

Charlottesville-Albemarle
Regional Transit Authority Plan

Appendix E

Service Standards

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1 Executive Summary

Performance criteria, measures, and service standards are established by transit agencies to provide a systematic method to determine:

- Effectiveness in serving the community and meeting agency goals
- Efficiency in the use of resources

Service standards are benchmarks used by transit management to monitor service efficiency and effectiveness.

Performance criteria are established by the governing body of the agency. These criteria define which aspects of the operation are considered by the governing body to be of most importance in assessing how well the agency is meeting its established goals.

Performance measures are the quantitative or qualitative data that are used to track the performance of the system. Specific measures are associated with each criterion, for example if one criterion is frequent service, then the time between scheduled buses (headway) is a measure. Similarly, if generating a certain proportion of operating revenues from user charges is a criterion, then the farebox recovery ratio (the ratio of revenues obtained from passenger fares to system operating cost) is a performance measure.

Service standards are the values of the performance measures that a system strives to achieve. If on-time performance is a measure, then the standard may be 95 percent. If farebox recovery is a measure, then 15 percent may be the standard.

These standards serve as benchmarks that are used to:

- Determine what new services are required, where, and when
- Identify services that are performing well and should be supported
- Identify services that are not meeting expectations and should be modified or terminated

In addition, the standards can be used to guide the formation of route improvement proposals.

Transit agencies use the standards in two ways: for major reviews of resources and services to assess the overall system for modification and for regular, often monthly, ongoing service monitoring. Regular monitoring of performance by transit management is essential to determine when established services are no longer achieving an acceptable level of performance so that some action (e.g. increased marketing, reduced frequency,

shorter service span, elimination of service, etc.) is necessary to preserve system resources.

The development of service standards is based on several key factors including:

- Policies established by the governing body of the transit agency
- Suitability to the characteristics of the service territory and requirements
- Consideration of the cost of achieving the desired level of performance
- Ease of evaluating each standard (the parameters defined in each standard permit a straightforward evaluation of actual system performance and set forth clear guidelines for evaluating service alternatives or determining when action is required)
- Prevailing practice in the transit industry

Establishing standards for transit services often involves a tradeoff between the quality of service as perceived by transit users—both current and potential riders—and the cost of providing services. In many transit agencies efficient use of scarce resources has been for many years of primary importance. In such circumstances, the performance criteria typically stress serving the greatest number of passengers or minimizing the operating subsidy. The associated measures relate to factors such as passengers per mile, subsidy per passenger, and farebox recovery ratio. The service standards associated with these measures are often based on the average values observed for the specific system at some point in time. The objective is to strive to exceed, or at least not fall below, the adopted standards in future years.

An alternative approach to setting standards is to define what it is that an agency is seeking to achieve in terms of service to its customers. Coverage (i.e., the proportion of the service area within walking distance of a bus stop) or frequency are customer oriented performance measures. The standards adopted reflect both the policy direction by the governing body and the fiscal resources available to achieve those standards.

The final set of service criteria, measures, and standards that would be applied by the organization providing transit service to Charlottesville and Albemarle County will be determined by the board of directors or other adopted policy level body established to oversee the agency. The proposed set of service measures and standards, intended for the fixed-route services, address four major factors:

- Service coverage
- Patron convenience
- Fiscal condition
- Passenger comfort

These factors have general applicability. The specific standards established will reflect the relative weight that the policy board places on effectiveness vs. efficiency. As of January 2008, the direction appears to be that providing the highest quality transit service to the community in order to offer an attractive travel choice has greater weight than the cost of the services. The suggested values provided for each measure reflect this policy direction.

In any case, it must be realized by both the staff of the transit agency and its governing body that the standards must be treated as guidelines that serve to indicate a possible need for action rather than absolute rules that requires action. There will always be situations where a particular route or service fails to meet one or more standards but for which there are other overriding reasons for retaining the service. Great care will be required when these measures and standards are first applied to CTS or transit authority services so that expectations of service and patterns of transit use that have developed over many years are not needlessly disrupted. In essence, there should be agreement that for at least the first few years a “hold-harmless” policy will apply to historic services.

The suggested service measures and standards for fixed-route services are shown in Table 1. In response to the direction received at the Workshop held on February 11, 2008 the proposed standards reflect a very high quality transit service – one that is significantly more intensive than current CTS operations with commensurately greater capital and operating costs. The policy making body of the transit authority, once established, will need to revisit the proposed standards to confirm that they reflect appropriate policies.

Demand-response or paratransit services, such as those operated by JAUNT, are quite different from fixed-route, fixed-schedule operations. The performance criteria, performance measures, and service standards that would apply would be quite different. JAUNT is the operator of the “LINK” service offered by CTS in the area of Holmes Ave. and the Greenbrier neighborhood. If the regional transit authority chooses to continue to operate similar services, appropriate service measures and standards will be needed. The suggested service measures for demand-response services operated in lieu of fixed route are shown in Table 2.

Table 1: Summary of Service Measures and Minimum Standards – Fixed Route/Fixed Schedule

Service Coverage					
Availability	Production	4 dwelling units or more per acre			
	Attraction	50 employees or more per acre			
Frequency		Headway			
	Period	Priority (min)	Local (min)	Trunk (min)	Express Trips
	Weekday Peak	5-14	15-20	15-20	2
	Weekday Off-peak	15-20	21-30	15-20	—
	Saturday	10-14	15-20	15-20	—
Sunday	0	0	15-30	—	
Span	Period	Start Time	End Time	Total Hours	
	Weekday	6:00 am	Midnight	18	
	Saturday	6:00 am	Midnight	18	
	Sunday	7:00 am	8:00 pm	13	
Patron Convenience					
Speed	Location	Operating Speed			
	Core	8 to 12			
	Fringe	10 to 14			
	Outlying	12 to 18			
	Priority	25 to 35			
Loading	Service	Load Factor			
	Local	0.76-1.00			
	Trunk/Priority	1.01-1.25			
	Express	0.76-1.00			
Bus Stop Spacing	Location	Spacing			
	Core	5 to 6 per mile			
	Fringe	3 to 4 per mile			
	Outlying/Priority	2 or 3 per mile			
Dependability	Period	Local (%)	Trunk (%)	Express/Priority (%)	
	Peak	90	90	95	
	Off-peak	95	95	—	
	Trips Operated	99.80%			
	Pull-outs Operated	99.90%			
	Miles Per Road Call	6,000 miles			
Crash Ratio	Fewer than 10 per 100,000 vehicle miles traveled				

Table 1: Summary of Service Measures and Minimum Standards – Fixed Route/Fixed Schedule (Continued)

Fiscal Condition*				
Farebox Recovery (applies only for services on which fare is charged)	Service Type	Passengers Per Vehicle Hour		
	System			
	Local	12		
	Trunk/Priority	12		
	Express	8		
	Route	Local	Trunk/Priority	Express
	Successful (Over 80% of system average)	Over 9.5	Over 9.5	Over 6.4
Acceptable (Over 60%)	7.2-9.5	7.2-9.5	4.8-6.4	
Problem (Under 60%)	Under 7.2	Under 7.2	Under 4.8	
Productivity	Service Type	Passengers Per Vehicle Hour		
	System	18		
	Local	20		
	Trunk/Priority	22		
	Express	10		
	Route	Local	Trunk/Priority	Express
	Successful (Over 80% of system average)	Over 16.0	Over 18.0	Over 8.0
Acceptable (Over 60%)	12.1-16.0	13.1-18.0	6.1-8.0	
Problem (Under 60%)	Under 12.0	Under 13.0	Under 6.0	
Average Fleet Age		Six years		
Passenger Comfort				
Waiting Shelters	Passenger Criteria	Shelter first priority: More than 50 boardings per day. Shelter second priority: More than 25 boardings per day. Benches: More than 10 boardings per day.		
	Dimensions	Shelters a minimum of 50 square feet and enclosed on all sides except for entrances with benches and passenger information.		
Bus Stop Signs	Features	Uniform signs with route information and a unique color delineating different service types (local, trunk and express).		
Revenue Equipment	Features	Clean, comfortable, well-maintained fleet.		
Public Information	Features	Route timetables, emergency and general comment contact information, system route maps and a complaint procedure including follow-up protocol. Telephone information available from start of service to one hour prior to the end of service.		

*Note: During the first year of a new service, fiscal and productivity standards are half of those shown.

Table 2: Summary of Service Measures and Minimum Standards – Demand-Response in lieu of Fixed Route

Service Coverage				
Availability	Production Attraction	Same as fixed route		
Frequency	Period Weekday Peak Weekday Off-peak Saturday Sunday	Headway Response time (i.e., time between request for service and pickup) no greater than twice fixed-route frequency for the time period.		
Span	Period Weekday Saturday Sunday	Start Time	End Time	Total Hours
		Same as fixed-route		
Patron Convenience				
Speed	Location Core Fringe Outlying	Operating Speed (mph) N.A. N.A. N.A.		
Loading	Service Local Trunk Express	Load Factor 0.76-1.00 N.A. N.A.		
Bus Stop Spacing	Location Core Fringe Outlying	Spacing 5 to 6 per mile 3 to 4 per mile 2 or 3 per mile		
Dependability	Period Peak Off-peak Trips Operated Pull-outs Operated Miles Per Road Call	Percent On-time Local (%) Trunk (%) Express (%) 90 90 95 95 95 — 99.80% 99.90% 6,000 miles		
Crash Ratio	10 per 100,000 vehicle miles traveled			

Table 2: Summary of Service Measures and Minimum Standards – Demand-Response in lieu of Fixed Route (Continued)

Fiscal Condition*				
Farebox Recovery (applies only for services on which fare is charged)	Service Type	Farebox Recovery (%)		
	System	N.A.		
	Local	N.A.		
	Trunk/Priority	N.A.		
	Express	N.A.		
	Route	Local	Trunk/Priority	Express
	Successful (Over 80% of system average)	At least 50% of fixed-route standard		
	Acceptable (Over 60%)			
	Problem (Under 60%)			
Productivity	Service Type	Passengers Per Vehicle Hour		
	System	N.A.		
	Local	N.A.		
	Trunk/Priority	N.A.		
	Express	N.A.		
	Route	Local	Trunk/Priority	Express
	Successful (Over 80% of system average)	At least 50% of fixed-route standard		
	Acceptable (Over 60%)			
	Problem (Under 60%)			
Average Fleet Age		Three years		
Passenger Comfort				
Waiting Shelters	Passenger Criteria	N.A.		
	Dimensions	Shelters a minimum of 50 square feet and enclosed on all sides except for entrances with benches and passenger information.		
Bus Stop Signs	Features	Uniform signs with route information and a unique color delineating different service types (local, trunk and express).		
Revenue Equipment	Features	Clean, comfortable, well-maintained fleet.		
Public Information	Features	Route timetables, emergency and general comment contact information, system route maps and a complaint procedure including follow-up protocol. Telephone information available from start of service to one hour prior to the end of service.		

*Note: During the first year of a new service, fiscal and productivity standards are half of those shown.

2 Introduction

Performance criteria, measures, and service standards are established by transit agencies to provide a systematic method to determine:

- Effectiveness in serving the community and meeting agency goals
- Efficiency in the use of resources

Service standards are benchmarks used by transit management to monitor service efficiency and effectiveness.

Criteria define which aspects of the operation are of most importance; measures are the data used to track performance, and standards are the benchmarks used to:

- Determine what new services are required, where, and when
- Identify services that are performing well and should be supported
- Identify services that are not meeting expectations and should be modified or terminated

In addition, the standards can be used to guide the formation of route improvement proposals.

The development of service standards is based on several key factors including:

- Policies established by the governing body of the transit agency
- Suitability to the characteristics of the service territory and requirements
- Relationship to the policies established by the agency board of directors or governing body of the jurisdiction operating the services
- Consideration of the cost implications achieving the adopted standard
- Ease of evaluating each standard (the parameters defined in each standard permit a straightforward evaluation of actual system performance and set forth clear guidelines for evaluating needed actions and service alternatives)
- Prevailing practice in the transit industry

It should be noted that some of the service standards may conflict with one another since some of the standards relate to the benefits derived from transit service while others relate to the cost of providing service. Nonetheless, the process of establishing service standards permits the tradeoffs to be delineated and informed decisions to be made to resolve differences.

Establishing standards for transit services often requires the governing body of a transit agency to make trade-offs between the quality of service as perceived by transit users –

both current and potential riders – and the cost of providing services. Passengers seek bus services that operate very frequently (short headways), on which they can always find a seat (i.e., a load factor, the ratio of passengers to seats, less than 1), that are available at any time of day (long service span), and that are dependable (on-time performance). Transit agencies strive to meet these expectations within the constraints of available resources, but often find that compromises or tradeoffs are required. A transit agency striving to maintain a high ratio of passengers per vehicle-hour will tend to have a shorter span of service. Operating more crowded buses can reduce operating costs and lead to a higher farebox recovery ratio; a tradeoff that will decrease passenger comfort but increase operational and financial efficiency.

To assist transit agencies in evaluating services, the Transportation Research Board has developed the Transit Capacity and Quality of Service Manual (TCQSM).¹ The Manual does not address all aspects of transit operations. Rather, the Manual addresses the key factors that relate to *quality of service as perceived by customers*. For these factors, the Manual suggests ratings of “A” to “F” akin to the level-of-service ratings used in highway planning. It is not suggested that all transit systems must achieve level-of-service “A.” Rather, the Manual recognizes that, as with roadway level-of-service analysis, needs and resources will vary by community and that different levels-of-service will be appropriate not only in different communities but also in different portions of a single urban area.

Relating recommended standards to the levels-of-service defined by the Transit Capacity and Quality of Service Manual permits planners to assess the quality of service provided to customers with accepted national measures and to consider allocation of resources. However, it should be noted that the TCQSM service levels are ambitious and may either need to be altered to a lower level of performance so as to minimize costs, or to a higher level of performance in communities that strive to have exceptional service and that have few funding constraints. In either case, the standards serve as a starting point for service standard discussions. Setting service standards policy is a dynamic process; based on the evaluation of the system, further modifications may need to be made to define acceptable performance on an on-going basis. Annual reviews of service standards are recommended, especially as system investment is increased.

Other performance measures common in the transit industry are quantitative in nature and are related to the efficiency of the agency and effective use of available resources. These measures include farebox recovery ratio (proportion of system costs recovered from the farebox), passenger boardings per vehicle revenue hour, passenger boardings per vehicle revenue mile, and ratio of platform-hours to revenue-hours.

¹ *Transit Capacity and Quality of Service Manual, 2nd Edition*, TCRP Report 100, Transit Cooperative Research Program, Transportation Research Board, Washington DC, 2003

The proposed set of service standards appropriate for the regional system being considered includes four major aspects:

- Service coverage
- Patron convenience
- Fiscal condition
- Passenger comfort

A list of service standards within the four broad categories and the recommended level of service performance for each are presented in this report.

It must be realized by both the staff of the transit agency and its governing body that the standards must be treated as guidelines that serve to indicate a possible need for action rather than absolute rules that require action. There will always be situations where a particular route or service fails to meet one or more standards but for which there are other overriding reasons for retaining the service. Great care will be required when these measures and standards are first applied to CTS or transit authority services so that expectations of service and patterns of transit use that have developed over many years are not needlessly disrupted. In essence, there should be agreement that for at least the first few years a “hold-harmless” policy will apply to historic services.

Note that the standards proposed herein relate only to fixed-route, fixed-schedule transit services or demand-response services operated in-lieu of a fixed-route service. The operating characteristics and operating environment of demand-response transit such as that operated by JAUNT differ greatly from fixed-route services; different standards must apply.

Finally, as with all performance standards and metrics, a regularly scheduled monitoring system is also presented.

3 Service Standards: Fixed Route/Fixed Schedule

3.1 Service Coverage

This category deals with transit route and scheduling and includes standards related to:

- Availability
- Proximity – distance from transit service to trip ends
- Frequency – the number of times a transit vehicle traverses the route
- Service span – the length the service is in operation during the day and the days of the week on which service is provided.

3.2 Availability

The availability of transit service is an important predictor of transit success, and therefore, an important variable to consider when developing transit service standards. There are two measures of availability: proximity, or closeness, of transit to a user's origin and destination, and frequency of transit vehicles serving a route.

3.3 Proximity

The proximity of transit service to a user's origin and destination is a key variable in their decision to ride transit. Therefore, route spacing that provides transit coverage that is in close proximity to both ends of the trip becomes very important. Areas that have a high residential density should typically be directly served by transit. Routes should be spaced closer together in these dense areas to provide high quality service to the greatest number of transit users. In order to retain an effective transit service as growth and development take place, it is recommended that proper route spacing be considered during review of development proposals and site plans, especially in relation to large subdivision plots and dense residential re-developments

3.3.1 Residential Areas

Many trips originate or end at households. Areas that have high residential densities should have a superior level of transit service as research has shown that denser residential areas tend to generate higher transit ridership. Table 3, derived from the TCQSM, indicates the route coverage standards based on population density. It should be noted that density is not the only variable to consider when deciding on route spacing. Topography and the roadway network efficiency must also be considered.

Table 3: Transit Route Spacing Guidance

Population Density (Households Per Acre)			
Over 10	7 to 8.9	4 to 6.9	Under 4
1/6 mile	1/6 mile	1/4 mile	1/2 mile

The suggested standard would mandate a one-sixth of a mile (800 foot) walking distance between home and the closest route in high-density residential areas. In contrast, for those areas where residential density is relatively low, routes can be spaced farther apart while still meeting the standard. These standards are stratified by the land use density located around the perspective route. In areas that do not exhibit characteristics associated with the need or propensity to use transit, the standard permits limited or no service.

Residential densities in the Charlottesville-Albemarle study area vary greatly. The current average residential density within the City of Charlottesville is approximately 2.6 housing units per acre. However, neighborhoods located around the University of Virginia, and in the downtown area have much higher densities, well over 9 dwelling units an acre. Some areas will undoubtedly not meet these standards for fixed-route services but still be desirable areas for transit provision (e.g. the Route 250 West corridor from Charlottesville to Crozet). Service should however, meet the intent of the guide – areas with more people and higher densities of development need and will support more transit service than sparsely populated areas.

3.3.2 Non-Residential Areas

Activity centers deserve transit service if they are large enough to attract an adequate number of transit trips. To assist in this determination, "threshold levels" have been established for different categories of activity centers. These threshold levels, which are based on past experience and judgment, should serve as guidelines in determining which centers in each category should be given consideration for service. Other factors, such as the proximity of the activity center to existing bus routes, should be considered before providing new service to a major activity center.

Employers

Areas that support 50 employees or more per acre are large enough to warrant consideration for service. This standard applies to both individual employers and groups of employers in a concentrated area (e.g., industrial or office park).

Shopping Centers

Shopping trips constitute a major reason for transit travel. Shopping centers (including malls and major plazas) with more than 100,000 square feet of leased retail space are large enough to warrant consideration for transit service.

Hospitals/Nursing Homes

These usually do not attract a large number of transit trips. However, these often serve those who depend on transit. Therefore, institutions of 100 beds or more should be considered candidates for transit service.

Social Service/Government Centers

Public agencies, government centers and community facilities attract some volume of traffic, often including those who are dependant on public transportation. Since the nature and size of these facilities varies greatly, no numerical threshold will be set. Judgment, as well as trip purposes and characteristics of the users (e.g., elderly and low income citizens) should be considered in deciding whether to serve a facility.

In conjunction with adopting a standard to serve social service and government facilities, it is recommended that agreements be developed between the transit agency and local governments and social service agencies specifically stating that transit supportability will be a key component of site location or relocation decisions.

Other Venues

Transit service to other venues such as arenas, concert halls, or historic sites may be justified if events are scheduled with sufficient frequency to justify regular service and if the characteristics of those attracted to the site or attending the events suggest that a significant number would wish to use transit. Fares must be charged for any such service, the services must be regularly scheduled and operated, and must appear in published timetables. Services operated only in conjunction with infrequent events are likely to be viewed by FTA as “charter services” and, therefore, prohibited uses for vehicles purchased with federal funds and ineligible for federal assistance.

The categories of generators listed above represent the destination end of the transit trip. Combined with the availability standard for the residential end of the trip, they provide a comprehensive view of service requirements within the service area. It should be noted that application of the availability standard will provide a major input to subsequent service planning activities.

3.4 Frequency

Service frequency is one of the commonly applied measures of transit level of service. In general, frequencies or "headways" (the amount of time between consecutive buses running the same route) are established to ensure sufficient vehicles are provided at the maximum load point(s)² on a route to accommodate the passenger volume.

2 The “peak load point” is the location on a transit route where the number of passengers travelling past the point on the bus is greatest.

The TCQSM definition of the levels-of-service for frequency is presented in Table 4.

Table 4: TCQSM Frequency Level of Service Definitions

LOS	Average Headway (min)	Vehicles Per Hour	Comments
A	<10	>6	Passengers do not need schedules
B	10-14	5-6	Frequent service, passengers consult schedules
C	15-20	3-4	Maximum desirable time to wait if bus missed
D	21-30	2	Service unattractive to choice riders
E	31-60	1	Service available during the hour
F	>60	<1	Service unattractive to all riders

While it would be desirable to provide Level-of-Service A for all routes at all times of day, the standard for services provided must be balanced against the expected peak-time ridership and the resources available. For the regional system, we suggest a level of service measurement stratified by types of service (e.g. local, trunk or express route operating characteristics) and time period (weekday peak, weekday off-peak, Saturday and Sunday). Currently, CTS operates two trunk routes (Route 7 and the Free Trolley) and 12 local routes (Route 1A, Route 1B, Route 2A, Route 2B, Route 3A, Route 3B, Route 4A, Route 4B, Route 5, Route 6A, Route 6B, and Route 10). The following minimum policy headways are suggested as shown in Table 5. As trunk service is the backbone of the system, service levels should be higher than local or express routes (which would only operate during the peak periods). During all service hours, it is suggested that trunk service operate at a LOS “C”. Local routes can be less frequent, and it is suggested that they operate at a level of service “D” during non-peak hours. Express routes typically provide week-day peak hour service only, so a LOS assignment based on frequency does not apply. It is suggested, however, that if express routes are initiated, a minimum of two trips in the peak direction, per peak period be provided.

Table 5: Frequency Guidance proposed for Charlottesville-Albemarle County

Period	Priority (LOS)	Local (LOS)	Priority/Trunk (LOS)	Express
Weekday peak	5-14 (B)	15-20 (C)	15-20 (C)	2 Trips
Weekday off-peak	15-20 (C)	21-30 (D)	15-20 (C)	—
Saturday	10-14 (B)	15-20 (C)	15-20 (C)	—
Sunday	0	0	15-30 (C)	—

It should be recognized that the policy headways represent minimum acceptable values in terms of frequencies. For example, a trunk bus route that operates every 10 minutes

on Sunday would exceed the standard but would still be acceptable to customers. However, the agency might want to operate a less frequent service in order to meet cost-recovery standards. On the other hand, a route with less frequent service (e.g., a bus every 90 minutes) would not conform to the standard and should be examined for more frequent service.

In some cases, the headway of a route may be established as the round trip cycle time. As with all standards, the headway matrix presented above should be considered a guide, not an absolute measure. In some cases, limited service may be afforded to outlying attractors areas or residential concentrations at greater headways in order to maintain a satisfactory farebox recovery or productivity. Further, to the extent possible, headways should be designed to conform to regularly recurring clock face intervals (e.g., on the hour, half past, etc.).

3.5 Service Span

This standard measures the duration that each bus route is operated, both in hours during the day and in days of the week. Level of Service defined in the TCQSM is presented in Table 6.

Table 6: TCQSM Operating Span Level of Service Definitions

LOS	Hours of Service	Comments
A	19-24	Night or "owl" service provided
B	17-18	Late evening service provided
C	14-16	Early evening service provided
D	12-13	Daytime service provided
E	4-11	Peak hour service only or limited midday service
F	0-3	Very limited or no service

Desires of the transit constituency and financial capability of the operator are key considerations in setting not only weekday service spans, but also which routes are operated on Saturdays and Sundays. For weekday routes oriented to work and school trips, service should begin early enough to permit workers and students to make their morning start times and should end late enough to provide for return trips home, including those whose work or school hours end after 9:00 pm or 10:00 pm.

Service that is oriented to non-work travel can start later and end earlier, although retail areas in the study area should be provided service until at least 8:00 pm to accommodate both shoppers and employees. With these factors in mind, Table 7 reports the suggested service time span and corresponding TSQCM level of service.

Table 7: Operating Span Guidance Recommended for Charlottesville-Albemarle County

Service	Begin	End	Hours	Level of Service
Weekday	6 – 7 am	11 pm – midnight	18	B
Saturday	6 – 7 am	11 pm – midnight	18	B
Sunday	7 – 8 am	7 – 8 pm	13	D

Service span, like other standards, is a guide. Specific routes may start earlier or later than the suggested span depending on the need for service in a specific area, the generators served and the types of trip purposes. Similar to the frequency standard, the suggested spans are minimums. For example, if a route started at 5:00 am on Saturday the standard would be exceeded and there would be no need to start later in the day simply to comply with the standard.

3.6 Patron Convenience

This section details five service standards that are primarily concerned with patron convenience and safety. They include:

- Speed – the average speed buses should maintain during revenue hours
- Loading – the number of passengers that are on a bus at any particular point in time
- Bus stop spacing – how far apart bus stops are located
- Dependability – the percentage of trips the bus is on time according to the schedule
- Crash ratio – the number of crashes a bus is involved in (relative to operating hours) not only effects patron convenience and safety but also influences operating costs

3.6.1 Speed

Bus operations face certain unavoidable constraints that all vehicles on public streets experience during peak periods, such as congestion. For this reason the speed of transit vehicles, in the absence of any preferential treatments such as dedicated right-of-way, will not exceed the speed of traffic in general. While volatile traffic congestion is not a variable under control of the operator, passenger boarding and alighting processes, route alignments, stop spacing and fare collection methods are factors under the operator's control that influence operating speed.

While there are several measures of speed that may be employed in the evaluation of this criterion, the most meaningful to the patron is running speed – route miles/running time

(excluding layover³). As the system will operate in a variety of settings (urban core/urban fringe/outlying suburban), different running speeds considered appropriate for the type of mixed traffic encountered in the various urban forms are presented in Table 8.

Table 8: Running Speed Guidance

Location	Speed (mph)
Core	8 to 12
Fringe	10 to 14
Outlying	12 to 18
Priority	25 to 35

The core area is defined by the City of Charlottesville, the University of Virginia campus, and the Route 29 North corridor, with the fringe being the adjacent environs such as the Albemarle County Comprehensive Plan designated Neighborhoods. The outlying area includes the remainder of the service area. As might be expected, traffic, safety, and bus operating conditions in each of these areas will have a varying influence on running speed.

3.6.2 Loading

To ensure that most of the passengers will be able to obtain a seat on a transit vehicle for at least a major portion of their trip, loading standards must be established and schedules devised that reflect passenger demand. This standard is measured as the ratio of passengers on board to the seated bus capacity expressed as a percentage. Values of 100 percent or less indicate all riders are provided a seated ride while values of more than 100 percent denote standees, as is displayed in Table 9. Loading standards indicate the degree of crowding (number of standees) which is acceptable, with consideration given to both the type of service and the operating period.

Table 9: TCQSM Load Factor Level of Service

LOS	Load Factor (passengers/seat)	Comments
A	0.00-0.50	No passenger need sit next to another
B	0.51-0.75	Passengers can choose where to sit
C	0.76-1.00	All passengers can sit
D	1.01-1.25	Comfortable standee load for design
E	1.26-1.50	Maximum schedule load
F	>1.50	Crush load

The recommended loading standards are displayed in Table 10. The majority of the regional system will require that a seat is available for every rider's entire trip (LOS "C")

³ "Layover" is extra time provided for bus operations at one or both ends of a route. This time provides a rest break for drivers and permits a bus to make up time if it is running behind schedule.

except during the peak periods along the trunk alignment (LOS “D”) as the heaviest amount of transit ridership should be taking place along these segments. Due to the higher rate of speed, all express and priority bus passengers should be seated during their trip (LOS “C”).

Table 10: Load Factor Guidance

Service	Load Factor	Level of Service
Local	0.76-1.00	C
Trunk/Priority	1.01-1.25	D
Express	0.76-1.00	C

3.6.3 Bus Stop Spacing

While route alignments are the primary determinants of transit availability, an additional measure of transit accessibility is bus stop spacing. Placing stops at every intersection provides many portals for potential riders to access the system and provides the shortest walking distance to the bus from surrounding land uses. However, operating speed (and therefore passenger convenience) decreases when stops are spaced closely. Therefore, a bus stop spacing standard must consider the density of the service area, characteristics of the land uses served, and appropriate operating speeds.

In some instances, the bus stop spacing standard should be discarded in favor of simply considering the location of patron concentration. This is especially true for stops that serve major activity centers such as regional shopping malls or university campuses.

The exact placement of a bus stop in the area of a signalized intersection is also a matter of concern. Site-specific traffic and street conditions should ultimately determine safe stop locations, and the exact placement of a stop should always be a matter for individual traffic engineering analysis. Overall, a consistent policy should be pursued with respect to location. In Albemarle County, it may be necessary to discuss bus stop placement with VDOT. Within Charlottesville, the City Traffic Engineer should be involved in bus stop location decisions.

There is an inverse relationship between bus stop spacing and overall development patterns. Within the core area, bus stops should be placed every other block; however, consideration should be given to permitting convenient transfers between bus lines. As the density of development decreases, bus stop spacing can be increased as shown in Table 11. Using this table, it can be deduced that in the core of Charlottesville (including the University of Virginia), there should be five or six transit stops per mile. While in fringe areas, such as Crozet or Biscuit Run, there should be three or four transit stops per mile.

Table 11: Bus Stop Spacing Guidance

Location	Spacing
Core	5 to 6 per mile
Fringe	3 to 4 per mile
Outlying/Priority	2 or 3 per mile

3.6.4 Dependability

Published timetables must provide the transit patron with a reasonable guarantee that the scheduled service will operate on time. The dependability of service is important to people who typically plan trips around the availability of bus service. Moreover, riders associate a time penalty with unreliable bus service which reduces the attractiveness of public transportation to choice riders.

The most important measure of dependability is schedule adherence, which measures the difference between scheduled time and the time the bus actually passes a particular location. The schedule adherence standard consists of two parts: the definition of on-time and the proportion of buses that operate within the on-time range. For purposes of assessing dependability, on-time is established at up to five minutes later than the scheduled arrival time. This standard allows the bus reasonable latitude for encountering general delays, without unduly inconveniencing waiting patrons. For most passengers, a wait of up to five additional minutes is not regarded as excessive. Buses should never be early, as this could cause patrons to miss the bus entirely, subjecting them to an even longer wait for the next scheduled bus. Table 12 displays the TCQSM level of service stratification. This table is based on a typical passengers work week who rides twice each day to and from work.

Table 12: TCQSM On-time Level of Service*

LOS	On-time Percentage (%)	Comments –“ typical” passenger perception
A	95.0-100.0	1 late transit vehicle every 2 weeks
B	90.0-94.9	1 late transit vehicle every week
C	85.0-89.9	3 late transit vehicles every 2 weeks
D	80.0-84.9	2 late transit vehicles every week
E	75.0-79.9	1 late transit vehicle every day
F	<75.0	1 late transit vehicle at least daily

* Note: Applies to routes with published timetable, particularly to those with headways longer than 10 minutes. On-time is 0 to 5 minutes late, and can be applied to either arrivals or departures, as appropriate for the situation being measured.

The standard proposed for schedule adherence is LOS “B” - 90 and 95 percent for local/trunk services during the peak and off-peak periods, respectively. The guide suggests that LOS “A,” 95 percent on time, or better, be established for Priority and

peak hour commuter/express services. Therefore, either 18 out of 20 peak local buses or 19 out of 20 local off-peak and express trips should be considered on-time according to the standard. The lower value for local bus service during peak hours is established due to volatile operating environments due to traffic congestion, causing a higher probability of travel delays.

Aside from on-time schedule adherence, dependability can also be measured by successful completion of scheduled trips, percentage of scheduled pull-outs, and operating miles between road calls.

The completed trips standard is proposed at 99.8 percent. Therefore, only one in five hundred bus trips can be missed. Since it is easier to avoid service disruptions if a complication to schedule adherence is detected while the service vehicle is still at the garage rather than in the field (assuming that sufficient spare vehicles and operators are available for on the fly substitution) an even more stringent standard of 99.9 percent is appropriate for pull-outs. This permits one pull-out in a thousand to be missed.

The final measure of dependability is the number of miles operated between service disruption road calls. A general guide should be 6,000 miles between road calls for mechanical reasons. Dependability is summarized in Table 13.

Table 13: Dependability Guidance

Period	Percent On-time Local/Trunk (LOS)	Express (LOS)
Peak	90 (B)	95 (A)
Off-peak	95 (A)	--
Completed Trips	99.8%	
Pull-outs Operated	99.9%	
Miles Per Road Call	6,000 miles	

3.6.5 Crash Ratio

The number of accidents a transit system experiences can influence how the patron views that system from a safety standpoint. However, it is also recognized that systems will not be entirely free from accidents due to mixed-traffic operations. In the interest of passenger safety and vehicle reliability, the number of accidents chargeable to the regional system should not exceed 10 per 100,000 vehicle miles for the entire (local, trunk and, express) system. Exceeding this standard should prompt an in-depth analysis of accident locations and a review of safety and vehicle maintenance programs.

The definition of a crash (also referred to as a collision or accident) should be one that can be applied by the Authority and is useful to the agency. The definition used in the National Transit Database is:

“Collision⁴

A vehicle accident in which the first harmful event is the impact of a road vehicle in transport with:

- Another vehicle
- An object, or
- Person(s).

Collision with Object: An incident in which a transit vehicle strikes an obstacle other than a vehicle or person (e.g., building or utility pole).

Collision with Person: An incident in which a transit vehicle strikes an individual. Incidents involving suicides and attempted suicides are excluded from this category.

Collision with Vehicle: An incident in which a transit vehicle strikes or is struck by another vehicle.”

3.7 Fiscal Condition

The fiscal condition of the service area reflects the overall fiscal health of the system in general and for individual routes. These fiscal standards are expressed by three specific quantifiable variables:

- Fare structure
- Farebox recovery - the ratio of patron fares collected to operating costs expressed as a percent
- Productivity

For the Farebox Recovery and Productivity Standards it is suggested that there be standards for the system, for groups of routes, and for individual routes. It is important to note that the when routes are assessed using these measures, they should be compared only against other routes having similar characteristics. For example, it would not be appropriate to compare the productivity of a route on which a fare is charged against the Trolley for which there is no fare. Similarly, a local neighborhood route should not be compared against the trunk route serving downtown, UVa, and the Route 29 corridor. For this report four groupings are used - System, Local, Trunk/Priority, and Express. It is left to the discretion of the Board and staff of the transit authority to determine the proper groupings.

4 <http://www.ntdprogram.gov/ntdprogram/Glossary.htm#G67>, May 4, 2008

3.7.1 Fare Structure

Establishing a fare structure requires balancing the objectives of achieving a reasonable proportion of system revenues through user charges against the desire to make the transit service affordable to those having the greatest need for the service, coupled with the objective of attracting as many riders as possible. Fares are sometimes also imposed to act as a barrier to joyriding.

The primary objective for the fare structure is that it should reflect the cost of providing the amount of service used by passengers and should be perceived as equitable by the community and transit riders. Standards for the fare structure may include:

- Long trips should be more expensive than short trips
- Riders should not have to pay a significantly higher fare simply because they have to transfer to complete a trip

3.7.2 Farebox Recovery

One of the primary objectives for the regional transit service is to provide area residents with the best possible service while adhering to budgetary constraints. The desirable farebox recovery ratio for the system as a whole is set by the transit agency policy making body (e.g. board of directors, city council, etc.). Once set, transit management endeavors to meet the established goal. As financing of transit services varies widely, there is no set “industry standard” for farebox recovery. Each community determines what proportion of the cost of providing service should be generated by the farebox. This can be as low as 0% in systems supported fully by public revenues. In many communities the size of Charlottesville farebox ratios in the range of 5 to 15% are common.

The farebox recovery guideline applies at both the system and individual route levels while taking into account the distinct operating characteristics associated with local, trunk, and express routes. Each route should be examined individually to determine if a specific bus route is placing an inordinate financial burden on the entire system, comparing routes to system-wide averages of each service type. By taking steps to see that each route or group of routes is meeting the farebox recovery standards, the systemwide objective can be achieved.

Three farebox recovery levels are defined – successful, acceptable, and problem.

- **Successful** routes are those that achieve a farebox recovery at least 80 percent of the system average;
- **Acceptable** route farebox recovery is between 60 percent and 80 percent of the system average;
- **Problem** route farebox recovery is less than 60 percent of system average and indicates that actions are required to either increase revenues or reduce costs.

According to the National Transit Database, the system average farebox recovery ratio for CTS was 10 percent in 2006. Thus, if the operating goals and priorities were to be unchanged, it would be reasonable to expect the service as a whole to operate with approximately 10 percent system wide farebox recovery, with local and trunk service operations obtaining a higher percentage than express service, as shown in Table 14.

Table 14: Farebox Recovery Guidance by Service Type*

Service Type	Percent Farebox Recovery (%)
System	10
Local	12
Trunk/Priority	12
Express	8

* Standards should be reassessed after governing board has adopted passenger oriented service standards

However, the service goals that have been requested for the proposed Transit Authority are in many aspects more ambitious than the service currently provided by CTS or proposed for CTS in FY '09. If services meeting the customer oriented service standards are implemented, the costs of operation will increase substantially and the farebox recovery ratio for the system and for individual routes will decline. Over time the ridership will likely increase and the farebox recovery ratio increase, but this may take some years. If the new service proposals are implemented, it should not be expected that the farebox recovery standards referenced in Table 14 will be met.

In addition to the system wide farebox recovery ratios described above, a second set of standards have been developed for the analysis of financial health on a route by route basis. These measures can be applied on a relative basis even if the overall systemwide farebox recovery ratios reflect the customer-oriented service plans. Each bus route should have a farebox recovery ratio calculated. Individual route performance should then be compared to the suggested farebox recovery standard, which differs by service type. Table 15 provides guidelines for evaluating route performance against the suggested standard and indicates a rating category. For example, in order for an individual local route to be considered successful, the farebox recovery ratio should be 80 percent of the system-wide farebox recovery standard of 12 percent. Thus, individual local routes are considered successful if they obtain a 9.5 percent farebox recovery ratio.

Table 15: Farebox Recovery Guidance by Route

Category	Percentage Applied to Service Type (%)	Farebox Recovery		
		Local (%)	Express (%)	Trunk/Priority (%)
Successful	Over 80% of system average	To be determined after systemwide objectives have been defined		
Acceptable	60%-80% of system average			
Problem	Under 60% of system average			

3.7.3 Productivity

Productivity relates to the number of passengers a transit system carries for each service unit in operation. For this evaluation, the statistic of passengers per revenue-vehicle hour is used as the primary measure of productivity. Due to the line haul (few stops) operating characteristic associated with the express routes, there is little turnover of seats as boarding and alighting options for the duration of the route are limited (concentrated at the two trip ends). Local and trunk routes have far more ridership turnover (boarding and alighting throughout the duration of the route). Therefore, the express routes will need to have a different standard than the local and truck service routes. The proposed productivity guidance standards are presented in Table 16. According to the National Transit Database, unlinked passenger trips (boardings) per vehicle revenue hour for the current CTS system were 18 in 2006.

As with farebox recovery, the service goals that have been requested for the proposed Transit Authority are in many aspects more ambitious than the service currently provided by CTS or proposed for CTS in FY '09. If services meeting the customer oriented service standards are implemented, the amount of service provided measured in revenue vehicle-hours will increase substantially and the passengers per revenue vehicle-hour for the system and for individual routes will decline. Over time the ridership will likely increase with the result that productivity as measured by passengers per vehicle-hour also increases, but this may take some years. If the new service proposals are implemented, it should not be expected that the passengers per revenue vehicle-hour standards referenced in Table 16 will be met until the services have matured.

Table 16: Passengers Per Revenue-Vehicle Hour Guidance by System*

Service Type	Value
System	18
Local	20
Trunk/Priority	22
Express	10

* Standards should be reassessed after governing board has adopted passenger oriented service standards

Much like the farebox recovery guidance described above, productivity guidance has been further developed so an analysis of specific routes can be undertaken. An individual local route is considered “successful” if it serves more than 80 percent of the passengers per vehicle hour of the guidance described above. Meaning a local route that has 16 passengers per vehicle hour is considered successful (80 percent of the system guidance standard). The guidance by route is presented in Table 17.

Table 17: Passenger Per Vehicle Hour Guidance by Route

Category	Percentage Applied to Service Type (%)	Farebox Recovery		
		Local (%)	Express (%)	Trunk/Priority (%)
Successful	Over 80% of system average	To be determined after system-wide objectives have been defined		
Acceptable	60%-80% of system average			
Problem	Under 60% of system average			

Note that the transit concepts being considered for the regional system represent a large increase in service compared to the current CTS services. The passenger per hour targets established here will almost surely not be met in the first year of operation of the expanded system. The policy body of the transit organization should review these targets as well as the system performance after initial operations of the expanded system.

3.8 Passenger Comfort

The goal of passenger comfort standards is to identify regional transit service equipment and facilities operational standards that provide adequate comfort to attract choice riders to the system. In assessing passenger comfort, these standards address the following issues:

Equipment Standards

- Clean/Attractive
- Fleet Age
- Noise/Air Pollution
- Identity

Stop/Transfer Center Standards

- Shelters/Benches
- Lighting
- Multimodal Connectivity
- Signs
- Public Information

The passenger comfort standards consist of five separate variables relating to either service equipment or passenger facilities:

- Fleet Age
- Waiting Shelters/Benches
- Bus Stop Signs
- Revenue Equipment
- Public Information

3.8.1 Fleet Age

The expected economic life of a well-maintained fixed-route transit bus defined by FTA is twelve years. As vehicles age, the amount of maintenance required increases. To maintain an even level of demand for maintenance and to avoid the need to purchase a large number of vehicles in any single year, establishing a vehicle replacement schedule that results in an average fleet age of six years is recommended.

3.8.2 Waiting Shelters/Benches

A major concern of transit riders, particularly in inclement weather, is the amount of time spent on the street exposed to the elements. Thus, protection from rain, wind, snow, and sun are valid concerns. Accordingly, these guidelines include specific reference to waiting shelters.

The placement of shelters and the development of a priority location program should be based on the number of boarding and/or transferring passengers at a specific stop. Placing shelters at all stops which serve 50 or more daily boarding and/or transferring riders, or which serve concentrations of elderly or handicapped residents, should be the first priority. Stops where passenger boarding/transferring activity is between 25 and 49 daily occurrences would be assigned a second priority. Bus stops that have 10 to 25 boardings daily do not warrant construction of waiting shelters, however, benches are suggested as is the provision of concrete landing pads to increase safety for bus patrons.

Shelters should comply with ADA standards and include a minimum of 50 square feet of area enclosed on all sides except for entrances. Benches should also be provided and should appropriately reflect average ridership. Service information including route numbers, schedules of bus lines that serve the stop, and contact information for both emergency's and general comments should be displayed.

3.8.3 Bus Stop Signs

All bus stops in the system should be identified by a uniform style bus stop sign bearing a symbol denoting the transit agency name, route numbers, and contact information. Additionally, if the service option chosen for regional provision includes trunk and express service operation, a unique color scheme or other easily identifiable trademark delineating the trunk or express service from local service is recommended.

3.8.4 Revenue Equipment

In order to maximize passenger comfort and thereby spur demand, the bus fleet should be composed of visually attractive and functionally comfortable vehicles. This standard is primarily a matter of maintenance: seats should not be loose or ripped, floor covering should be in good repair, lighting should be operational, and each vehicle's interior should be clean. Of particular importance is the riding environment for the patron, including functional air conditioning, ventilation and heating systems.

Buses should also be attractive for the community in general – noise, smoke, and odor should be kept to as low a level as possible through use of the latest equipment and strict maintenance procedures. Exteriors of buses used for the full service routes should be washed daily and body damage should be scheduled for immediate repair.

Buses should indicate clearly their route number and final destination. Traditionally, buses have a route destination sign overhead in front and also one on the side. These

signs should display route number and destination information in a manner easily understood by the patron.

3.8.5 Public Information

A transit system should develop and maintain a public information program that not only provides information to those who ask for it, but also aggressively educates the public about the system and how to use it. The information should be accurate and reliable at all times.

Route timetables should include all the information necessary for a non-user to make a trip on the bus, including route maps, schedules, fare information, transfer information, and agency contact information. Individual route timetables should be available. Specific service information should be available and prominently displayed on all buses. Appropriate sets of public information should be available at major activity centers as well. A route map of the area showing all routes should be available at no cost. System route maps should also be displayed at each bus shelter along with specific departure times for each bus on each route.

Finally, information should also be available by phone during service hours. Information can also be made available to the public through other media sources, such as the internet, mobile phones, real-time information signs, and other technologies that can quickly communicate up-to-date information. Improving customer access to service information, especially accurate real-time information, will increase passenger comfort associated with waiting for transit vehicles. Additionally, a complaint handling and processing procedure should be in place including follow-up protocol to assure that the complaint is satisfactorily addressed.

4 Service Standards: Demand-Response Services Operated in Lieu of Fixed-Route (e.g., LINK)

In some portions of the current CTS service area having a lower density of demand, a demand-response service is provided by JAUNT in-lieu of the fixed-route, fixed-schedule service provided by CTS. In areas such as this, performance measures and service measures are still useful to measure and monitor performance, but the standards that are applied must reflect the nature of the operations.

Compared to other types of service, fixed-route/fixed-schedule service is generally the most efficient and effective because it is designed to serve large numbers of people in concentrated areas with few vehicles, and therefore, service standards developed for fixed-route/fixed-schedule service will be inappropriate for other service types, such as demand response.

Demand-response service fulfills a different transportation need than fixed-route/fixed-schedule service; it generally provides basic transportation to smaller numbers of people dispersed around a service area. The nature of supplying demand-response service requires it to operate at lower efficiency and effectiveness than fixed-route/fixed-schedule service, but it nonetheless provides essential service. These differences must be taken into account when developing service standards for demand-response service.

The suggested service standards for demand response service are shown in Table 18.

Table 18: Summary of Service Measures and Minimum Standards – Demand-Response in lieu of Fixed Route

Service Coverage				
Availability	Production Attraction	Same as fixed route		
Frequency	Period Weekday Peak Weekday Off-peak Saturday Sunday	Headway Response time (i.e., time between request for service and pickup) no greater than twice fixed-route frequency for the time period.		
Span	Period Weekday Saturday Sunday	Start Time	End Time	Total Hours
		Same as fixed-route		
Patron Convenience				
Speed	Location Core Fringe Outlying	Operating Speed (mph) N.A. N.A. N.A.		
Loading	Service Local Trunk Express	Load Factor 0.76-1.00 N.A. N.A.		
Bus Stop Spacing	Location Core Fringe Outlying	Spacing 5 to 6 per mile 3 to 4 per mile 2 or 3 per mile		
Dependability	Period Peak Off-peak Trips Operated Pull-outs Operated Miles Per Road Call	Percent On-time Local (%) Trunk (%) Express (%) 90 90 95 95 95 — 99.80% 99.90% 6,000 miles		
Crash Ratio	10 per 100,000 vehicle miles traveled			

Table 18: Summary of Service Measures and Minimum Standards – Demand-Response in lieu of Fixed Route (Continued)

Fiscal Condition*				
Farebox Recovery (applies only for services on which fare is charged)	Service Type		Farebox Recovery (%)	
	System		N.A.	
	Local		N.A.	
	Trunk/Priority		N.A.	
	Express		N.A.	
	Route	Local	Trunk/Priority	Express
	Successful (Over 80% of system average)	At least 50% of fixed-route standard		
	Acceptable (Over 60%)			
	Problem (Under 60%)			
Productivity	Service Type		Passengers Per Vehicle Hour	
	System		N.A.	
	Local		N.A.	
	Trunk/Priority		N.A.	
	Express		N.A.	
	Route	Local	Trunk/Priority	Express
	Successful (Over 80% of system average)	At least 50% of fixed-route standard		
	Acceptable (Over 60%)			
	Problem (Under 60%)			
Average Fleet Age		Three years		
Passenger Comfort				
Waiting Shelters	Passenger Criteria		N.A.	
	Dimensions		Shelters a minimum of 50 square feet and enclosed on all sides except for entrances with benches and passenger information.	
Bus Stop Signs	Features		Uniform signs with route information and a unique color delineating different service types (local, trunk and express).	
Revenue Equipment	Features		Clean, comfortable, well-maintained fleet.	
Public Information	Features		Route timetables, emergency and general comment contact information, system route maps and a complaint procedure including follow-up protocol. Telephone information available from start of service to one hour prior to the end of service.	

*Note: During the first year of a new service, fiscal and productivity standards are half of those shown.

5 Service Monitoring Program

The performance measures and service standards described above are intended to establish the criteria for the type of transit services desired by the board of the transit authority. With measures and standards defined, the resulting data needs for proposed monitoring services can then be identified. Revisions can and should be made as changes occur in the study area, service proposals are implemented and transit policies are revised. It should be remembered that the proposed service standards are minimum levels of service. Any route can exceed these standards as long as prevailing or future ridership projections support such service.

Service monitoring requires an investment of resources to collect and analyze the data needed to determine system performance. In order to provide a process of continual monitoring, Table 19 presents a summary of the program in regards to specific component activities and data collection needs. The conduct of specific items will range in frequency from daily to once in five years depending on the nature of the task. Additionally, some tasks will occur as appropriate, rather than at prescribed intervals. Data collected from these tasks should serve to inform and guide service planning decisions and service standards changes.

To establish a baseline against which the applicability of the adopted standards and the progress of the Authority in meeting its goals and objectives, all the data specified should be collected in the first year of operation of the Transit Authority.

Table 19: Service Monitoring Program

Item	Frequency of Data Collection	Estimated Staff-Days per Occurrence
Service Standards Review	Yearly	10
Regional Inventory		
Major generators/attractors	Yearly	5
Residential development	Yearly	5
Population and Employment	1 – 5 years	10
Demographic Characteristics	5 years	15
Land Use and Zoning	1 – 5 years	10
Transit Surveys		
Ride Checks (passenger boarding and alighting counts)	Yearly	1 person-day per peak bus
Driver trip reports (Vehicle condition, operational notes)	Daily	By driver
On-board Survey of Rider Characteristics and Origin-Destination patterns	5 years	5 days per peak bus
Household survey of Non-rider attributes and travel patterns	5 years	By outside firm. Approximately \$20,000
Vehicle Inspection	Quarterly	0.5
Other		
Route Profile Updates	As needed	3 days per route
Route Diagnostics	Yearly	3 days per route
Adequacy Review	Yearly	10
Route and Service Planning	Continuous	By staff