

City of Lebanon

Transit Feasibility Study

Technical Memorandum #1: Transit Service Needs

**Prepared for:
City of Lebanon**

**Tennessee Department of
Transportation (TDOT)**

June 2005

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Task 1: Document the Need for Transit Services – This task includes the collection and analysis of various types of data. Demographics, socioeconomic indicators, and development patterns will be reviewed to determine if and where transit may be applicable. Field work and interviews with key stakeholders from the City and region are conducted to gain an understanding of specific needs.

Task 2: Formulate Service Concepts – Using the information and analysis conducted in Task 1, transit service concepts will be presented to the City for consideration. These concepts may range from general public dial-a-ride service to traditional fixed route bus service. The service concepts and their relationship to the Music City Star Line will be presented.

Task 3: Identify a Preferred Service Alternative – Task 3 will include a presentation to City officials on the various service concepts and their characteristics. Once a preferred concept is selected, details such as costs, estimated ridership, and potential funding sources will be prepared.

Task 4: Identify Requirements for Implementation – The implementation of transit service will require investigation into many institutional, operational, and administrative issues. This task will summarize the key issues and their associated impacts should transit service be implemented.

Task 5: Prepare a Final Plan – All of the previous tasks will be summarized into a final plan and presented to the City of Lebanon.

Structure of Technical Memorandum #1

This Technical Memorandum documents the work being done during Task 1 of the study and is comprised of six sections. Section 1 provides background information about the study and its structure. Section 2 provides information on sources of data and previous studies conducted in the region and their applicability to this effort. The third section documents demographic and socioeconomic data analyzed to determine transit markets. Section 4 reviews existing transportation available in Lebanon. Section 5 summarizes the discussions that took place during the Stakeholder Interviews. The final section presents the need for transit service in the City of Lebanon. Some of the observations and analysis discussed in this Technical Memorandum were from the result of two site visits conducted to view the area, establish potential origin and destination patterns, and meet with City officials.

2 BACKGROUND INFORMATION

To support research and data collection efforts, the City of Lebanon provided valuable background information including the following materials:

- List of major employers and number of employees;
- Preliminary development plans;
- Growth management plans, and
- Information on the proposed Music City Star Line depot in Lebanon.

Other information, such as census data, economic statistics, average daily traffic counts, and Mid-Cumberland Human Resource Agency (MCHRA) data was also collected from various sources. This warehouse of information was used as a basis to begin research and analysis of the City's demographics, future development, employment patterns, and existing transportation services – ultimately leading to the determination of need for transit in Lebanon.

One source of particular use for this project was the *Nashville Area Transit Development Plan*, completed in January 2003.

Nashville Area Transit Development Plan

The *Nashville Area Transit Development Plan* focused on the area covered by the Nashville Area Metropolitan Planning Organization (MPO), specifically Davidson, Rutherford, Sumner, Williamson, and Wilson Counties. The Plan reviewed existing conditions and travel patterns, identified transit opportunity areas, and recommended preliminary service concepts to explore for high population areas (such as Lebanon).

The Plan found that more than 5,000 home-based work trips and close to 18,000 home-based non-work trips were internal to the City of Lebanon, with an additional 5,000 work and 7,000 non-work trips destined for Lebanon. According to the 2000 U.S. Census, nearly 44% of households own 1 or less vehicles. These and other factors led to two recommendations for transit service in Lebanon; local circulator service and commuter express service from Lebanon, through Mt. Juliet, to Nashville. The local service was proposed as a “flexible” route, operating along a fixed route, but able to deviate off-route to pick up additional passengers. The commuter express service was recommended as a bridge to the introduction of commuter rail service, now anticipated to begin operations in late 2005.

Because the Transit Development Plan covered a large region, the recommendations were general in nature. This study will build off of the recommendations of the prior work by focusing on specific local transit demand, possible service configurations, and implementation strategies.

3 DEMOGRAPHIC CHARACTERISTICS OF LEBANON

Demographic and socioeconomic characteristics of Lebanon were evaluated because they are often good indicators of those likely to use transit. For example, household density, income, age, vehicle ownership, and employment density are all factors that have the potential to affect transit ridership.

According to the 2004 special Census, the City of Lebanon has approximately 21,865 residents in a land area covering 29.2 square miles. Table 1 below presents additional characteristics:

TABLE 1: CHARACTERISTICS OF LEBANON, TENNESSEE

Population	21,865 (2004 special Census)
Population 19 years and under	27%
Population 65 years and over	14%
Average Household Size	2.41
Owner-occupied Housing Units	60%
Disability Status (21 to 64 years)	21%
Labor Force (for population 16 and over)	10,495 (65%)
Average Travel Time to Work	24 minutes
Work in county of Residence	68%
Median Household Income	\$35,118

Source: 2000 U.S. Census

Household Density

An important factor in the potential success of transit is the household density of a given area. In general, fixed route services can be supported in areas of moderate to high-density development. In lower density areas, flexible routes and demand-response services generally provide a better match. Table 2, derived from the *Transit Capacity and Quality of Service Manual*, shows basic industry guidelines for type of service by density (expressed as households per acre).

TABLE 2: HOUSEHOLD DENSITY GUIDELINES FOR TYPES OF TRANSIT SERVICE

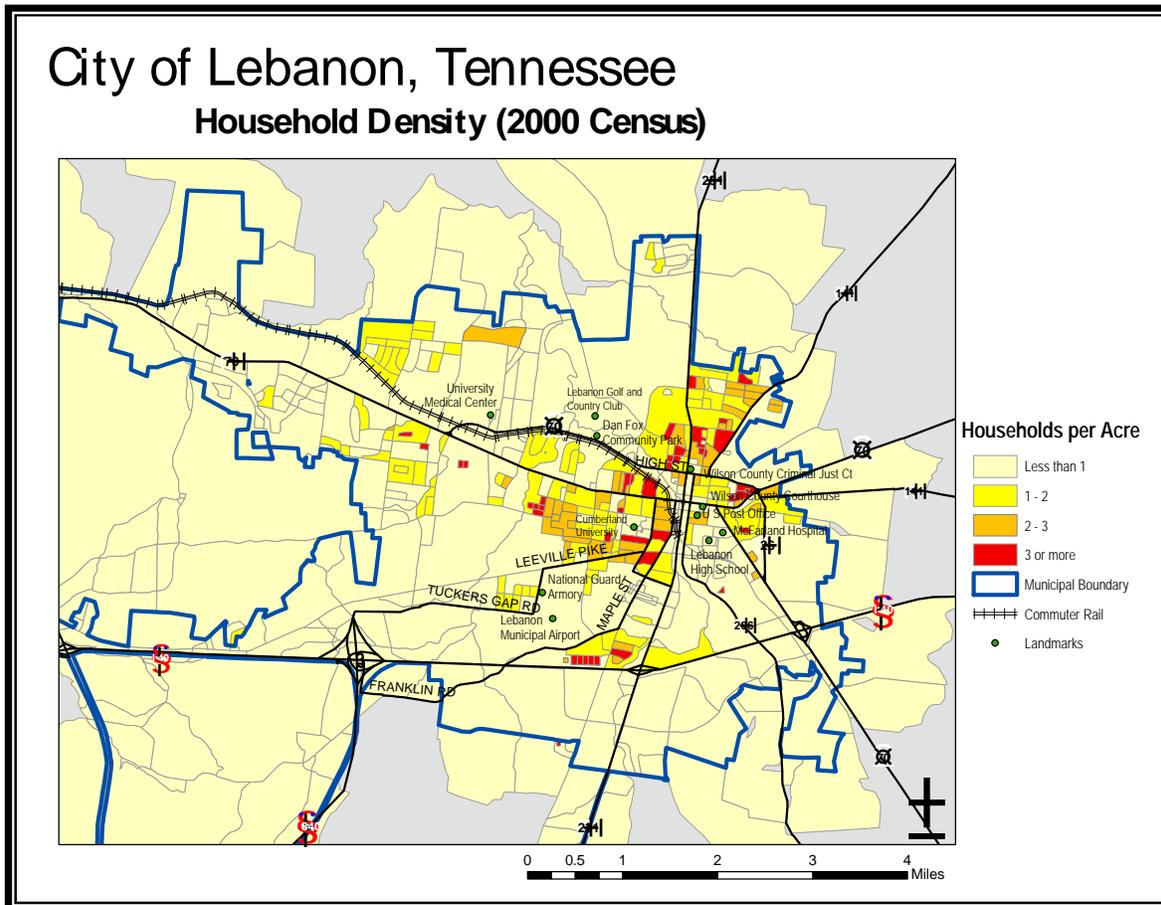
Service Type	Household Density
Fixed Route	3 HH/Acre or more
Fixed and Flexible Service	2-3 HH/Acre
Demand Response / Flexible Service	1-2 HH/Acre
Demand Response	0-1 HH/Acre

Source: *Transit Capacity and Quality of Service Manual*

Figure 1 on the following page shows the existing (year 2000) household density for the City of Lebanon. The red areas on the map indicate the locations where traditional fixed route bus service is most likely to be supported. These areas are most prevalent north of

High Street on both sides of Cumberland Street (U.S. Route 231). There are also pockets of higher household density west of Cumberland Street between Main Street and I-40.

FIGURE 1: CITY OF LEBANON HOUSEHOLD DENSITY



Transit Dependent Markets

Outside of major urban areas, the most likely users of public transportation in a car-dominated area such as Lebanon, Tennessee are individuals who may not have the option of traveling by car – seniors, teenagers, persons with disabilities, those with low incomes, and those without access to a car. Analyzing these populations can be helpful in understanding the potential for transit use in the area. If the feasibility of transit services is established, the location analysis of these markets provides insight as to where transit service should be provided. A review of 2000 U.S. Census data provided the following findings:

- Seniors for whom age has started to impair their ability to drive are of particular interest for transit service. Lebanon has a relatively average percentage of senior population with 14.0% of age 65 and over, and 7.4% of the population of age 75 and older.
- Another market for transit is children who are old enough to travel alone, but not yet old enough to drive, particularly if parents are not available to drive them to

because of work obligations. In Lebanon, 6.5% of the population is between 10 and 15, which is not a significant number considering that in these types of communities, most of these children are usually able to drive with their parents.

- A total of 21.1% of the population between 21 and 64 have a disability in Lebanon, slightly higher than the national average of 19.2%.
- In Lebanon, 35.2% of households have an income lower than \$25,000 per year and approximately 13% have an income below \$10,000.
- In Lebanon, 8.9% of the occupied housing units, or 717 households, do not own a vehicle, and 35.2% (2,826 households) own only one vehicle.

Employment

Educational, health, and social services, and manufacturing are the two industrial sectors that provide the most jobs in Lebanon. The number of jobs provided by each sector, according to the 2000 U.S. Census, is shown in Table 3.

TABLE 3: EMPLOYMENT IN LEBANON

Industrial Sector	%
Educational, health and social services	19.3%
Manufacturing	17.9%
Retail trade	12.2%
Arts, entertainment, recreation, accommodation and food services	9.5%
Professional, scientific, management, administrative services	6.9%
Construction	6.3%
Finance, insurance, real estate, and rental and leasing	6.2%
Wholesale trade	5.0%
Other services (except public administration)	4.9%
Public administration	4.4%
Transportation and warehousing, and utilities	4.4%
Information	2.3%
Agriculture, forestry, fishing and hunting, mining	0.5%
TOTAL	9,761

Source: 2000 U.S. Census

The number of jobs available in Lebanon, similar to most cities in the region, and the importance of various diverse sectors is indicative of the commercial, educational, medical, and recreational significance of Lebanon within Wilson County and the region. The major employers located in Lebanon, based on data obtained from the City, is presented in Table 4.

TABLE 3: MAJOR EMPLOYERS IN LEBANON

Employer	No. of Jobs
Dell	1,500
Toshiba	1,188
Cracker Barrel Old Country Store - 1969	750
TRW Chassis	600
Nashville Auto Auction	523
Parker Seals	410
Lochinvar	400
PFG Customized Distribution	400
LoJac Enterprises	250
Menlo Worldwide Logistics	250
Hartmann Luggage, Inc.	245

Source: City of Lebanon

According to the *Transit Capacity and Quality of Service Manual*, fixed route transit services are typically more successful in areas with employment densities above 4 jobs per acre. Based on a review of employment in the area, the locations with this type of employment density are located on the northwest and south sides of the City. Thus, fixed route transit services, targeted to commuters, would be more successful when linking these areas to areas with population density higher than 3 households per acre. Other types of services may be more appropriate to target leisure markets and trips from places with lower residential and employment densities.

4 OVERVIEW OF EXISTING TRANSPORTATION

Mid-Cumberland Human Resource Agency

The only current transit service available in the region of Lebanon is that provided by Mid-Cumberland Human Resource Agency (MCHRA). MCHRA provides demand response (or dial-a-ride) service over 6,000 square miles to the following counties:

- Cheatham
- Dickson
- Houston
- Humphreys
- Montgomery
- Robertson
- Rutherford
- Stewart
- Sumner
- Trousdale
- Williamson
- Wilson

In theory, the service is available to all residents of the area, however, given the limited resources, priority is given to elderly, disabled, and economically disadvantaged with medical needs. MCHRA is funded by the Federal Transit Administration (FTA), Tennessee Department of Transportation (TDOT), local revenues, and fares. The standard fare within the area is \$1.50, \$2.00 if a county line is crossed, and \$0.50 for an additional stop. MCHRA



provides service between 6:00 a.m. and 6:00 p.m. Monday through Friday. Service is provided with vans shown in the picture to the right, with capacity ranging between 7 and 15 passengers.

According to the *TDOT 2004 Annual Status of Public Transportation* report, MCHRA provided a total of 165,602 passenger trips in fiscal year 2004. The average cost of a trip was \$18.34 and there were 0.2 passenger trips per capita for the entire 12-county service area (with a population of 867,000). In Wilson County, a total of 21,237 trips were provided by MCHRA on 8 vehicles in fiscal year 2004. Of those trips, 94% were in Lebanon. The majority of trips made on MCHRA are for accessing work or medical facilities.

Other Means of Transportation

The main mode of transportation in Lebanon is the private automobile. According to 2000 U.S. Census Journey to Work data, 95% of Lebanon workers use a car or van for their trip to work. The main access road to the City is Interstate 40, which runs east-west along the south side of Lebanon. Lebanon has a road network with diverse thoroughfare types which provide adequate circulation to the City. In 2002, the heaviest traffic volume (excluding I-40) was recorded on South Cumberland Street (U.S. Route 231) between I-40 and Spring Street with 24,510 vehicles per day. Other heavily traveled road segments include Baddour Parkway west of Cumberland Street (16,510 Average Daily Traffic (ADT) count), High Street east of Hartsville Pike (18,400 ADT), and North Cumberland Street north of High Street (15,060 ADT). Very few trips in Lebanon are made with taxis, bicycle, or walking.

A key future mode of transportation affecting Lebanon will be the introduction of commuter rail service on the Music City Star Line. The Nashville Regional Transportation Authority (RTA) will operate the rail service providing access between downtown Nashville and Lebanon at six stations. At this time, it is anticipated service will begin in December, 2005. While no schedule has been developed, it is anticipated that three trips will operate during each of the morning and afternoon peak periods. Two of those trips will operate between Lebanon and Nashville with an estimated duration of about 52 minutes, with westbound service provided in the morning (to Nashville) and the reverse in the afternoon. At this time, there are tentative plans to provide a reverse commute trip (from Nashville to Lebanon) during the mid-morning, with a return trip during mid-afternoon.

According to the *Music City Star East Corridor Commuter Rail Service Business Plan*, estimated ridership at the Lebanon stop is about 160 per day at service initiation, growing to 230 by the year 2012. According to the RTA, the one-way trip fare between Lebanon and Nashville will be \$4.00. It should be noted that all information provided in this section is still considered preliminary. TranSystems will continue to monitor the operational details of the Music City Star Line as they become finalized and incorporate these into any service recommendations for the City of Lebanon.

The Lebanon station will be located on North Greenwood Street between the U.S. Route 70 bypass and Hill Street (see picture to right). According to the City of Lebanon, access will be available off of both the bypass and Greenwood. A total of 258 parking spaces will be provided along with 8 ADA accessible spaces.



5 STAKEHOLDER INTERVIEWS

In May 2005, a site visit was conducted to interview stakeholders and to collect additional information. A list of stakeholders was compiled by the City of Lebanon. Each stakeholder was invited to participate in 45 minute interviews held at City Hall. The following individuals contributed input to the planning process:

- Henry Harding, Lebanon Housing Authority
- Pam Tomlinson, University Medical Center
- Wallace Alsup, Lebanon Senior Center
- Larry Tomlinson, Agricultural Center
- Gary Renfro, Toshiba
- Ken Caldwell, Chamber of Commerce
- Micky Hall, Wilson County Schools
- Hershey Gehris, Prime Outlets Mall (via letter to the City of Lebanon)

In general, the stakeholders agreed on the importance of the project and were complimentary of the City for investigating the feasibility of transit. Listed below are some of the common themes heard for each of the questions asked during the interview process:

- *What should the priority of public transportation be?* Most stakeholders felt that the priority for public transportation should be to provide service to the transit dependent populations of Lebanon (seniors, those with disabilities, low income families, and those without access to a car). Other responses including getting people to work and accessing the commuter rail service once initiated.
- *What type of transit service is needed most in Lebanon?* Most stakeholders felt that a local service was needed. Many recognized the fact that the commuter rail service will address the need to get to and from Nashville. Other responses included getting to and from special events (such as the Agricultural Center for the Annual Fair).
- *What are the most popular destinations in Lebanon?* Nearly all stakeholders mentioned the need to access the University Medical Center on the northwest side of the City. Other important destinations included the Walmart on Route 231, K-Mart and Kroger on U.S. Route 70, Prime Outlets Mall, and in the future, the Hartmann Drive corridor.
- *Where are most people originating to access these destinations?* The stakeholders seemed to think that many of those accessing the hospitals and grocery stores were originating from the north and west sides of the city, which is consistent with the population density patterns analyzed. The hospital and Prime Outlet Mall seems to draw visitors both locally and regionally.

- *What are the challenges to implementing transit service?* Most stakeholders mentioned that educating people about how to use the service would be the most important challenge to implementing and sustaining transit service. The “unknown” of how residents will react to service was also a common theme. Somewhat surprisingly, only one stakeholder mentioned funding as a challenge to implementing transit service.
- *Is transit needed in Lebanon?* Most stakeholders felt that transit was needed in Lebanon and that residents would use it if it were safe, convenient, relatively inexpensive, and reliable. The need for an all-day mobility option seemed to be a common theme. Several stakeholders mentioned the taxi service that operates in Lebanon and that trips can be made anywhere in the City for \$5.00. However, the service ends early and wait times can be rather long. The stakeholders felt that once people got used to the idea of transit service, it would become a valuable asset to the community.

6 CONCLUSIONS: THE NEED FOR TRANSIT IN LEBANON

Based on the quantitative and qualitative data collected and analyzed as a part of Task 1, it can be concluded that there is a mobility need in Lebanon that could be served by transit service. Future tasks in this study will determine the exact configuration and type of service suitable for the area.

The demographic and socioeconomic figures in Lebanon portray a community with significant transit dependent markets and with sufficient density and economic activity to support the introduction of transit service. Lebanon has clusters of population with limited access to private vehicles, lower incomes, and people with medical needs. There are also several large employers in the area which may attract some trips. Because of the initial configuration of the Music City Star Line, reverse commute options (those accessing jobs in Lebanon from home locations in Nashville) may be limited. However, feeder bus service to the Lebanon station (for those living in Lebanon and accessing jobs in Nashville) is a service concept worth exploring.

Based on the information collected, likely trip origin areas for transit services are residential zones with low auto ownership and higher densities such as the area bounded by Hartsville Pike, Cumberland Street, and Oakdale, and the area bounded by Leeville Pike, Dawson Lane, and Main Street. Likely destination areas include the U.S. Route 231 corridor south past I-40 (including the Prime Outlets Mall and Industrial Parks), the University Medical Center (UMC), the area including the McFarland Campus of UMC and Lebanon High School, the Baird Industrial Center, the Coles Ferry/Castle Heights intersection (including the Lebanon Senior Center and Jimmy Floyd Family Life Center), and the U.S. Route 70 (Main Street) corridor.

As reinforced in the Stakeholder Interviews (see Section 5), it will be vital to develop a service that is reliable and available throughout the day. It will also be important to educate residents about the benefits of transit. One common theme heard from Stakeholders was to begin the service with a large event so that the benefits and reliability of transit service can be seen first hand. This will obviously be dependent on the course of action the City wishes to pursue, but one opportunity would be the Annual Fair, typically held in August of each year.

Although in its majority Lebanon is a typical auto-dependent mid-size community with low residential densities, it has retained an active downtown square, two important regional destinations (i.e., the Prime Outlets Mall and University Medical Center), some areas of high residential density, and active commercial and entertainment trips. Thus, the City of Lebanon has the ability to generate and attract a significant number of trips, some of which can be served by transit.

City of Lebanon

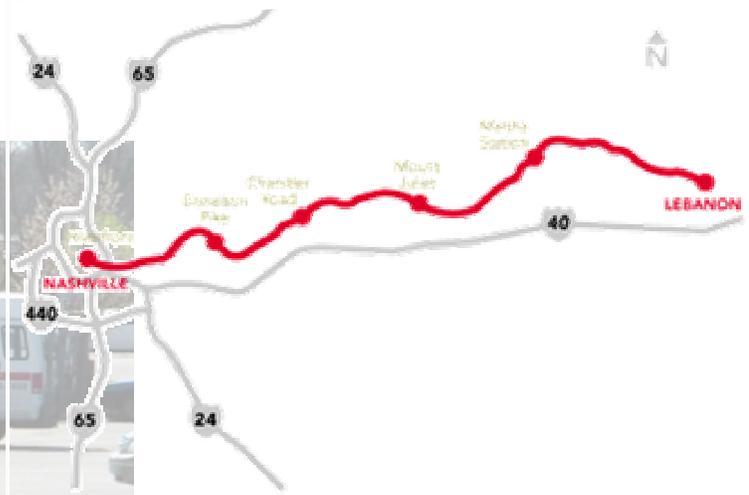
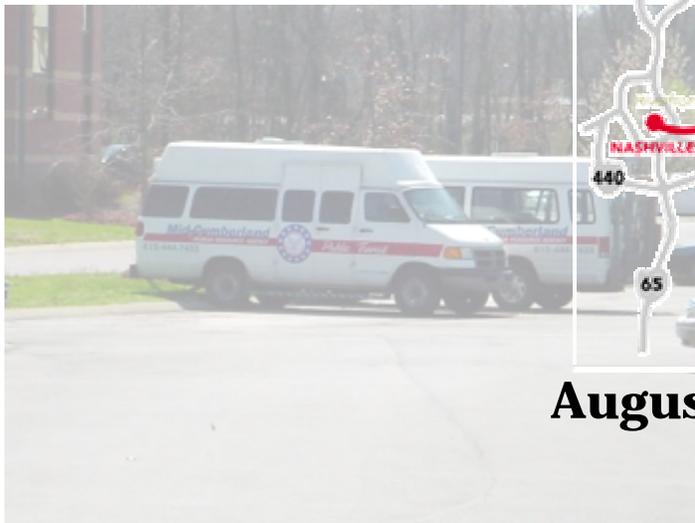
Transit Feasibility Study

Technical Memorandum #2: Service Alternatives

Prepared for:

City of Lebanon

Tennessee Department of
Transportation (TDOT)



August 2005

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1 INTRODUCTION

In February, 2005 the City of Lebanon approached the Tennessee Department of Transportation (TDOT) for planning assistance to study the feasibility of starting new transit services in Lebanon. The introduction of new commuter rail service (the Music City Star Line between Nashville and Lebanon) brings with it the opportunity to study the feasibility of intra-city transit that will play a role in making the rail service more accessible to City residents and workers and enhance mobility in the community.

In April, 2005, the City of Lebanon initiated the Transit Feasibility with the overall objective of analyzing the need for transit service in the Lebanon area. If a need for transit exists, a preliminary plan to provide those services would be provided.

The project included the following five tasks:

Task 1: Document the Need for Transit Services – This task includes the collection and analysis of various types of data. Demographics, socioeconomic indicators, and development patterns will be reviewed to determine if and where transit may be applicable. Field work and interviews with key stakeholders from the City and region are conducted to gain an understanding of specific needs.

Task 2: Formulate Service Concepts – Using the information and analysis conducted in Task 1, transit service concepts will be presented to the City for consideration. These concepts may range from general public dial-a-ride service to traditional fixed route bus service. The service concepts and their relationship to the Music City Star Line will be presented.

Task 3: Identify a Preferred Service Alternative – Task 3 will include a presentation to City officials on the various service concepts and their characteristics. Once a preferred concept is selected, details such as costs, estimated ridership, and potential funding sources will be prepared.

Task 4: Identify Requirements for Implementation – The implementation of transit service will require investigation into many institutional, operational, and administrative issues. This task will summarize the key issues and their associated impacts should transit service be implemented.

Task 5: Prepare a Final Plan – All of the previous tasks will be summarized into a final plan and presented to the City of Lebanon.

Technical Memorandum #1 Findings

Technical Memorandum #1: Transit Service Needs (June, 2005) found that there is a mobility need in Lebanon that could be served by transit service.

The demographic and socioeconomic figures in Lebanon portray a community with significant transit dependent markets and with sufficient density and economic activity to

support the introduction of transit service. Lebanon has clusters of population with limited access to private vehicles, lower incomes, and people with medical needs. There are also several large employers in the area which may attract some trips. Because of the initial configuration of the Music City Star Line, reverse commute options (those accessing jobs in Lebanon from home locations in Nashville) may be limited. However, feeder bus service to the Lebanon station (for those living in Lebanon and accessing jobs in Nashville) is a service concept worth exploring.

Although in its majority Lebanon is a typical auto-dependent mid-size community with low residential densities, it has retained an active downtown square, two important regional destinations (i.e., the Prime Outlets Mall and University Medical Center), some areas of high residential density, and active commercial and entertainment trips. Thus, the City of Lebanon has the ability to generate and attract a significant number of trips, some of which can be served by transit.

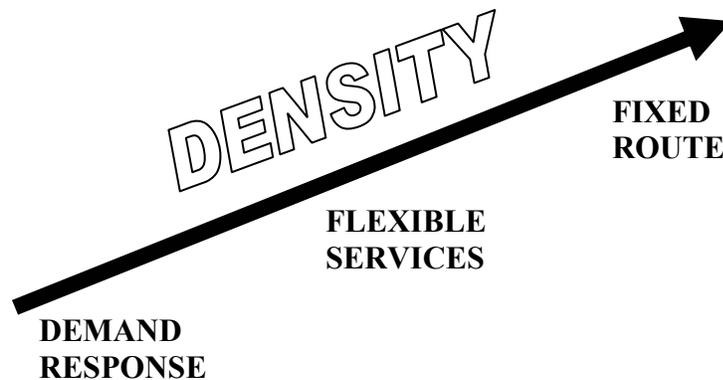
Structure of Technical Memorandum #2

This Technical Memorandum documents the work being done during Task 2 of the study and is comprised of three sections. Section 1 provides background information about the study and its structure, along with a brief review of findings from *Technical Memorandum #1: Transit Service Needs*. Section 2 presents an overview of the different types of transit service in operation throughout the country today and lists three possible options for consideration in the City of Lebanon. Section 3 summarizes the characteristics of the three options, providing an overview of the advantages and concerns with each option.

2 SERVICE ALTERNATIVES

Transit bus service can be provided in many different forms, ranging from fixed route to demand response, or dial-a-ride, service. Fixed route bus service is designed to travel along a designated route at set times and frequencies throughout the day. Demand response service is a door-to-door service operated in response to users' requests. There are also hybrids of bus service, often referred to as flexible, or deviation services. This type of service operates along a fixed route, but users have the option of calling in advance (or indicating to a driver when on the bus) to request a pick-up or drop-off within a defined zone from the fixed route. Some transit providers employ this type of service as a way to meet ADA requirements, which mandate that all fixed routes operate complimentary paratransit service within $\frac{3}{4}$ mile. There are also intercity bus services, or express bus, that link heavily populated areas in a region.

The type and configuration of transit bus service is dependent on the operating environment. As noted in *Technical Memorandum #1: Transit Service Needs*, key factors to consider are the population and employment density of a given area. The more dense population and employment is in a given area, the more applicable fixed route services are (see below).



Additional transit services include heavy and light rail, automated guideway service, and Bus Rapid Transit (BRT). These types of services are more applicable to urbanized areas. The service alternatives presented for the City of Lebanon all use bus as the primary mode. However, with the introduction of new commuter rail service (the Music City Star Line between Nashville and Lebanon), efforts should be made to coordinate these different modes of transit service.

Based on the characteristics of the service area analyzed in *Technical Memorandum #1: Transit Service Needs*, previous analysis conducted in the *Nashville Area Transit Development Plan*, and the expertise of the consulting team, the service alternatives were narrowed down to the following three different service types that may address the identified transit need in Lebanon:

- Expanded Demand Response Service within Lebanon
- Express Bus Service between Nashville and Lebanon
- Flexible Route Service within Lebanon

The first alternative is to expand the coverage of the demand response service currently provided by Mid-Cumberland Human Resource Agency (MCHRA) to serve not only disadvantaged communities but the general public with the same type of operation. The second alternative is to supplement the commuter rail service between Nashville and Lebanon with an express bus option, addressing the reverse commute and midday markets. The third alternative is to create a set of flexible bus routes operating within Lebanon. Although these alternatives are described in some detail below, the final agreed upon alternative may wind up being a combination of them.

Alternative 1: Expanded Demand Response Service within Lebanon

The first alternative is to provide door-to-door, demand responsive service to all Lebanon citizens and visitors. Mid-Cumberland Human Resource Agency (MCHRA) currently provides this type of service in the Lebanon area. In theory, the service is available to all residents of the area; however, given the limited resources, priority is given to elderly, disabled, and economically disadvantaged with medical needs.

One option for this service alternative is to provide MCHRA with more resources to expand their demand-responsive service. Another option is to have a separate agency provide service. Thus, more vehicles, drivers, schedulers, and dispatchers would be needed. The service would operate within a pre-established area, for example the City of Lebanon. Some specific distant destinations could be served, such as trips to the large employment center (anchored by Dell) located on the far west side of the city limits. The service span would be expanded to provide night and weekend service.

New vehicles would be needed to provide the expanded service. The vehicles may be similar to the passenger vans currently used by MCHRA. However, a new painting and graphics scheme could be used to create a new brand that allows marketing this service as a new one. Trips would still be requested in advance, which hinders the convenience for random travelers such as visitors, but service would be door-to-door within the coverage area.

This type of service may need an investment in a scheduling software, vehicles, drivers, schedulers, and dispatchers. It may also be feasible to contract out some of the trips with the taxi companies that exist in Lebanon.

The advantages presented by this type of service include:

- Door-to-door operation for clients
- Provides service to commuter rail station for access to Nashville
- Operational know-how already exists within MCHRA
- Operation (supply) matches demand
- Little infrastructure is needed
- Implementation may be faster and less expensive than other alternatives
- Coverage area may be the largest

Concerns for this alternative include:

- It requires advance trip reservation, which is not convenient for unexpected trips
- Expensive operation, the cost per passenger may be highest of all alternatives
- It may not have the permanence required to raise transit visibility in Lebanon
- The impetus for accessing transit is on the user, conflicting the “reliability” of transit service described by many stakeholders

Alternative 2: Express Bus Service between Nashville and Lebanon

The Nashville Regional Transportation Authority (RTA) will operate the Music City Star Line commuter rail service providing access between downtown Nashville and Lebanon at six stations. At this time, it is anticipated service will begin in December, 2005. While no schedule has been developed, it is anticipated that three trips will operate during each of the morning and afternoon peak periods. Two of those trips will operate between Lebanon and Nashville with an estimated duration of about 52 minutes, with westbound service provided in the morning (to Nashville) and the reverse in the afternoon. At this time, there are tentative plans to provide a reverse commute trip (from Nashville to Lebanon) during the mid-morning, with a return trip during mid-afternoon.

This alternative provides a supplement to the Music City Star Line commuter rail service with a focus on the reverse commute trip. Express bus service could be provided in both directions, adding service to the anticipated two inbound trips to Nashville and anticipated one reverse commute trip.

The service design would need to take into account the first and last leg of a trip and may need to be combined with another service alternative. Implementation costs may include the purchase of additional vehicles to operate the service. Operational costs will include drivers and dispatchers/coordinators.

The advantages presented by this type of service include:

- Provides additional service to downtown Nashville to supplement two rail trips
- Provides a more convenient reverse commute trip for those accessing jobs in Lebanon
- Little infrastructure is needed

Concerns for this alternative include:

- Transit dependent areas with lower densities are not provided with a transit alternative within Lebanon
- Expensive operation, and difficult to maintain ridership
- It may not have the permanence required to raise transit visibility in Lebanon
- Once rail service is expanded (number of trips), service may become obsolete

Alternative 3: Flexible Bus Service within Lebanon

This alternative proposes to create flexible bus routes in Lebanon. Flexible routes offer the reliability of fixed routes with the flexibility of being able to travel off a specific path to pick up and drop off passengers. Possible destinations would include University

Medical Center, the Main Street corridor, the downtown square, the McFarland Campus of UMC, the new rail depot, high density and transit dependent markets north of downtown, the Baird Industrial Center, the Coles Ferry/Castle Heights intersection, the south Cumberland corridor, and the Prime Outlets Mall and industrial areas south of I-40.

The specific routing, span of service, and frequency cannot be determined at this point, but it would be expected to provide service from at least 6:00 a.m. to 6:00 p.m. On-time service should be provided at least every 30 minutes in the peak and every 60 minutes off-peak to generate a sense of reliability among potential users. The service would be flexible enough to travel off route to pick up or drop off passengers. For instance, if a route traveled from downtown to the Prime Outlets Mall, the service could be designed to travel off route for a certain distance (typically 3/4 mile) or to a certain boundary. Again, this type of service design addresses ADA requirements while expanding coverage to additional areas.

While there is no fixed route service currently in Lebanon, its implementation should not pose an operational challenge due to the extensive knowledge on fixed route operation in the state and the country. Implementation costs may include the purchase of additional vehicles and shelters for the stops. Operational costs will include additional drivers and dispatchers/coordinators.

Although there is less door-to-door operation of service, the cost per passenger may be the lowest. In addition, a sense of permanence may be gained due to the infrastructure (i.e. shelters, terminals) and fixed nature of the services, which encourages users to rely more in the service and consider the transit system when making decisions (i.e. where to live, where to work, what trips to make).

One of the advantages of a route that operates in the same fashion every day is that people already know how the system in general works, and they are not deterred to use it due to fear of the unknown system. On the other hand, if the system is too conventional, it may not attract significant ridership due to the usual poor image of bus service. This image, and its performance, may be improved with the use of transit priority treatments in congested intersections or segments. Also, the use of an exciting and different vehicle (i.e. historic trolley, futuristic vehicle), graphic scheme, or brand may also help to attract riders to the new system, a theme mentioned by many stakeholders.

The advantages presented by this type of service include:

- Operational cost may be the lowest
- Provides service to commuter rail station for access to Nashville
- Service is familiar—most people already know how it works and it should not be particularly challenging to operate
- No advance reservation required to travel in the system (other than deviated portions)
- Provides a sense of permanence of the transit service
- Service concept fits best those areas with higher residential end employment densities

Concerns for this alternative include:

- Coverage area may be the smallest due to the fixed nature of the system; however, deviations enlarge the coverage area
- It may not be sufficiently attractive to encourage non-captive riders to use it
- Areas with lower densities are not provided with a transit alternative

3 QUALITATIVE SUMMARY OF SERVICE ALTERNATIVES

Table 1 summarizes the characteristics inherent to the service concepts proposed in each alternative. More details about the service including frequency, span, expected ridership, and number of vehicles, will be addressed when one of the concepts has been selected.

The table serves as a qualitative comparison between the alternatives. All of them would be feasible solutions for Lebanon; however, they target different markets, have different levels of investment, and would require different levels of maintenance and commitment from the City. These characteristics must be considered when selecting a service concept to carry forward into design.

Table 1 Qualitative Summary of Alternatives

	Alternative 1 Expand Demand Response	Alternative 2 Express Bus Service	Alternative 3 Flexible Bus Service
Service concept	<ul style="list-style-type: none"> • Door-to-door demand-responsive service 	<ul style="list-style-type: none"> • Express bus service to and from Nashville with focus on reverse commute 	<ul style="list-style-type: none"> • Fixed route service with on-demand deviations to pick up and drop off riders
Target Markets	<ul style="list-style-type: none"> • Mostly non-commuters in trips that allow a leeway on pick-up time and on-board time • All residents of Lebanon 	<ul style="list-style-type: none"> • All commuter trips • Lebanon residents working in Nashville • Those accessing jobs in Lebanon 	<ul style="list-style-type: none"> • Both commuter and non-commuter trips • Some residents – those along service corridors • Some visitors
User convenience	<ul style="list-style-type: none"> • Door-to-door service (+) • Fewest stops – almost an individual service (+) • Advance trip reservation required (-) • Allow leeway in pick-up times (-) 	<ul style="list-style-type: none"> • Set schedule patterned around work hours (+) • Approximate waiting time known (+) • Few stops, express service (+) • User must access a stop or park and ride lot (-) • Complimentary service needed (-) 	<ul style="list-style-type: none"> • Known route and schedule (+) • Shortest dwell time (time at stops) (+) • More stops (-) • User must access a stop (-) • Deviations take time (-)
Coverage	<ul style="list-style-type: none"> • Largest coverage – i.e. all residences within City of Lebanon 	<ul style="list-style-type: none"> • Small coverage – point to point service focusing on work coverage, complimentary service needed 	<ul style="list-style-type: none"> • Medium coverage – catchment area around the stops along the route and deviations
Attractiveness / Image	<ul style="list-style-type: none"> • Not very noticeable service by itself, it may need a larger marketing effort 	<ul style="list-style-type: none"> • Somewhat noticeable due to size of buses, could be coordinated with Music City Star Line service image 	<ul style="list-style-type: none"> • Somewhat noticeable due to shelters but may not be particularly enticing due to poor image of conventional buses
Capital Investment	<ul style="list-style-type: none"> • Vehicles 	<ul style="list-style-type: none"> • Vehicles • Optional: transit priority treatments 	<ul style="list-style-type: none"> • Vehicles • Shelters • Optional: transit priority treatments
Operational Cost	<ul style="list-style-type: none"> • Drivers • Schedulers/Dispatchers • Cost per passenger is high because trips are almost individual • Close match of service and demand 	<ul style="list-style-type: none"> • Drivers • Schedulers/Controllers • May have moderate/high cost per passenger • Close match of service and demand 	<ul style="list-style-type: none"> • Drivers • Shelters • Probably less hours of operation per passenger due to aggregation of trips • More difficult to match closely service and demand

Notes (+) Positive characteristic (+/-) Neutral characteristic (-) Negative characteristic

Table 1 Qualitative Summary of Alternatives (continued)

Permanence	<ul style="list-style-type: none"> • May not be regarded as a permanent service – people not likely to make decisions based on transit service 	<ul style="list-style-type: none"> • May not be regarded as a more permanent solution due to expanded commuter rail service anticipated in the future 	<ul style="list-style-type: none"> • May be regarded as a more permanent solution due to infrastructure (stops) – people are slightly more likely to make decisions based on transit service
Implementation	<ul style="list-style-type: none"> • May be fastest to implement – similar to current operation 	<ul style="list-style-type: none"> • Implementation can be coordinated with Music City Star Line (scheduled for December, 2005) 	<ul style="list-style-type: none"> • May be long to implement – need to procure and set up stops and on-demand procedures