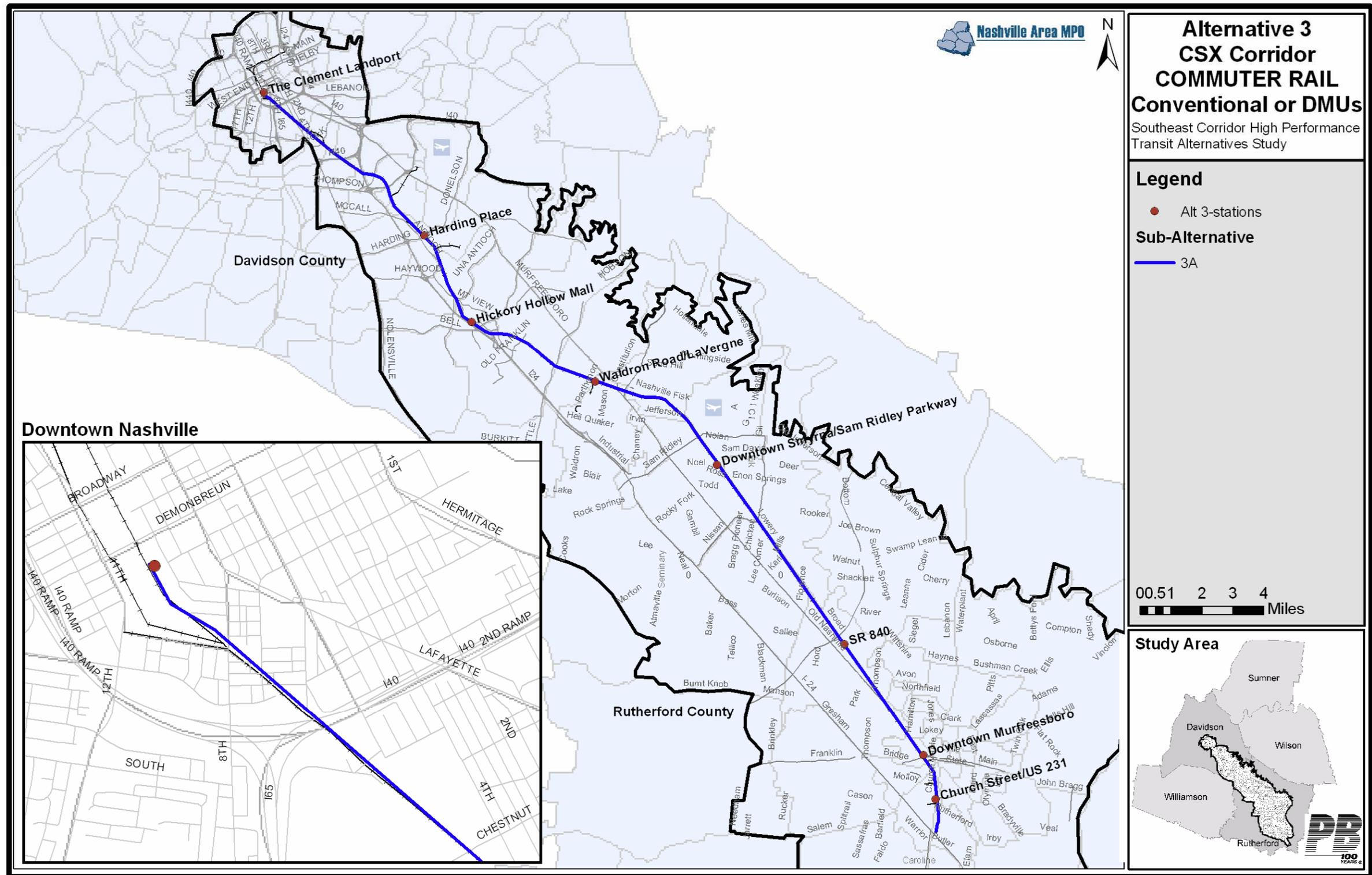
The 2B alignment introduces a station at Harding Road, relocates the stations at Haywood Lane Extended and Mullins Drive to along the I-24 alignment, and eliminates the stations at Richards Road and Antioch Pike.

### **Alternative 3 – CSX Alignment, Commuter Rail, Conventional Railroad Equipment or FRA-Compatible DMU**

This alternative explores various options for developing commuter rail service on the CSX rail line. Transit modes to be tested in guideways along the railroad corridor in this alternative include commuter rail service using conventional railroad equipment, or using DMU vehicles that meet the crash-worthiness and other safety standards set by the Federal Railroad Administration (FRA) for operation in mixed traffic with freight rail equipment. This differs from the DMU technology described in Alternative 1 and employed as an option in Alternatives 4 and 5, which are not FRA-compliant and could not be safely or legally operated on an active freight rail alignment. It is assumed the volume of freight traffic would not allow for a transit operator to secure a dedicated time-of-day window of operation, or separation with freight rail operations, using the CSX rail line as it is now configured, but rather that the transit operator may be able to negotiate the purchase of access rights to the outer-edge portions of the right-of-way to develop additional rail line capacity. As with Alternative 1, there may be locations where additional right of way will be required alongside the CSX property to provide a path for transit. However, there may also be segments where the existing rail right-of-way is wide enough to accommodate both freight and passenger operations. The alternative is shown on the map in Figure 4-5.

The base alignment for Alternative 3 would use the CSX right-of-way, or land adjacent to it, for most of the 32 mile route. Passenger service would be operated on passenger tracks beginning at its southern terminus from a station near the intersection of the CSX right-of-way and Church Street (US-231) in Murfreesboro. This station is intended to provide sufficient park-and-ride facilities to meet the demand for a typical end-of-the-line station, and in this instance, the station

Figure 4-5  
 Alternative 3 – CSX Alignment, Commuter Rail, Conventional Railroad Equipment or FRA-Compatible DMU



is well served by proximity to I-24, thus increasing its usefulness in intercepting Nashville-bound motorists. From the southern terminus the passenger service would continue north to downtown Murfreesboro, the communities of Smyrna and LaVergne and continue into Davidson County. Passenger trains would continue north on the edge of the CSX right-of-way to a terminal platform at Landport served by the rebuilt Demonbreun Street Bridge and MTA shuttle buses.

Stations: Beginning in downtown Nashville, the commuter rail stations for the base alignment for Alternative 3 have been identified as follows. Park-and-ride facilities would be essential station components at all stations except for stations in the downtown areas of Nashville and Murfreesboro.

1. The Clement Landport, the north terminal station would complete the initial construction of the facility with the addition of a passenger platform, parallel to the CSX tracks and on the Landport property.
2. Harding Place, the first station south of downtown Nashville would have access from Harding Place and provide sufficient parking space and feeder bus connections for the mid-Davidson County commuter.
3. Hickory Hollow Mall, this station would be accessed from Antioch Pike/Hickory Hollow Parkway, north of Bell Road.
4. Waldron Road/LaVergne, primary access to the station from LaVergne and Interchange City would be from Waldron Road; parking would be provided.
5. Downtown Smyrna or Sam Ridley Parkway, this station would be located in downtown Smyrna at the former train station unless traffic handling/safety issues on Murfreesboro Road/Lowery Street and the proximate CSX tracks dictate otherwise. The Sam Ridley Parkway location would be a backup site.
6. SR-840, this station would be accessed from Murfreesboro Road/Broad Street and represent an expansion of the existing park-and-ride lot.
7. Downtown Murfreesboro, the station with minimum, if any, parking facilities would be located near Main Street and emphasize pedestrian and feeder bus access.
8. Church Street/US-231, this end-of-the-line station would emphasize parking with direct access from Church Street and nearby access to I-24 via the Church Street interchange.

#### **Alternative 4 – CSX Alignment, LRT/DMU or BRT**

This alternative provides transit service to the corridor using either LRT/DMU or BRT vehicles on an alignment that would parallel the CSX rail right of way along most of its alignment. The majority of the alternative's length would use the edge of the CSX right-of-way to provide an exclusive path for the transit system. Additional right of way would have to be added to the CSX property at certain locations to complete the path for transit. As with commuter rail, negotiations with the railroad would determine the extent of right-of-way available for use by transit. The LRT/DMU modes would be expected to occupy a path of at least 40 feet in width. Like Alternative 1, this width would include the space in which two transit vehicles would operate and sufficient adjacent space on each side to provide for drainage and track evacuation routes. The distance separating the centerlines of the transit tracks from the CSX freight tracks would have to be determined, but most likely would be required to maintain at least 26 feet of separation from the edge of the CSX freight tracks.

The BRT route would mimic the path described for LRT/DMU vehicles along the outer edge of the CSX right-of-way. On city streets, BRT units would operate in curb lanes with sidewalk stations/stops. Within and adjacent to the CSX right-of-way, the two lane busway with shoulder space and areas to resolve drainage problems would occupy a path of about 52 feet. Passengers accessing the stations would be channeled to separate their path from crossing the active busway pavement. Similar to rail stations, special provisions would have to be taken to channel pedestrians away from the freight tracks except at established public crossings.

The base routing for Alternative 4 would follow the CSX right-of-way north from SR-96 in Murfreesboro. South of downtown Nashville, the guideway would leave the CSX alignment and proceed into the city along various alignments. One option (4A) would route trains from the CSX right-of-way onto northbound Second, Third or Fourth Avenues, west on Oak Street and north on Sixth Avenue before crossing over to Fourth and Fifth (or other streets as selected to serve downtown Nashville) via Gateway Boulevard. Other options (4B, 4C, and 4D) would approach downtown via Lafayette Street, from various alignments that connect the CSX rail line to Murfreesboro Road.

At the south end of the corridor, the guideway would exit the CSX right-of-way at the Church Street/US-231 Station and operate on street via Tennessee Boulevard to the end-of-the-line at the MTSU campus. The alignments are shown on the Map in Figure 4-6.

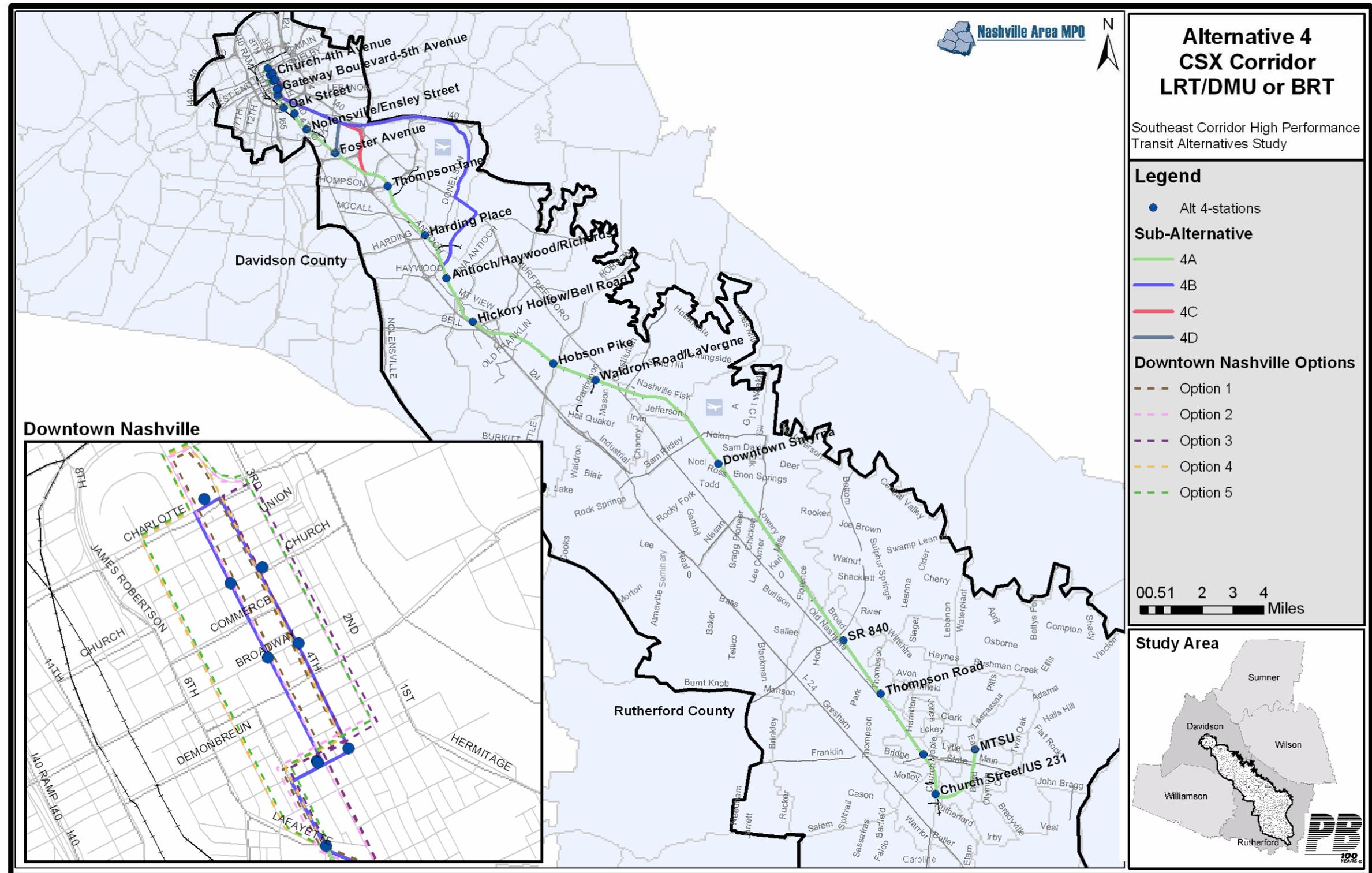
In Nashville-Davidson County, additional sub-alternative routing options for the corridor include leaving the exclusive guideway along the CSX and following the route of Alternative 2B north along the planned extension of Haywood Lane to the terminal of the Nashville International Airport, then along the southern side of I-40 to a point where the guideway transitions to Lafayette Street/Murfreesboro Road in the vicinity of Blanton Street, then into the downtown on Lafayette Street (4B); between the CSX rail line and Murfreesboro Road via Foster Avenue (4C) or via a rail line that parallels Creek Street and runs alongside the north-western side of Treveca Nazarene University (4D).

*Stations:* Beginning in downtown Nashville, the following transit stations have been identified for the base route.

Street running service in downtown Nashville would position transit in the curb lanes through the following seven stations.

1. MTA Music City Central in downtown Nashville between Fourth and Fifth Avenues.
2. Church Street, sidewalk station/stops would be on northbound Fifth at Church and southbound Fourth one block to the east on Church.
3. Broadway, a split station with the northbound station on Fifth Avenue and the southbound station on Fourth Avenue, both in curb lanes on the south side of Broadway.
4. Gateway Boulevard, This would be a split station with sidewalk station/stops on both sides of Gateway Boulevard at Fifth Avenue.
5. Lafayette Street, the station would be on 6th Avenue on the north or south side of Lafayette.Oak Street, this station would be near the intersection of 6th Avenue and Oak Street south of I-40.

Figure 4-6  
Alternative 4 – CSX Alignment, LRT/DMU or BRT



6. Chestnut Street, depending on the routing, a station would be on Second, Third or Fourth Avenues at Chestnut Street.

South of the Chestnut Station the guideway for LRT or BRT would enter the edge of the CSX right-of-way.

1. Nolensville/Ensley Street, the first station on the CSX guideway, would serve the north end of Nolensville Road and the State Fairgrounds.
2. Foster Avenue.
3. Thompson Lane, the at-grade crossing of Thompson Lane at the CSX.
4. Harding Place, an aerial station that would span Harding Place to maximize pedestrian access and provide park-and-ride facilities.
5. Antioch/Haywood/Richards, accessed from Richards Road.
6. Hickory Hollow/Bell Road, located on Antioch Pike/Hickory Hollow Parkway on the east side of the CSX and north of the Bell Road. Feeder/shuttle bus connections would play an important role in this stations' functioning.
7. Hobson Pike
8. Waldron Road/LaVergne, primary access to the station from LaVergne and Interchange City would be from Waldron Road; parking would be provided.
9. Downtown Smyrna or Sam Ridley Parkway, this station would be located in downtown Smyrna at the former train station unless traffic handling/safety issues on Murfreesboro Road/Lowery Street and the proximate CSX tracks dictate otherwise. The Sam Ridley Parkway location would be a backup site.
10. SR-840, this station would be accessed from Murfreesboro Road/Broad Street and represent an expansion of the existing park-and-ride lot.
11. Thompson Road, this station would serve the northeast side of Murfreesboro.
12. Downtown Murfreesboro, located near Main Street, the station would emphasize pedestrian and feeder bus access.
13. Church Street/US-231, this end-of-the-line station would emphasize parking with direct access from Church Street and nearby access to I-24 via the Church Street interchange.

At Church Street in the south end of the corridor, transit would enter a street-running service along Tennessee Boulevard to the MTSU campus.

1. MTSU, an at-grade station on the east side of the MTSU campus on Tennessee Boulevard.

Stations/stops for the street-running portions of Alternative 4 in downtown Nashville and Murfreesboro would utilize sidewalk stations for the curb lane operating transit vehicles. Stations within or adjacent to the CSX right-of-way would be developed with a platform and, as needed, parking, feeder bus and pedestrian sidewalk connections to the adjoining community.

### **Alternative 5 – Murfreesboro Road Alignment, LRT/DMU or BRT**

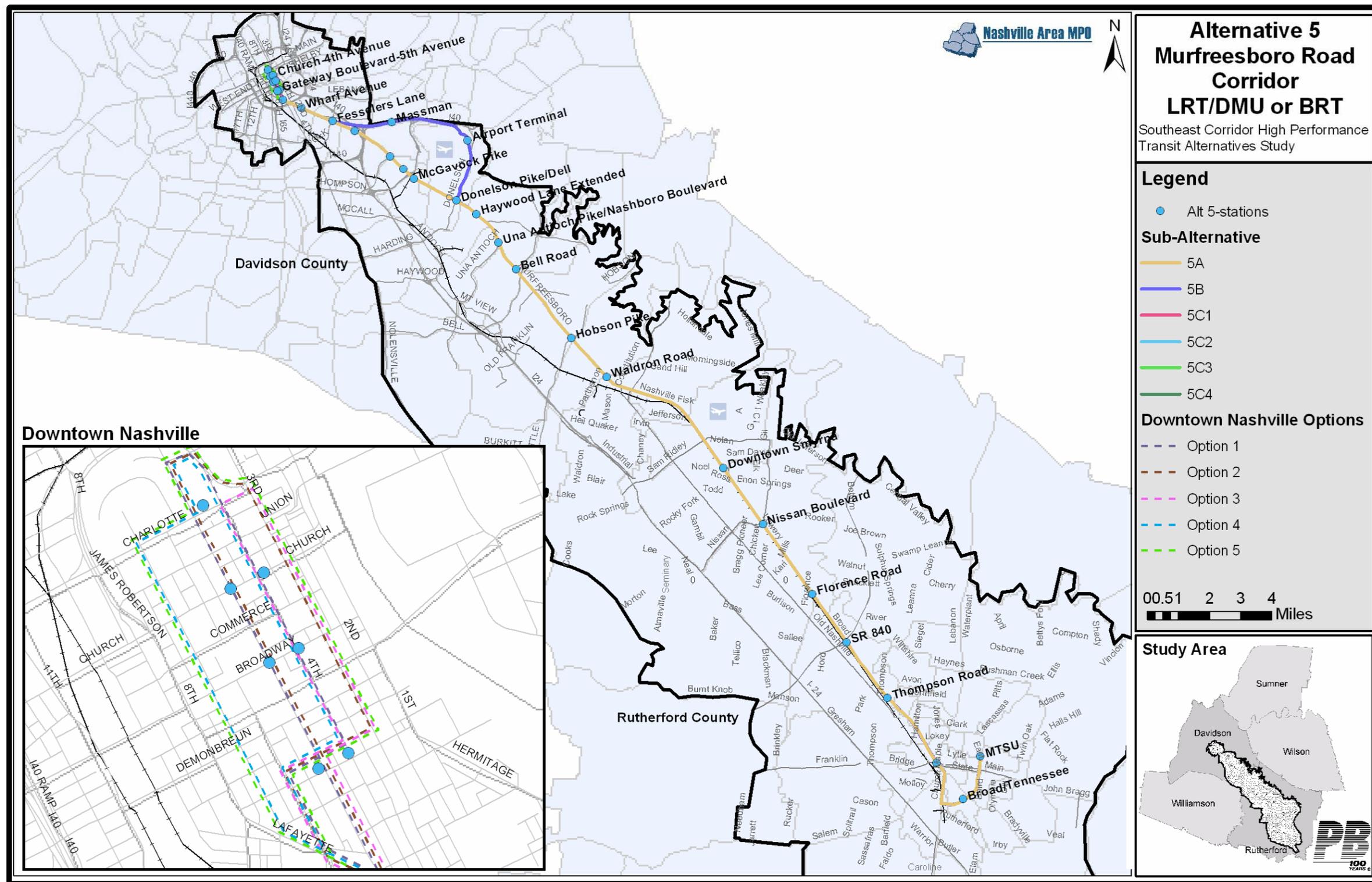
In Alternative 5 LRT, DMU or BRT service would operate on an alignment following Murfreesboro Road (US-41). Transit guideways for rail or bus would be located primarily in the center of the roadway, with the general purpose roadway lanes rebuilt to the outside on both

sides of the road (relocation of the roadway center line could allow for all of the reconstruction to occur on one side or the other of the existing roadway right-of-way). The rebuilding of the highway would require additional right-of-way and result in restrictions on vehicular turning movements that cross the center of the highway. At stations, the highway right-of-way would be widened to accommodate the center or outside platforms. Feeder/shuttle buses would use bus stops located in the curb lanes served by the signalized crosswalks. The alignment of the route (5A) is shown on the map in Figure 4-7.

Stations: Street-running stations would be typical throughout this alternative. Stations between the downtown Nashville MTA transfer center and the intersection of Murfreesboro Road and Haywood Lane extended would be the same as in Alternative 2. South of Haywood Lane, the additional stations would be along Murfreesboro Road. The stations are:

1. The MTA Music City Transit Center, this station is located in the downtown area of Charlotte Street between Fourth and Fifth Avenues.
2. Church Street, sidewalk station/stops would be on northbound Fifth at Church and southbound on Fourth one block to the east on Church.
3. Broadway, a split station is assumed with the northbound station on Fifth Avenue and the southbound station on Fourth Avenue, both in the curb lanes on the south side of Broadway. Gateway Boulevard, like Broadway, split stations on both Fourth and Fifth Avenues north of Gateway Boulevard, or on Gateway Boulevard in the vicinity of Fourth and Fifth Avenues.
4. Lafayette Street, this station would have station/stops on both sides of Lafayette at Fourth Avenue.
5. Wharf Avenue, this station would be located in the center of Lafayette Street/Murfreesboro Road.
6. Fessler's Lane, a station located on Murfreesboro Road at Fessler's Lane.
7. Blanton Avenue, a station located immediately north of the I-24 interchange at Blanton Avenue.
8. Thompson Lane, this station would serve residential areas on both sides of Murfreesboro Road.
9. Glengarry Drive, a station would serve residential areas on both sides of Murfreesboro Road.
10. McGavock Pike,
11. Donelson Pike/Dell,
12. Haywood Lane Extended,
13. Una Antioch Pike/Nashboro Boulevard,
14. Bell Road,
15. Hobson Pike,
16. Waldron Road,
17. Downtown Smyrna or Sam Ridley Parkway,

Figure 4-7  
 Alternative 5 – Murfreesboro Road Alignment, LRT/DMU or BRT



18. Nissan Boulevard,
19. Florence Road,
20. SR-840,
21. Thompson Road,
22. Downtown Murfreesboro, the station would be located on Broad Street near Memorial Drive and Main Street.
23. Broad/Tennessee, this station would emphasize parking with indirect access from I-24 via the Church Street interchange.
24. MTSU, an at-grade station on the east side of the MTSU campus on Tennessee Boulevard.

As on Alternatives 1, 2, 4, and 6, the airport alignment could serve the City of Murfreesboro via a number of alignments, and each station in the Murfreesboro area could serve as the terminal station if necessary.

### **Alternative 5B – International Airport Option**

An optional route at the north end of the corridor, designated 5B, follows a route to the Nashville International Airport by turning north at Donelson Pike to a station at the airport terminal, turning west along the south side of I-40 to a station at Massman Drive and reentering Murfreesboro Road at the station at Blanton Avenue. Under this sub alternative, these stations would replace the stations under Alternative 5A at McGavock Pike, Glengarry Drive and Thompson Lane.

### **Alternative 6 – Murfreesboro Road Alignment, BRTL**

This alternative places BRTL on Murfreesboro Road, running in the curb lanes of the highway. At major bottlenecks, the alternative could employ stretches of exclusive busway in the outside (right) lanes to avoid congested traffic and thus improving average operating speed. Other traffic devices used to maintain operating speeds could be queue-jump lanes at signalized intersections and preferential phasing at traffic signals. However, no full-length dedicated right of way would be implemented.

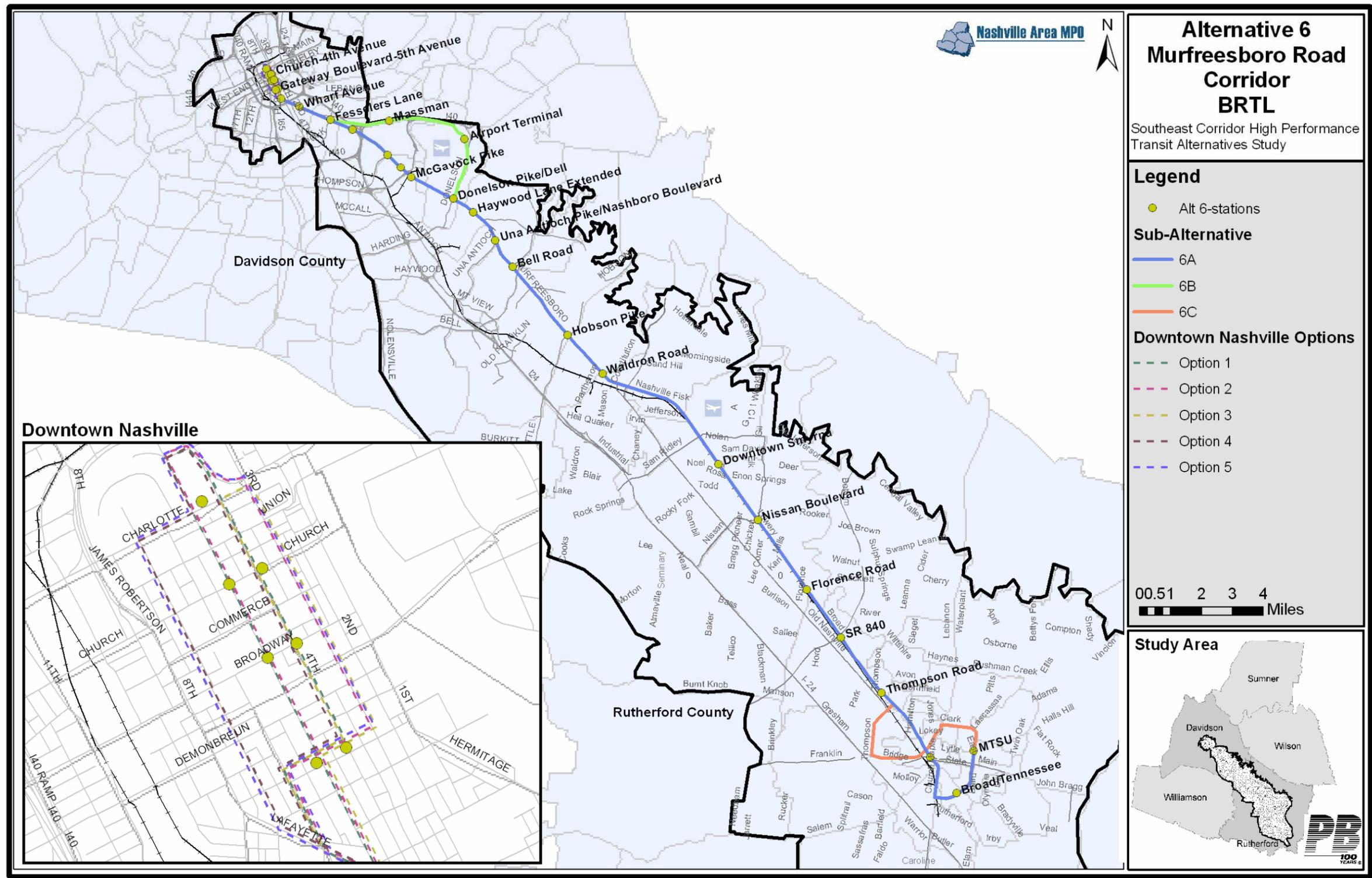
Unlike in Alternative 5, where left-turning traffic experiences major adjustments to its travel path, in Alternative 6 right turning traffic from and across the path of transit vehicles would present both safety and transit speed issues. Accordingly, steps to reduce right turns would be taken including the closing or consolidating drives to private property and closing some minor street intersections.

Station/stops would be located in the outside lanes of the highway and incorporated into sidewalks, as appropriate. Additional sidewalk and pedestrian improvements may be required to tie the stations to the adjoining walk-shed. Parking would be in facilities outside the highway right-of-way near the station/stops, and signalized pedestrian crosswalks would tie together the platforms on opposite sides of the highway. The alignment options are shown in the map in Figure 4-8.

Stations: Station/stops would be the same as those cited in Alternative 5.

1. MTA Music City Central in downtown Nashville between Fourth and Fifth Avenues.
2. Church Street, sidewalk station/stops would be on northbound Fifth at Church and southbound Fourth one block to the east on Church.

Figure 4-8  
Alternative 6 – Murfreesboro Road Alignment, BRTL



3. Broadway, a split station is assumed with the northbound station on Fifth Avenue and the southbound station on Fourth Avenue, both in the curb lanes on the south side of Broadway.
4. Gateway Boulevard, like Broadway, split stations on both Fourth and Fifth Avenues north of Gateway Boulevard, or on Gateway Boulevard in the vicinity of Fourth and Fifth Avenues.
5. Lafayette Street, this station would have station/stops on both sides of Lafayette at Fourth Avenue.
6. Wharf Avenue, this station would be located in the center of Lafayette Street/Murfreesboro Road.
7. Fesslers Lane, a station on Murfreesboro Road at Fesslers Lane.
8. Blanton Avenue, located immediately north of the Blanton Avenue interchange with I-24.
9. Thompson Lane, this station would serve residential areas on both sides of Murfreesboro Road.
10. McGavock Pike,
11. Donelson Pike/Dell,
12. Haywood Lane Extended,
13. Una Antioch Pike/Nashboro Boulevard,
14. Bell Road,
15. Hobson Pike,
16. Waldron Road,
17. Downtown Smyrna or Sam Ridley Parkway,
18. Nissan Boulevard,
19. Florence Road,
20. SR-840,
21. Thompson Road,
22. Downtown Murfreesboro, the station would be located on Broad Street near Memorial Drive and Main Street.
23. Broad/Tennessee, this station would emphasize parking with indirect access from I-24 via the Church Street interchange.
24. MTSU, an at-grade station on the east side of the MTSU campus on Tennessee Boulevard.

### **Alternative 6B – International Airport Option**

An optional route, 6B at the north end of the corridor follows the same route to the Nashville International Airport as defined in Sub-Alternative 5B including turning north at Donelson Pike to the Airport terminal station, turning west along the south side of I-40 to a station at Massman Drive and reentering Murfreesboro Road at the Blanton Avenue station. This sub-alternative

would substitute these two stations for three Alternative 6A stations: McGavock Pike, Glengarry Drive and Thompson Lane.

#### **4.4 Screening of Phase I Alternatives**

The screening of the 13 alternatives and sub-alternatives identified for the first phase of screening was based largely on qualitative assessments reached by the members of the project Steering Committee, MPO and consultant staff. These assessments were made in a series of meetings and workshops in which the alternatives were rated and a short list of alternatives was developed for assessment in the second phase of screening. The alternatives were compared to the initial phase screening criteria described in Section 3.8. These criteria, in turn, were based on the project goals and objectives identified in 3.0 Needs Assessment and Evaluation Methodology. The assessment is organized in the Phase I Evaluation Matrix that are shown in the tables included in this section of the report.

The Phase I assessment relies heavily on qualitative assessments of the relative advantages and disadvantages of each of the alternatives across the many evaluation criteria, and relatively few quantitatively-based assessments. On each of the qualitative assessments, the Steering Committee came to agreement, after much discussion, on an ordinal scoring of “+”, “=” or “-“ for each alternative, in which “+” is a positive score and “-“ is a negative one, with “=” indicating that the factor is neither positive or negative for this alternative. This approach avoided excessive precision in what is obviously a rough estimate of the relative merits of each alternative across a wide range of criteria. Qualitative assessments such as these are based largely on the informed, but necessarily subjective, judgments of the Steering Committee members and staff participating in the discussions. Moreover, the various goals, objectives and criteria have not been “weighted” in terms of their relative importance by the Steering Committee. For these reasons, it is important not to consider this evaluation matrix as a mechanism for selecting a preferred alternative from among those examined in Phase I. It is better seen as a tool for organizing much of the information necessary for creating the smaller number of alternatives that will be examined in detail in the Phase II screening.

#### **Goal 1: Provide Longer Distance Travelers in the Southeastern Corridor with alternatives to driving private vehicles in heavily-congested traffic conditions.**

The initial screening of alternatives considered evaluation criteria based on several of the objectives included under goal 1. The analysis results are summarized in Table 4-2. The following discussion explains the results of the analysis for each of the objectives considered in the initial analysis under goal 1.

*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 travel time, convenience (in the context of specific time-of-day and day-of-week trips), safety, cost (to the individual user) and comfort.*

The Steering Committee found that full LRT or BRT options along I-24, or CR, LRT or full BRT options using the CSX rail alignment, would be better suited to providing longer-distance trips serving standard commute travel markets and meeting the various requirements of this objective than the other options. BRTL in the I-24 and Murfreesboro Road corridors would be subject to delays due to congested traffic conditions and would cause delays, which would diminish the value of transit so commuters. The Steering Committee did not believe that BRTL options could provide travel speeds, comfort or convenience that could compete with driving

**Table 4-2  
Initial Alternatives Screening-Goal 1 Criteria**

Goals and Objectives	Initial Screening Criteria	Alternative 1: I-24 Alignment LRT/DMU or BRT		Alternative 2: I-24 Alignment BRT Light		Alternative 3: CSX Alignment Commuter Rail	Alternative 4: CSX Alignment, LRT/DMU or BRT				Alternative 5: Murfreesboro Road Alignment, LRT, DMU, BRT		Alternative 6: Murfreesboro Road Alignment, BRT Light		
		1A via I-24	1B via Airport	2A via CSX- Haywood Extended	2B via Harding/ Donelson Pike		4A via CSX	4B via Airport	4C	4D	5A via Murfreesboro Road	5B via Airport	6A via Murfreesboro Road	6B via Airport	
<b>Goal 1: Provide longer-distance travelers in the southeastern corridor with alternatives to driving private vehicles in heavily-congested traffic conditions.</b>															
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.	Does the proposed strategy provide an alternative to automobile use for longer distance travelers in the corridor (qualitative)	+	+	=	=	+	+	+	+	+	+	=	=	-	-
2. Provide enhanced multi-modal access to home, jobs, services, and other activity centers for corridor residents, workers, and visitors.	Will not be considered in initial screening.														
3. Provide transportation options that serve both work and non-work trips.	Does the proposed strategy provide transportation options that serve both work and non-work trips (qualitative)	+	+	+	+	-	+	+	+	+	+	+	+	+	+
4. Provide improved transit opportunities for reverse-commuters.	Does the proposed strategy provide for use by reverse-commuters (qualitative)	+	+	+	+	=	=	=	=	=	=	+	+	=	=
5. Improve access to mass transit in areas of the corridor outside central Nashville.	Number of <u>residents</u> within 1 mile of stations/stops (quantitative measure)	<b>89,000</b>	<b>90,000</b>	<b>91,000</b>	<b>86,000</b>	<b>34,000</b>	<b>81,000</b>	<b>83,000</b>	<b>82,000</b>	<b>78,000</b>	<b>86,000</b>	<b>86,000</b>	<b>82,000</b>	<b>82,000</b>	
	Number of <u>jobs</u> within 1 mile of stations/stops (quantitative measure)	<b>178,000</b>	<b>186,000</b>	<b>192,000</b>	<b>199,000</b>	<b>144,000</b>	<b>172,000</b>	<b>183,000</b>	<b>177,000</b>	<b>174,000</b>	<b>189,000</b>	<b>189,000</b>	<b>190,000</b>	<b>190,000</b>	
6. Increase utilization of public transit in the corridor for all trip purposes.	Will not be considered in initial screening.														
7. Provide greater diversity of transportation options in the corridor by providing improved conditions for pedestrians, bicyclists, and other non-automotive users.	Will not be considered in initial screening.														

"+" Positive or Better "-" Negative or Worse "=" Average or Little Change

and encourage significant numbers of commuters to switch to transit. LRT or BRT options using Murfreesboro Road would be delayed by frequent cross streets and frequent station spacing compared to the I-24 and CSX corridor options, causing travel time delays that would reduce the attractiveness of these options to commuters. The Steering Committee rated options operating on Murfreesboro Road lower on this objective, regardless of transit type, due to the large number of cross streets that could not be avoided under these options and the associated travel time delays.

*2. Provide enhanced multi-modal access to home, jobs, services, and other activity centers for corridor residents, workers, and visitors. (not considered in initial screening)*

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

The Steering Committee interpreted this objective as the ability of each alternative to provide for non-work travel markets (such as shopping and entertainment trips), which were identified as important travel markets in Chapter 3. Non-work trips tend to be shorter, to not be oriented to downtown Nashville, and many are made during the off-peak travel periods (midday, evening and weekend) and in the reverse-commute direction. All of the proposed alternatives were rated well by the committee on this objective except the CR option on the CSX alignment. Commuter rail service on the CSX line would be limited by capacity and budget constraints to operating primarily, if not exclusively, in the peak direction and during the weekday peak travel periods, thus providing less service for reverse-commute direction travelers and little or no service during the midday, evening and weekend time periods. The wider stop spacing typical of commuter rail would limit the facility of the service for shorter trips. For these reasons, CR was perceived as serving non-work trip travel markets less well than the other options considered.

*4 Provide transit opportunities for reverse commuters.*

Under this objective, bus-based alternatives were generally rated more highly than rail-based ones for serving the reverse commute market. Bus-based alternatives would provide more opportunities for one-seat rides for reverse-commuters, while rail based options likely would require transfers.

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

This objective was evaluated based on the number of residents and the number of jobs located within one mile of stations located outside downtown Nashville. The alignments differed little in the number of people living and working near them; the numbers varied mainly based on the number of stations. All of the BRT and LRT alternatives ranged from 180,000 to 190,000 residents and 80,000 to 90,000 employees, regardless of whether they were in the I-24, CSX or Murfreesboro Road alignments, because these alternatives had about the same large numbers of stations throughout the corridor. CR alternatives had fewer stations and thus fewer people living or working near them. The CSX alignment had slightly fewer residents and employees than either Murfreesboro Road or I-24. Alternatives along I-24 had the most employees near their stations, while alternatives along Murfreesboro Road had the most residents.

*6. Increase utilization of public transit in the corridor for all trip purposes. (not considered in initial screening)*

*7. Provide greater diversity of transportation options in the corridor by providing improved conditions for pedestrians, bicyclists, and other non-automotive users. (not considered in initial screening)*

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

The scoring of alternatives under the criteria applicable to Goal 2 is shown in Table 4-3. The evaluation of Goal 2, in this initial screening, was highly qualitative in nature, based primarily on the professional judgments and opinions of the members of the Steering Committee, the consultant team, and others who participated in the screening process. More detailed analysis of land use in the corridor is part of the detailed phase of alternatives screening.

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

This objective was evaluated based on the transit type. Experience in other cities has shown that rail-based improvements (heavy rail, LRT or CR) have been successful in attracting and concentrating development around stations. Bus-based alternatives have not been proven to be as successful, or are too new to have a well-documented track record. BRT and BRT light alternatives were thus rated negatively on this objective, while CR and LRT alternatives were rated more favorably.

*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).*

This objective was measured according to the number of centers near (within 1 mile of) non-downtown based employment and activity centers, as identified in 3.0 Needs Assessment and Evaluation Methodology. Alternatives in the I-24 alignment were rated highest in this regard, with 8-9 major employment and activity centers lying within close proximity of its stations. Alternatives in the CSX alignment rated second, with 7-8 centers, and Murfreesboro Road was rated lowest, with only 5-6 centers. The commuter rail alternative along the CSX alignment had only five centers within close proximity, owing again to the wider station spacing and lower number of stations under that alternative.

*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.*

All alternatives are well connected and oriented to downtown Nashville and other employment and activity centers, although the activity centers that are well served vary between the three alignments (I-24, CSX and Murfreesboro Road). Alternatives using Murfreesboro Road were rated lower than the other alignments, largely because it would require crossing many intersections, which may make it slower than the other alternatives, and thus would provide a less convenient connection to Downtown Nashville and to the other activity and employment centers than the other alternatives.

**Table 4-3  
Initial Alternatives Screening-Goal 2 Criteria**

Goals and Objectives	Initial Screening Criteria	Alternative 1: I-24 Alignment LRT/DMU or BRT		Alternative 2: I-24 Alignment BRT Light		Alternative 3: CSX Alignment Commuter Rail	Alternative 4: CSX Alignment, LRT/DMU or BRT				Alternative 5: Murfreesboro Road Alignment, LRT, DMU, BRT		Alternative 6: Murfreesboro Road Alignment, BRT Light	
		1A via I-24	1B via Airport	2A via CSX- Haywood Extended	2B via Harding/ Donelson Pike		4A via CSX	4B via Airport	4C	4D	5A via Murfreesboro Road	5B via Airport	6A via Murfreesboro Road	6B via Airport
<b>Goal 2: Promote efficient land use and development patterns in Nashville/Davidson County and the Rutherford County communities in the Southeast Corridor Study Area.</b>														
1. Promote compact transit-accessible land development in Nashville, Murfreesboro, LaVergne, Smyrna and other communities in the southeastern corridor study area.	Is the technology/alignment primarily transit-based (which tends to concentrate development)? (qualitative measure)	=	=	-	-	=	+	=	+	+	+	=	-	-
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).	Proximity of alternative and stations to existing employment and activity centers (Quantitative - Number of Centers)	8	9	8	8	5	7	8	7	7	5	6	5	6
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.	How well does the alternative strategy serve downtown Nashville, Interchange City, and downtown Murfreesboro (qualitative measure)	=	=	=	=	=	=	=	=	=	=	-	-	-
4. Promote development that re-uses existing sites and buildings, and that efficiently uses existing public infrastructure and public services.	Qualitative assessment of the use of existing public infrastructure	=	=	-	+	=	=	=	-	-	=	=	+	+
5. Promote multi-use development combining many activities including commercial, retail, education, recreation, and housing.	Will not be considered in initial screening.													

"+" Positive or Better "-" Negative or Worse "=" Average or Little Change

*4. Promote development that re-uses existing sites and buildings, and that effectively uses existing public infrastructure and public services.*

This criterion primarily examined the degree to which the alternatives used existing facilities rather than requiring additional right of way or construction of new facilities. The alternatives that scored most highly on this alternative were those that did not require new facilities or right of way, primarily BRTL alternatives on using the I-24 and Murfreesboro Road alignments. Alternatives that required new right of way scored negatively.

*5. Promote multi-use development combining many activities including commercial, retail, education, recreation, and housing. (not considered in initial screening)*

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

Table 4-4 lists the scoring of the criteria under Goal 3.

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

Options that offered strong potential for promoting new development and redevelopment were rated positively under this alternative. Thus, rail-based alternatives were rated positively, as were alternatives that would provide new access and open up new areas for development or redevelopment (Alternative 3, which used the CSX alignment, and 4C-Foster Avenue, and 4D-rail line paralleling Clark Street). Alternatives that offered little new infrastructure (especially BRT light alternatives) or served highly developed or undevelopable areas (such as the perimeter of the airport in alternatives 1B, 4B, 5B and 6B) were rated negatively.

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

Alternatives that met this objective were those whose stations were located nearer to, or were more accessible to, existing housing developments, which would benefit the alternative's capacity to serve many transit markets but particularly transit dependent populations. Areas surrounding I-24 and CSX contain more housing development than those surrounding Murfreesboro Road, which is predominately commercial or industrial. Thus, the I-24 and CSX corridors were ranked better than the Murfreesboro Road corridor on this criterion. Options that contained an airport alignment, which bypassed residential development as a result of the airport detour, scored negatively on this criterion.

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

This objective was stratified by considering separately the performance of each alternative in serving a short list of the corridor's most important employment centers. By analyzing the service to employment centers, each alternative can be rated on the potential capacity to serve a variety of transportation markets, including commuters to downtown Nashville, commuters to locations south of downtown Nashville, and reverse commuters. Employment centers considered in the analysis included:

**Table 4-4  
Initial Alternatives Screening-Goal 3 Criteria**

Goals and Objectives	Initial Screening Criteria	Alternative 1: I-24 Alignment LRT/DMU or BRT		Alternative 2: I-24 Alignment BRT Light		Alternative 3: CSX Alignment Commuter Rail	Alternative 4: CSX Alignment, LRT/DMU or BRT				Alternative 5: Murfreesboro Road Alignment, LRT, DMU, BRT		Alternative 6: Murfreesboro Road Alignment, BRT Light	
		1A via I-24	1B via Airport	2A via CSX- Haywood Extended	2B via Harding/ Donelson Pike		4A via CSX	4B via Airport	4C	4D	5A via Murfreesboro Road	5B via Airport	6A via Murfreesboro Road	6B via Airport
<b>Goal 3: Improve economic development and employment opportunities and expand access to jobs.</b>														
1. Promote sustainable economic growth throughout the corridor by providing improved access and optional transportation modes.	Qualitative assessment of development potential by modes	=	=	-	-	=	+	=	+	+	+	=	-	-
2. Provide improved access to housing opportunities throughout the corridor by providing improved transportation access and options.	Qualitative assessment of access to housing opportunities throughout the corridor	+	-	=	=	+	+	-	+	+	=	-	=	-
3. Provide improved access to employment centers throughout the corridor by providing improved transportation access and options.	Does the alternative improve access to (qualitative measure):													
	Downtown Nashville	+	+	+	+	+	+	+	+	+	+	+	+	+
	Vanderbilt/West End Area	+	+	+	+	-	+	+	+	+	+	-	+	+
	Interchange City	+	+	+	+	+	+	+	+	+	-	-	-	-
	Dell	-	+	+	+	-	-	+	-	-	+	+	+	+
	Nissan	-	-	-	-	+	+	+	+	+	+	+	+	+
	Downtown Murfreesboro/MTSU	+	+	+	+	+	+	+	+	+	+	+	+	+
4. Provide high quality transit access to Nashville International Airport from downtown Nashville, Murfreesboro and other areas within the corridor.	Will not be considered in initial screening.													
5. Enhance reverse commute options providing access for Nashville residents to job opportunities in other areas of the corridor.	Will not be considered in initial screening.													
6. Provide improved access to special events and other destinations in the study corridor.	Does the alternative enhance access to special events and special event destinations in the corridor (qualitative measure)	=	=	=	=	-	=	=	=	=	=	=	=	=

"+" Positive or Better "-" Negative or Worse "=" Average or Little Change

- Downtown Nashville
- Vanderbilt/West End Area
- Interchange City
- Dell
- Nissan
- Downtown Murfreesboro/MTSU

Alternatives were scored relative to their ability to provide connections for commuters to each of these sites. All of the alternatives were rated highly in their ability to serve downtown Nashville, but alternatives that bypassed other employment centers or had fewer stations were rated lower based on their inability to serve those sites. For example, alternatives in the I-24 alignment were rated low in their ability to serve Nissan, which is located in the Murfreesboro Road area; options operated on Murfreesboro Road were similarly rated low in their ability to serve Interchange City. The CSX rail alternative was rated lower than other alternatives in its ability to serve the Vanderbilt/West End area, Dell and MTSU, which can only be operated by shuttle buses under that alternative.

*4. Provide high quality transit access to Nashville International Airport from downtown Nashville, Murfreesboro and other areas within the corridor. (not considered in initial screening)*

*5. Enhance reverse commute options providing access for Nashville residents to job opportunities in other areas of the corridor. (not considered in initial screening)*

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

Most of the alternatives were ranked as equal in terms of serving special event markets and other short trip markets. The CSX commuter rail alternative was identified negatively, because the commuter rail service would provide little or no evening or weekend service, which would preclude special events service, because the CSX rail alternative is not located adjacent to some of the special events locations such as the Starwood Amphitheater or the locations of games of area sports teams such as the Tennessee Titans football team, Nashville Sounds baseball team, and the football teams of Vanderbilt, TSU and MTSU, and because the commuter rail option would have fewer and more widely-spaced stations, which would further limit the number of locations within walking distance of stations.

#### **Goal 4: Preserve the Natural and Social Environment**

Table 4-5 shows the scoring for criteria under Goal 4. A number of the more critical evaluations of environmental impacts were not considered at this stage of the analysis. These include direct comparison between the alternatives in terms of their impact on air quality, noise and vibration, aesthetic considerations, and land use. The more detailed evaluation of criteria will be made in the detailed evaluation of alternatives.

*1. Improve air quality. (not considered in initial screening)*

*2. Minimize transportation-related noise impacts. (not considered in initial screening)*

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

**Table 4-5  
Initial Alternatives Screening-Goal 4 Criteria**

Goals and Objectives	Initial Screening Criteria	Alternative 1: I-24 Alignment LRT/DMU or BRT		Alternative 2: I-24 Alignment BRT Light		Alternative 3: CSX Alignment Commuter Rail	Alternative 4: CSX Alignment, LRT/DMU or BRT				Alternative 5: Murfreesboro Road Alignment, LRT, DMU, BRT		Alternative 6: Murfreesboro Road Alignment, BRT Light	
		1A via I-24	1B via Airport	2A via CSX-Haywood Extended	2B via Harding/Donelson Pike		4A via CSX	4B via Airport	4C	4D	5A via Murfreesboro Road	5B via Airport	6A via Murfreesboro Road	6B via Airport
<b>Goal 4: Preserve the natural and social environment.</b>														
1. Improve air quality.	Will not be considered in initial screening.													
2. Minimize transportation-related noise impacts.	Will not be considered in initial screening.													
3. Protect and, where possible, enhance environmentally sensitive areas.	Proximity to or impacts on parks, schools and other institutions; impacts on bodies of water; <u>number of private properties impacted</u> ; aesthetic considerations (within 500 ft - quantitative measure).	<b>800</b>		<b>1,200</b>		<b>800</b>		<b>1,600</b>			<b>1,800</b>		<b>1,900</b>	
4. Minimize community and neighborhood disruption.	Proximity of alternatives to parks, schools, hospitals, and other institutions/community services (within 500 ft - quantitative measure)	<b>9 Parks, 3 Schools, 1 Hospitals</b>		<b>8 Parks, 2 Schools, 1 Hospitals</b>		<b>7 Parks, 2 Schools, 0 Hospitals</b>		<b>12 Parks, 7 Schools, 0 Hospitals</b>			<b>2 Parks, 5 Schools, 0 Hospitals</b>		<b>5 Parks, 6 Schools, 0 Hospitals</b>	
	Does the alternative cross or touch the Stones River National Battle Field (Yes/No)	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
5. Minimize negative aesthetic impacts of transportation investments and, where possible, design systems that add to the aesthetic environment.	Will not be considered in initial screening.													
6. Address environmental justice concerns by carefully assessing disproportionate impacts and providing improvements that benefit members of socially disadvantaged groups.	Locations of concentrations of low income and minority communities within 1/4 mile of alignment (quantitative measures):													
	Stations	<b>8,000 Minority 16,000 Low-Income</b>		<b>10,000 Minority 13,000 Low-Income</b>		<b>2,000 Minority 5,000 Low-Income</b>		<b>3,200 Minority 10,000 Low-Income</b>			<b>10,000 Minority 15,000 Low-Income</b>		<b>10,000 Minority 15,000 Low-Income</b>	
	Alignment	<b>21,000 Minority 22,000 Low-Income</b>		<b>22,000 Minority 20,000 Low-Income</b>		<b>9,000 Minority 13,000 Low-Income</b>		<b>20,000 Minority 20,000 Low-Income</b>			<b>23,000 Minority 19,000 Low-Income</b>		<b>24,000 Minority 21,000 Low-Income</b>	
7. Promote land use and development policies, and transportation strategies that are consistent and mutually supportive.	Will not be considered in initial screening.													
8. Provide transportation options that reduce stress.	Will not be considered in initial screening.													
9. Minimize impacts to farmland and open space in existing rural areas of the corridor.	Number of acres of rural land within 100 feet of alternative alignment and stations (quantitative measure)	<b>1,700</b>		<b>2,700</b>		<b>1,200</b>		<b>1,200</b>			<b>1,900</b>		<b>1,600</b>	

"+" Positive or Better "-" Negative or Worse "=" Average or Little Change

This criterion measures the potential impacts of the alternatives on parks, schools and other institutions, impacts on bodies of water, the number of private properties impacted within 500 feet of the alignments of the alternatives. In this phase, the analysis was limited to the number of private properties impacted by the various alternatives, because many of the other elements of this criteria (such as proximity to parks, schools and bodies of water) were considered under other criteria and will be reported as such.

The GIS analysis of the alternatives found that the Murfreesboro Road alignments would have the greatest impacts on private property, impacting 1,800-1,900 private parcels. The alternatives in the I-24 alignment that remained almost wholly within the I-24 right of way over their entire alignment (1A, 1B) and the CSX Commuter rail alternatives (Alternative 3) impacted the fewest parcels (800). Alternatives that diverged from the highway or rail alignments in the area just south of downtown Nashville quickly increased the number of properties they affected by passing through residential and industrial areas south of the city.

#### *4. Minimize community and neighborhood disruption.*

This criterion in this phase of the analysis considered the number of parks, schools and hospitals that would lie within 500 feet of the alternative rights of way and thus might be adversely affected by the alternatives. The results vary greatly between the alternatives. The greatest number of impacts were created by the combination of on and off railroad alignments in Alternative 4, the LRT/DMU or BRT on the CSX alignment. This set of alternatives potentially would impact 12 parks and 7 schools. The I-24 alignments also affected a large number of sites, primarily parks. The Murfreesboro Road alignments affected the fewest sites overall and affected fewer parks but larger numbers of schools than the other alternatives. The CSX commuter rail alternative, whose right of way is almost exclusively in a long-time rail right of way, also had relatively few impacts of this type.

Affects on the Stones River National Battlefield, a historic site in the southern portion of the alignment of the corridor north of Murfreesboro, are a key piece of the environmental analysis. In this initial phase of analysis, the evaluation notes that the CSX alignment and alternatives that use that alignment would pass through the battlefield. This is particularly an issue for alignments under Alternative 4, which necessarily would require additional right of way in this area. Alternatives operating in the Murfreesboro Road and I-24 alignments would not directly affect the battlefield site.

#### *5. Minimize negative aesthetic impacts of transportation investments and, where possible, design systems that add to the aesthetic environment. (not considered in initial screening)*

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

The issue of environmental justice impacts is a complicated one of balancing the need to provide access for minority and low-income people to use a proposed transit improvement, while ensuring that they do not disproportionately suffer negative impacts of building and operating the improvement—issues such as noise, vibration, property acquisitions and other dislocations. The detailed analysis will take a more in-depth look at environmental questions. In this phase, the analysis considered the number of minority and low income persons located within 500 feet of stations and alignments. The proximity to stations considers the positive aspect of the improvement for minority and low-income communities, since proximity to stations

equates to access to the proposed improvements. Proximity to the alignment equates to the potential negative aspects.

In all cases, more minority and low income persons live near the alignment than they do the stations. Alternatives in the CSX alignment provide relatively less access to minority and low income populations than the other alternatives, and fewer minority and low income people would be negatively impacted by the alternatives in that alignment. The alternatives serving Murfreesboro Road and I-24 were relatively the same, each serving around 10,000 minority and 10,000-15,000 low income persons living within the station areas, while impacting around 20,000-25,000 minority and low income persons.

*7. Promote land use and development policies, and transportation strategies that are consistent and mutually supportive. (not considered in initial evaluation)*

*8. Provide transportation options that reduce stress. (not considered in initial evaluation)*

*9. Impacts to farmland and open space in existing rural areas of the corridor.*

This criterion measured the acres of rural land (zoned agricultural or public open space) located within 100 feet of the alignment and stations. The CSX alignment alternatives ranked best in this regard, with most of its alignment located in older, built-up areas. The I-24 BRT light alignment (Alternative 2), which veers off existing I-24 alignment, performed worst, affecting some 2,700 feet of agricultural and open space land.

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

Table 4-6 shows the scoring of criteria under Goal 5. Costs and benefits, as well as the institutional and funding structure necessary to build and operate major transit improvements, are major challenges facing any significant expansion of a transit system. Preliminary capital cost estimates, made at a conceptual, unit cost level, were used to compare the alternatives in this phase of analysis. Operating cost estimates and more detailed capital cost estimates will be made for the detailed screening of alternatives. The Steering Committee also rated the alternatives in terms of their potential for community support.

*1. Assure that total benefits of the preferred alternative investment strategy warrant their total costs.*

This key evaluation criteria under the FTA's New Starts program is made by comparing the benefits to the transportation system (estimated by the travel demand model) to the net annual operating cost and annualized capital cost of developing, building and operating the proposed system. Since model runs were not performed for this initial analysis, a full estimate of the costs and benefits are not possible. Capital cost estimates were made for each of the alternatives and sub-alternatives and offered a first comparison between them. Since all of the alternatives are roughly the same length (30-40 miles) and face many of the same issues in terms of property acquisition and terrain, the costs tended to vary more by transit type than by alignment. BRT light alternatives offered the lowest potential costs, under fifty million dollars for alternatives in both the I-24 and Murfreesboro Road alignments. BRT was next lowest. Of the rail modes, traditional commuter rail was least expensive. DMU was higher and LRT which includes overhead structures and wires and other infrastructure related to electrification, was the most

**Table 4-6  
Initial Alternatives Screening-Goal 5 Criteria**

Goals and Objectives	Initial Screening Criteria	Alternative 1: I-24 Alignment LRT/DMU or BRT		Alternative 2: I-24 Alignment BRT Light		Alternative 3: CSX Alignment Commuter Rail	Alternative 4: CSX Alignment, LRT/DMU or BRT				Alternative 5: Murfreesboro Road Alignment, LRT, DMU, BRT		Alternative 6: Murfreesboro Road Alignment, BRT Light	
		1A via I-24	1B via Airport	2A via CSX-Haywood Extended	2B via Harding/Donelson Pike		4A via CSX	4B via Airport	4C	4D	5A via Murfreesboro Road	5B via Airport	6A via Murfreesboro Road	6B via Airport
<b>Goal 5: Develop a cost-effective transportation system improvement strategy that maximizes community consensus and institutional support.</b>														
1. Assure that total benefits of the preferred transportation investment strategy recommended by the study warrant their total costs.	Capital cost estimates for right-of-way based costs (excluding vehicles and maintenance facilities), developed at a unit-cost level of detail (quantitative measure, millions of 2004 Dollars)	<b>BRT: \$290-\$370 LRT: \$670-\$830 DMU: \$480-\$600</b>	<b>BRT: \$350-\$440 LRT: \$740-\$920 DMU:\$530-\$660</b>	<b>BRTL: \$110-\$140</b>	<b>BRTL: \$30-\$40</b>	<b>COM: \$460-\$580</b>	<b>BRT: \$340-\$420 LRT: \$620-\$770 DMU: \$450-\$560</b>	<b>BRT: \$390-\$480 LRT: \$700-\$860 DMU: \$510-\$640</b>	<b>BRT: \$350-\$430 LRT: \$630-\$780 DMU: \$460-\$580</b>	<b>BRT: \$350-\$430 LRT: \$630-\$780 DMU: \$460-\$580</b>	<b>BRT: \$260-\$320 LRT: \$530-\$660 DMU: \$390-\$490</b>	<b>BRT: \$270-\$340 LRT: \$560-\$700 DMU: \$410-\$520</b>	<b>BRTL: \$40-\$50</b>	<b>BRTL: \$40-\$50</b>
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.	Order of magnitude capital costs by mode:													
	BRTL			=	+								+	+
	BRT	=	-				-	-	-	-	+	+		
	LRT	-	-				-	-	-	-	=	=		
	DMU	-	-				-	-	-	-	-	-		
COM						-								
3. Ensure that the costs and benefits are shared equitably among citizens and governmental entities throughout the region.	Will not be considered in initial screening.													
4. Maximize the leverage of local funds in obtaining State and Federal funds to support transportation investments in the corridor.	Will not be considered in initial screening.													

\*+ Positive or Better \*- Negative or Worse "= Average or Little Change

costly mode. The need to build costly flyovers and other improvements to integrate the alternatives in the existing highway operations made the I-24 alternatives slightly more expensive than the CSX or Murfreesboro Road alternatives. The Murfreesboro Road alternatives were the least expensive by a slight margin. However, the differences in costs between modes far exceeded the differences between alignments.

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

The members of the Steering Committee, based on their knowledge and opinion of the perception of transit improvements and funding strategies among representatives of local and regional transportation agencies, public officials, and members of the public. The Steering Committee focused their rankings on this measure on the overall cost. Alternatives with high estimated capital cost were perceived as being more difficult to develop and were ranked negatively; alternatives that were less expensive or had less impact were ranked positively.

As with the capital costs, the alternative varied more on this criteria according to the transit type than the alignment. Light rail and DMU alternatives tended to be rated more negatively than BRT alternatives, primarily because of cost. Alternatives in or alongside the CSX alignment, other than commuter rail, were also all ranked negatively due to possible issues with negotiating right of way use with the private rail operator in the corridor, CSX Transportation, Inc.

*3. Ensure that the costs and benefits are shared equitably among citizens and governmental entities throughout the region. (not considered in initial evaluation)*

*4. Maximize the leverage of local funds in obtaining State and Federal funds to support transportation investments in the corridor. (not considered in initial evaluation)*

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

The committee considered the three objectives under this alternative and determined to not employ criteria under this goal in the initial screening, but to consider it in the detailed and final screening of alternatives.

#### **4.5 Summary and Conclusions of Initial Screening Findings**

The initial evaluation of alternatives did not provide conclusive evidence either to reject or endorse any of the 13 sub-alternatives examined. However, it did provide a number of indicators to direct the development of a short list of alternatives on which to provide detailed evaluation:

- Preliminary estimates indicated that the capital costs of a light rail alternative serving the full length of the corridor (Nashville to Murfreesboro) would cost more than \$500 million, while DMU-based alternatives would cost more than \$400 million. Given that BRT alternatives could provide similar service at a lesser cost of capital investment, it was determined that the alternatives tested in the Detailed Evaluation would not include a light rail or DMU alternative. BRT, commuter rail and BRT Light were retained as modes to be tested in the Detailed Evaluation.

*Result:* LRT is not carried forward to detailed screening

- The evaluation did not provide sufficient information to allow the elimination of any of the three major existing alignments under consideration. Each of the alignments (I-24, CSX rail line and Murfreesboro Road) has unique characteristics, based on the prevailing transportation mode in the corridor (interstate highway, pre-automobile era rail line, and arterial highway) and the resulting development patterns are typical of those types of transportation modes. Each alignment tended to have distinct advantages and disadvantages in cost effectively serving the various transportation markets in the corridor while avoiding impacts and achieving the other goals of the project. However, no alignment clearly emerged as superior and none had any fatal flaws identified at this level of evaluation. The CSX alignment appeared to be inferior to the other alignments, in that it is somewhat more isolated than the two roadway alignments from surrounding residential and commercial development in some segments of the corridor. The corridor had clear (and related) advantages in the lesser level of environmental impacts its use would generate. The disadvantages of this alignment were not clear enough at this point to suggest its elimination as a viable option, and the desire to maintain an option using the commuter rail mode further supported its being carried forward for further analysis.

*Result:* Carry forward one option using each alignment

- All of the alternatives, except for the “bus rapid transit light” alternatives, had high estimated capital costs, ranging from \$300 million to more than \$700 million. Many members of the public, commenting at public meetings and through other channels, as well as members of the steering committee, made note of the high costs. Some on the Steering Committee as well as some members of the public expressed skepticism at the Nashville region’s ability to support such costs, particularly in the context of proposed high capacity transit improvements in other corridors.

*Result:* Develop options with awareness of the need to minimize capital costs.

- The airport alignments included in a number of options (1B, 4B, 5B and 6B) were eliminated from consideration for a number of stated reasons. The airport alignments tended to be longer than the direct alignments that served Murfreesboro Road, the CSX rail alignment and I-24. These longer alignments increase capital costs. The longer alignments also increase travel time, which degrades the alternatives’ ability to serve longer distance trips and provide travel times that are competitive with driving. The market of airport users and employees, though important, was not thought to be large enough to warrant the high costs, both financial and in terms of travel time and convenience, associated with serving it. The Steering Committee considered serving the airport using a “spur” or alternate alignment, direct service to downtown via one of the primary alignments and a secondary alignment serving the airport. However, this was thought to be too costly to consider in an initial phase of system development, although it could be considered later as an add-on once the system is developed and proves successful. Finally, routing the alignment around the airport, which is constrained from further development of much of its land, would divert the alignment from existing development while offering few opportunities for shaping new development into more transit-supportive patterns. Other options, including development of a bus circulator to connect the airport and satellite parking to BRT or rail stations in the corridor, could provide service to the airport while avoiding routing of the main north-south service through the airport property.

*Result:* remove airport alignments from consideration in detailed screening.

- As a result of public input, Old Nashville Pike, a highway extending south from Murfreesboro Road in LaVerne to downtown Murfreesboro, was identified as a fourth viable alignment for the southern portion of the corridor. The Steering Committee accepted this suggestion, and Old Nashville Pike was considered for inclusion in one of the detailed alternatives that emerged from the initial evaluation.

*Result:* Alternatives using Murfreesboro Road alignment will use Old Nashville Pike for southern portion of alignment during the detailed screening of alternatives.

Based on this analysis, the Steering Committee determined to carry forward the following alternatives for the detailed screening:

- A No-Build option consisting of the existing network with planned and programmed improvements.
- BRT or BRTL on I-24
- A Low Cost, or TSM Alternative based on the BRT service on I-24
- Commuter rail service on the CSX rail alignment
- BRT or BRTL on Murfreesboro Road and Old Nashville Pike

These alternatives and their evaluation are described in Chapter 5 – Phase II Screening of Alternatives.