Chapter 5 Service Delivery Policy and Implications

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

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

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

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

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

Temporal Availability

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

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

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

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

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

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

Geographic Availability

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

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

Residential Distance to Transit

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

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

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

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

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

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

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

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

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

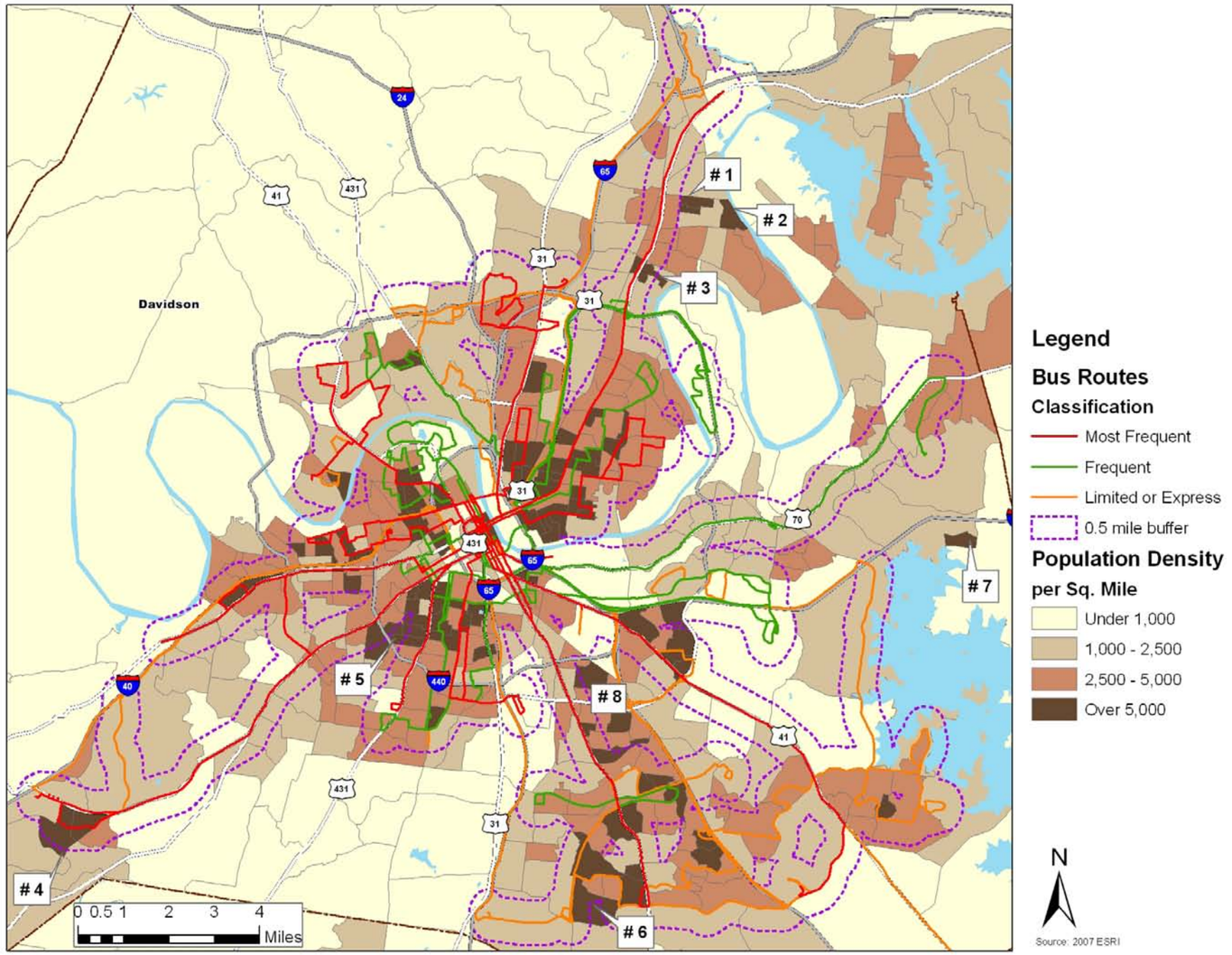
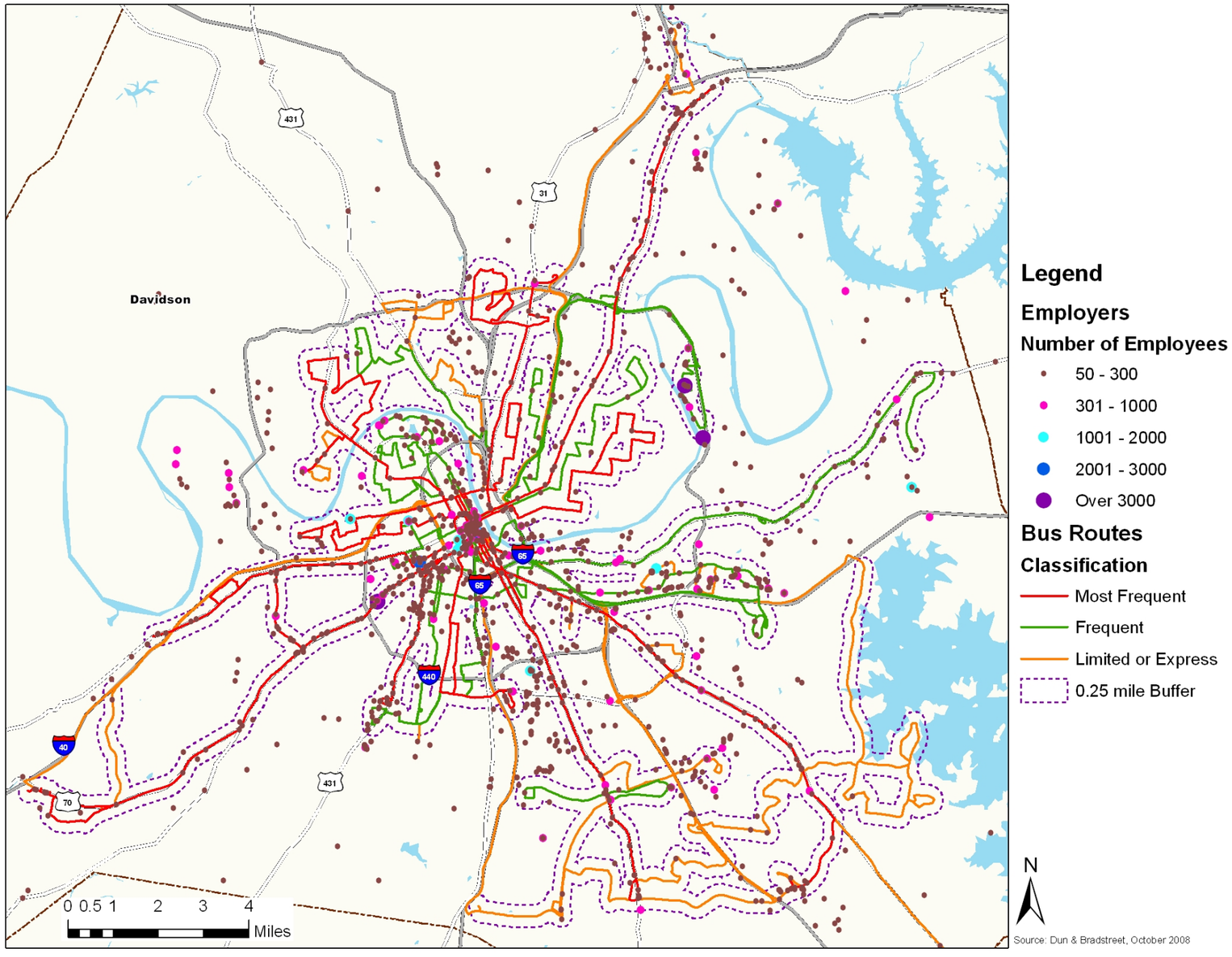


Figure 5-2: Nashville Employers and ¼ Mile Buffers for MTA Service



Pedestrian Access

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

Transit Supportive Areas

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

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

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

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

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

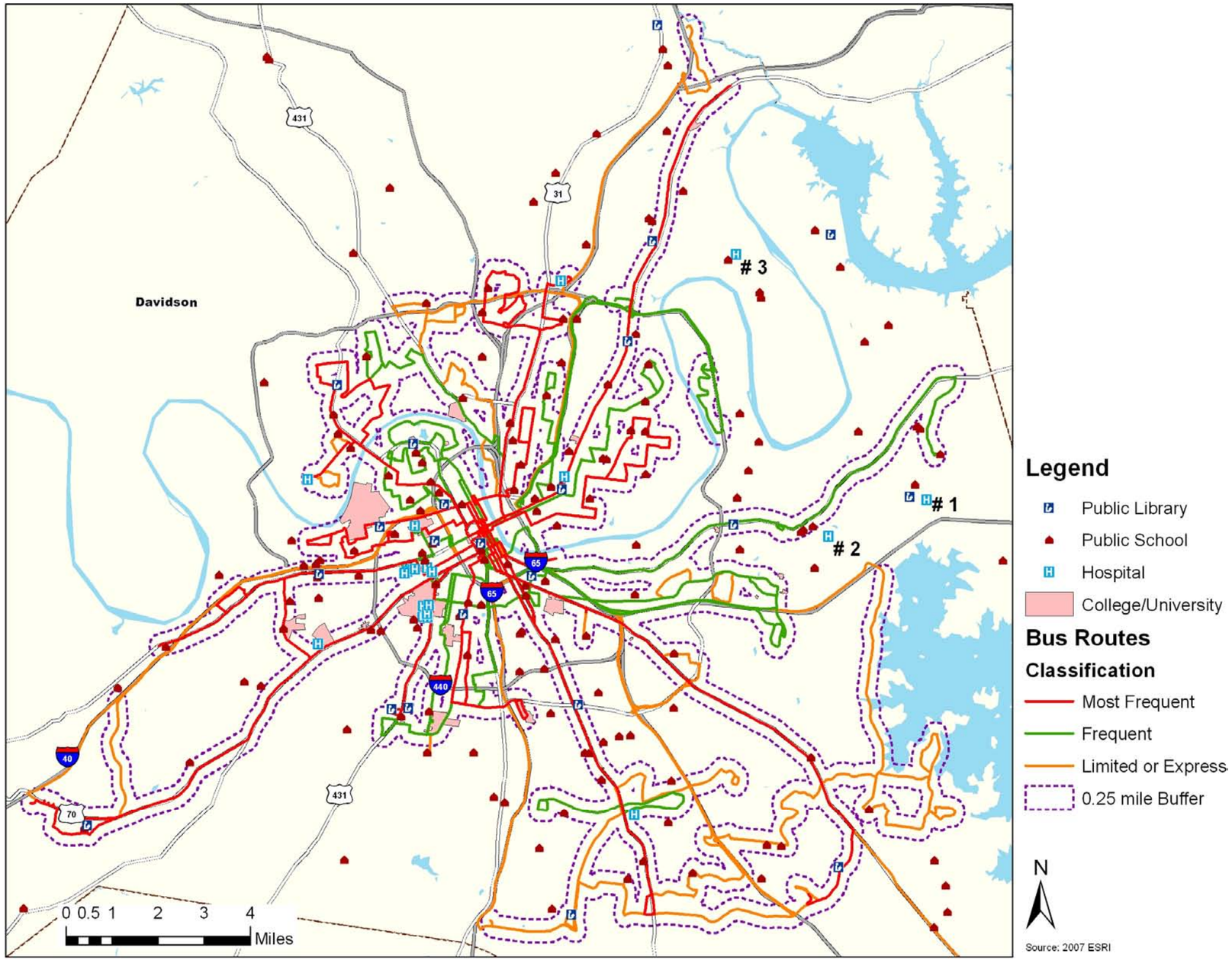


Figure 5-3 provides a picture of many of the specific destinations that will support transit use. Pink in Figure 5-3 indicates colleges or Universities. Most of these have MTA routes within ½ mile.

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

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

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

Park and Ride

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

Table 5-3: MTA Park and Ride Lot Utilization

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

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

The MTA Service Analyzer Software

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

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

Summary of Geographic Analysis

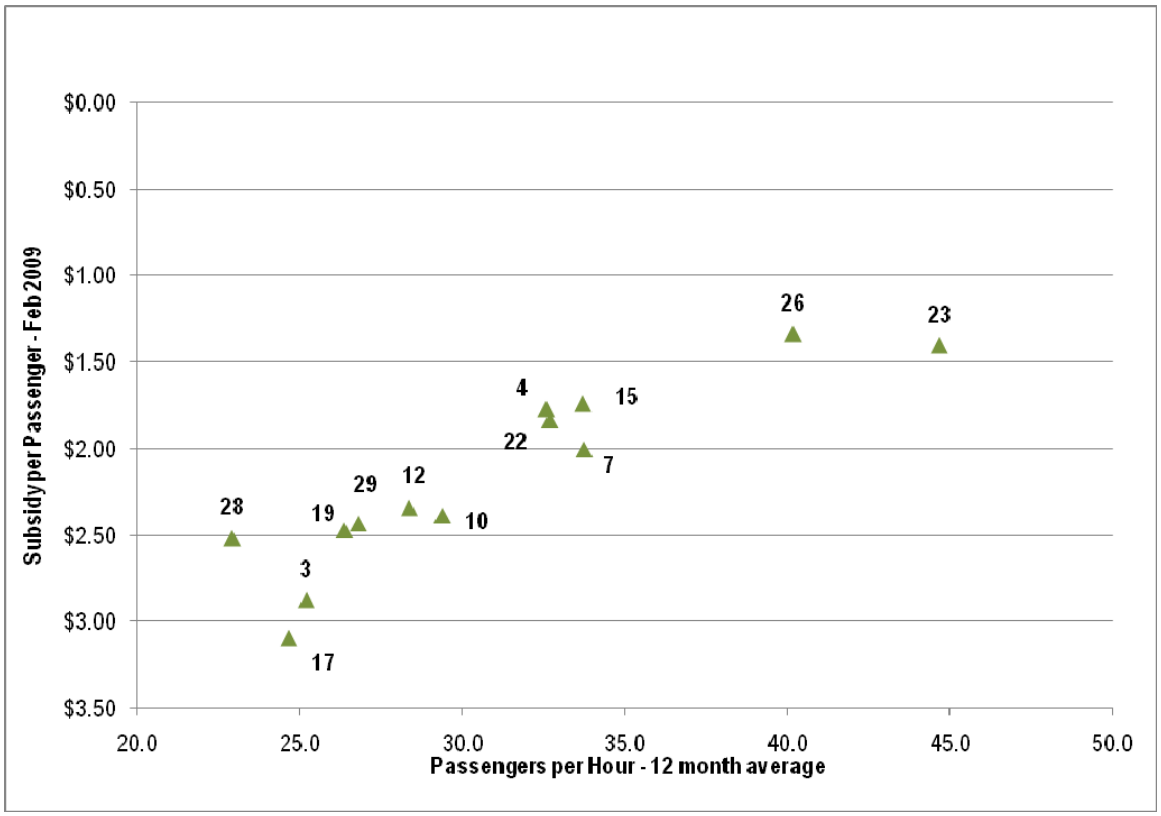
The data on population and employment in Nashville/Davidson County indicate an area that has been growing for several decades and that is expected to continue to grow through 2030. An analysis of population from 2007 ESRI data, employment from 2008 Dun and Bradstreet and land-use data from Metro planning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

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

Cost Effectiveness and Service Effectiveness Standards

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

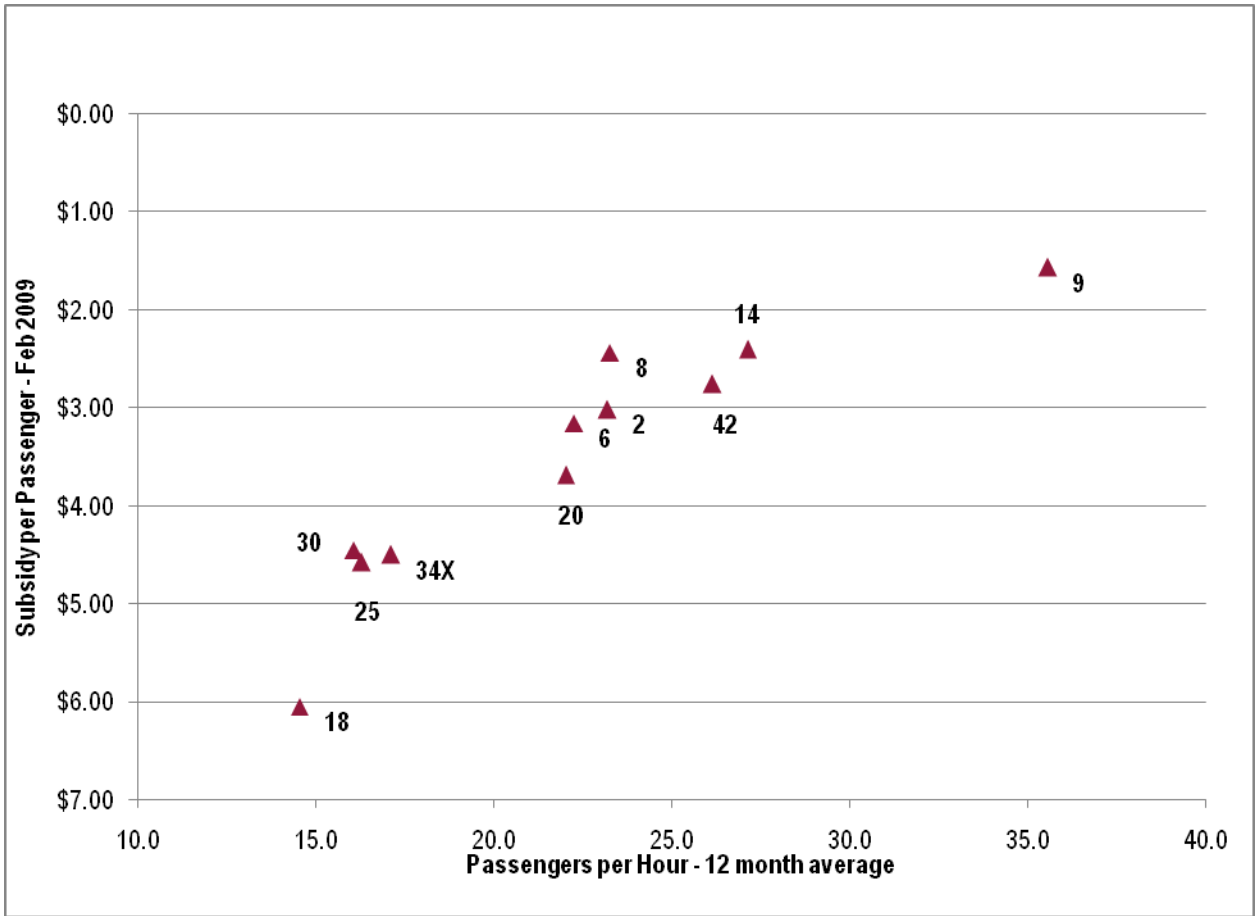
Figure 5-4: Cost and Service Effectiveness of the Most Frequent Routes (Numbers Indicate Route)



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

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

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



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

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

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

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

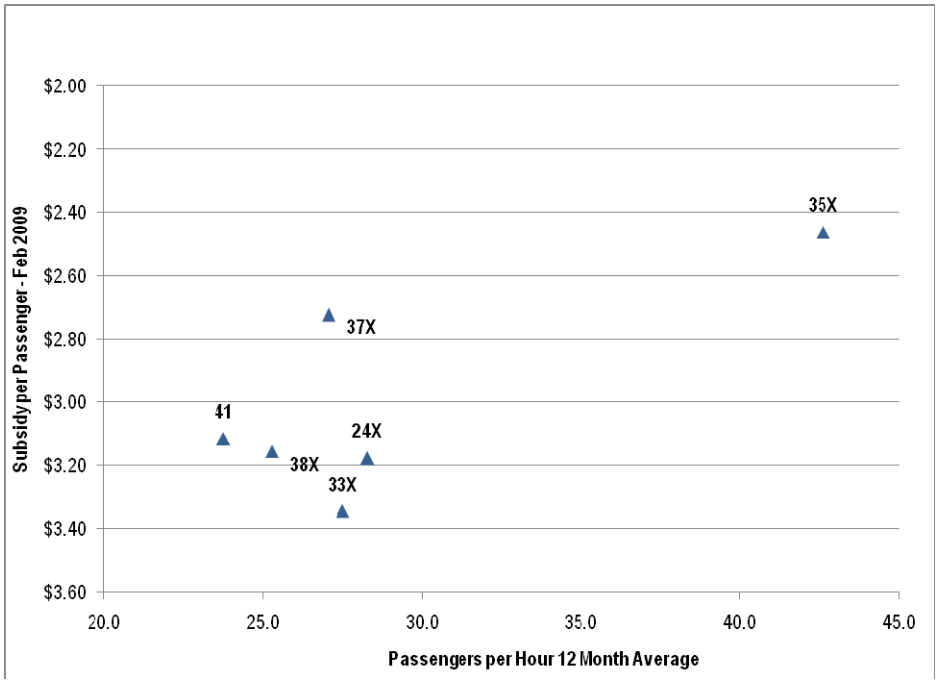
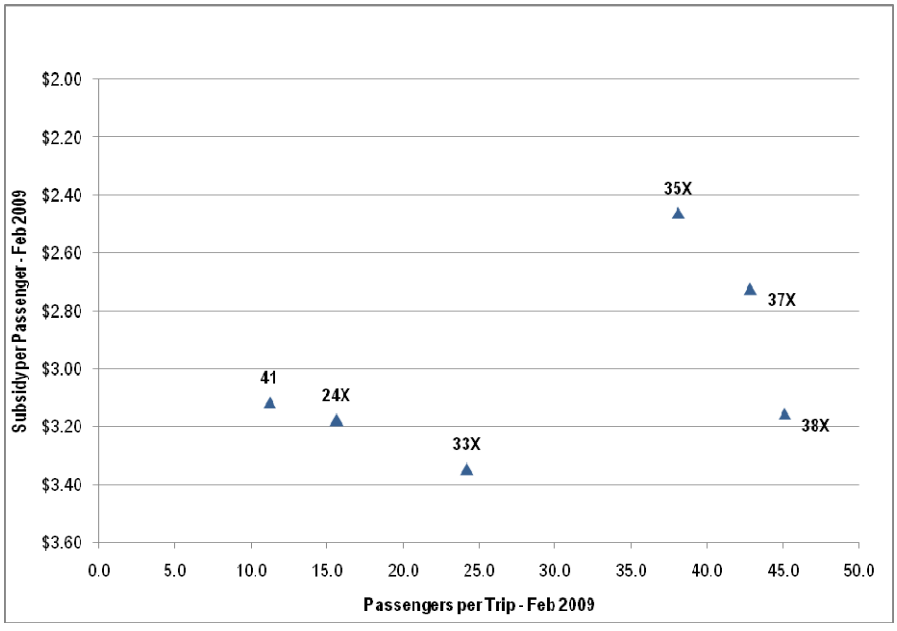


Figure 5-7: Cost and Service Effectiveness of the Commuter Routes (Passengers per Trip)



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

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

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

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

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

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

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

Summary

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

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

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