

Bus Service Guidelines



CONNECTICUT STATEWIDE BUS STUDY

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Introduction & Methodology

1.1 Introduction

Within the State of Connecticut (State), there are 19 transit properties (10 properties owned and operated by the State under *CTtransit* and *CTfastrak* and nine non-state properties) overseeing, managing and operating fixed route public transportation¹, including local bus, express bus, Bus Rapid Transit (BRT), shuttle bus, and flex route service. In addition, three private carriers, Greyhound Lines, Peter Pan Bus and Stagecoach USA (doing business as Megabus) offer intercity bus service within the State. Combined, they provide more than 42 million bus passenger trips annually², with anticipated growth in coming years.

In 2000, the Connecticut Department of Transportation (CTDOT) conducted the Statewide Bus System Study to evaluate the performance, effectiveness, and coverage of the various bus systems within the State. This effort collected data about the State's bus system including: ridership, operations, and planning for all transit providers in an effort to better coordinate service delivery and provide a more seamless experience for riders. The 2000 study generated data-driven recommendations to improve bus system performance, effectiveness, and bus route coverage based upon defined performance measures (i.e., route coverage, bus stop spacing, overall route directness, transit dependency, etc.). In the years since the study was completed, the State has experienced an increase in transit usage, changes in demographics and mobility needs, and new transit systems have been implemented (*CTfastrak*) or will be soon implemented (CTDOT's Hartford Line intercity rail service).

In 2015, the Governor announced *Let's GO CT* (<http://www.transformct.info>), a vision and call to action for the future of the State's transportation system. *Let's GO CT* recognizes bus service as the foundation of Connecticut's transit system. It calls for a

¹ Fixed route public transportation is defined as a system of transporting individuals on which a vehicle is operated along a prescribed route according to a fixed schedule."

² *Let's GO CT!* presentation May 13, 2015

re-evaluation of the State's bus system and it established a goal of increasing bus service availability by 25 percent in urbanized areas over the next 30 years. These developments have necessitated an update of the 2000 Statewide Bus System Study. It is the intent of this 2016 Connecticut Statewide Bus Study to provide an updated assessment of current and emerging travel patterns, unmet needs, and an evaluation of bus system performance resulting in recommendations to better align the existing bus system with the current and future travel needs of the State's residents and employees while providing a multi-modal transit network that supports economic growth and environmental goals.

This technical memorandum documents the methodology and the service guidelines that will be used to perform an assessment of Connecticut's fixed route transit system on a system-wide and route-specific basis.

1.1.1 Context

The State is comprised of a range of demographic and land use patterns from urban to rural. Demographics (i.e., low-income, zero- and one-car households, populations over 65 years, residential and employment densities) and land uses (residential, commercial, and institutional) influence bus system and route design, the types of services operated, and the populations served (i.e., commuters or transit dependent populations). Densely populated and developed urban areas include the cities of Hartford, New Haven, Bridgeport, Stamford, and Waterbury. Suburban areas with lower population densities and less intense development patterns include areas like West Hartford and Wethersfield outside of Hartford, Darien, a suburb of Stamford, and Milford, located between New Haven and Bridgeport. Rural areas in the state include counties such as Litchfield and Windham.

These differing service areas and the transit service types that best serve them require that the service guidelines that will provide the foundation of the 2016 Statewide Bus Study analyses are able to be consistently and equitably applied to the varied systems throughout the state. This means that all systems will be evaluated consistently by the guidelines but that each system's performance will only be compared with peer systems in the state. The evaluations will inform the study's recommendations for each local and regional system as well as the full statewide system.

There are a wide range of industry-applicable performance measures that can be applied to Connecticut's statewide fixed route system including multiple measures that yield similar conclusions and information. It is the focus of this study that the service guidelines used will yield unique analyses, without redundancy. The recommended service guidelines provided in this memorandum considered guidelines derived from a review of national best practices as well as recently conducted transit performance analyses within Connecticut. The guidelines identified also support the goals of the overall study, shown in Table 1, and statewide transportation plan (*Let's Go CT*).

Table 1: 2016 Statewide Bus Study Goals

Goal
Enhance fixed route transit access to jobs
Develop recommended improvements to service frequency and span to relieve overcrowding, improve reliability and best meet the state's travel needs
Develop recommended expansions and modifications of fixed route and intercity service
Determine where connectivity between the bus and rail system in Connecticut can be enhanced
Provide a modern, state-of-the art system including reasonable customer amenities
Provide cost-effective service consistent with travel needs and funding
Improve and expand urban bus service by 25% providing urban residents access to bus service with half-mile of home*
Upgrade and expand maintenance facilities to support improved fleet performance, system reliability and reduce non-revenue trips*
Provide state of the art service and information delivery*
Integrate operating service, information and customer service statewide*

* Let's Go CT goal

1.2 Process of Route Evaluation

The 2016 Statewide Bus Study will conduct a two-stage evaluation process using the service criteria that are described in the following sections of this technical memorandum. A Stage 1 Evaluation will be applied to all fixed routes within the state. Upon completion, a subset of routes will be evaluated in more detail in Stage 2.

Stage 1 Evaluation:

The Stage 1 evaluation will assess and rank the statewide bus routes based on three key service guideline areas: **transit propensity** (to measure the effectiveness of network coverage), **passenger trips per revenue hour** (to evaluate operational efficiency of routes), and **on-time performance** (to assess overall route performance and identify routes which require modified running times). This approach will provide an individual assessment of each route compared with other routes operated by that specific service provider, and other routes in the State. The routes will be ranked, identifying the best and poorest-performing routes in assigned peer groups (those routes within the top 10% of highest performing routes in each group and those within the lowest 10% of poor performing routes in each group). The best and poorest performing routes in each peer group will be advanced for further analysis in Stage 2, since these are the routes that would be most worthy of adjustments and investment

(best performing routes would be worthy of further investment, poor performing routes would be worthy of modification or adjustment).

It is important to recognize that within every system there are high and low performing routes. Many transit properties make policy decisions to provide service on routes that may not produce high ridership, but provide a valuable service to select users or connectivity that supports higher-performing services. Sometimes routes are created to address a specific policy directive and may not be focused solely on ridership performance. By conducting the analysis on an agency level, the state can set the appropriate balance between the needs of riders, operational concerns, and funding constraints to maximize the effectiveness of the statewide system.

The Stage 1 evaluation assumes that data is available for each route upon which the three screening criteria will be applied. Should data in one or all categories not be available for a particular route, the route will not be evaluated for that criterion.

Stage 2 Evaluation:

Following the Stage 1 Evaluation, the Stage 2 Evaluation will examine route and scheduling characteristics at a finer level of detail for those routes that are the highest and lowest performers. The Stage 2 evaluation will apply all of the evaluation criteria and performance metrics from the service guidelines. This analysis will identify specific strengths and weaknesses of the routes selected and will inform the development of route-specific recommendations.

A technical report summarizing the high and low performing routes, as well as performance gaps and issues, and their causes will be prepared.

Future Applicability of Service Guidelines:

CTDOT should require that the individual transit providers conduct regular assessments of service (periodic reviews) using the recommended service guidelines included in this document. Periodically, the guidelines should be reassessed to confirm that they are still relevant measures to apply to an evolving system. Should the goals of an agency change, or if regulations or other insights identify different outcomes or issues, then the performance monitoring program should adjust to respond accordingly. It is recommended that CTDOT require the periodic reviews and updates of the State's performance measures every two to three years, to ensure the Guidelines remain relevant and an active part of the statewide transit planning.

Proposed Service Guidelines

2.1 Overview

A single set of service guidelines has been developed to analyze and assess the statewide fixed route system. To develop guidelines that are cost effective, indicative of service performance, and support stated goals for this study (and in the future), a review of the *CTtransit* Service Guidelines dated June 2009 was performed. The *CTtransit* Service Guidelines define general service parameters regarding the types of routes operated by *CTtransit*. The parameters include:

- Route spacing
- Through-routing
- Route design
- Directness of service
- Route deviations
- Scheduling
- Evaluation guidelines for existing service
- Development guidelines for new service
- Customer considerations (bus stop types and amenities, spacing, and design)
- Customer information
- Safety and perceived security
- Vehicles and vehicle maintenance.

While instructive and useful as a base for this study, these guidelines do not identify or define metrics (e.g., numerical thresholds for passengers per mile or farebox recovery) by which to evaluate the bus routes or the system as a whole. Additionally, the *CTtransit* guidelines only cover specific services branded as *CTtransit* and were not intended to apply to any of the other bus operators in the state.

For the purposes of this study, more comprehensive system-level guidelines, design criteria, and evaluation measures were developed. Building off of the *CTtransit Service Guidelines*, system-wide bus service guidelines were analyzed for peer transit agencies representing a range of transportation providers and properties of varying size (small to large), serving a mix of land uses (from urban to rural) and an assortment of bus route types (i.e., flex routes, local routes, limited stop routes, BRT's, and express routes). The peer agencies include:

- Sarasota County Area Transit (SCAT) - Small transit property serving suburban and rural areas. Includes local, express routes.
- Southeastern Regional Transit Authority (SRTA) - Small transit property serving suburban and rural areas. Includes local routes.
- Greater Richmond Transit Company (GRTC) - Mid-size transit property serving suburban and urban areas. Includes local, and express routes.
- New York City Transit (NYCT) - Large transit property serving urban areas. Includes local, limited stop, BRT and express routes.
- New Jersey Transit (NJ TRANSIT) - Large transit property serving urban, suburban and rural areas. Includes local, limited stop, BRT and express routes.

The "best practices" performance criteria and evaluation measures used by the peer agencies are displayed in Table 2.

In addition to reviewing bus service guidelines from peer agencies, a review of recent bus studies completed by municipal, Metropolitan Planning Organizations (MPO) and transportation service providers in Connecticut was undertaken to identify the data collected, the evaluation measures used (if any), and the practicality of re-using any previously conducted system or route evaluations as part of the 2016 Statewide Bus Study. A matrix listing these studies along with the design criteria and the evaluation measures that were used for each study is included in Appendix A.

Table 2: Best Practices Review of Performance Criteria and Evaluation Measures

Performance Criteria/Evaluation Measure	CTtransit	NYCT	SCAT	GRTC	SRTA	NJT
Route Design						
Route Coverage at the Production End		✓	✓	✓	✓	✓
Route Coverage at the Attraction End				✓		✓
Bus Stop Spacing	✓	✓		✓		✓
Overall Route Directness	✓			✓		✓
Route Coverage	✓	✓			✓	
Service Area Poverty Level					✓	
Bus Stop Location Guidelines	✓	✓				
Route Design Guidelines (limited stop, express)		✓				
Schedule Design						
Frequency/Headway Guidelines	✓	✓	✓	✓	✓	✓
Span of Service Guidelines	✓	✓		✓		✓
Vehicle Requirements						
Route Run Time						
Efficiency & Productivity						
Fare Structure				✓	✓	
Farebox Recovery		✓	✓	✓	✓	✓
Loading	✓		✓	✓		✓
Productivity	✓		✓	✓	✓	✓
Average Fare					✓	
Operating Efficiency/ Effectiveness					✓	
Service Delivery						
Running Speed				✓		✓
Vehicle Trips Operated				✓		
Pull-Outs Dispatched (Percentage Missed)				✓		
Miles per Road Call				✓	✓	
Waiting Shelters/Benches/Area	✓			✓		✓
Bus Stop Signs	✓					✓
Revenue Equipment Condition	✓					✓
Public Information/Schedules						✓
Revenue Miles between Failures						
Fleet Spare Ratio					✓	
Rider Characteristics						
On-Time Performance	✓		✓			✓
Fleet Age					✓	

It is important to note that the studies reviewed above did not address the importance of developing performance measures so that the bus system/routes can be regularly assessed. This is a critical activity because annual assessments of the bus system and its routes ensures that any changes in travel behavior and service needs are addressed through regularly scheduled service changes. Therefore, it is the intent of the 2016 Statewide Bus Study to recommend a set of comprehensive service guidelines that can be easily implemented to regularly evaluate bus system performance.

The performance measures and evaluation criteria best suited for this study are based upon the research conducted, the vision and goals for the state transportation plan (*Let's Go CT*), and the goals for the 2016 Statewide Bus Study.

The proposed service guidelines are divided into four service standards: route design, schedule design, route productivity, and service delivery. These standards are consistent with industry best practices and the review of previous studies. Table 3 illustrates the relationship between the service standard, its corresponding criteria, the performance metric to be used in the evaluation process, and the project goal(s).

The proposed service guidelines are further detailed in the remainder of this chapter. Not every existing route in the system has sufficient data upon which each guideline can be applied at this time. However, all systems should strive to collect and report this data annually.

Table 3: Proposed Statewide Bus Service Guidelines

Service Standards	Criteria	Purpose of Criteria	Performance Metric	Project Goal Addressed
Route Design	Transit Propensity*	Used to assess existing bus route service coverage and to identify areas where new bus service may be warranted	A combined metric measuring population density, density of zero-car households, and density to jobs for areas outside of ½ mile of existing bus routes	Enhance access to jobs Develop recommended expansions and modifications of fixed route and intercity service
	Provision of Service at Major Activity Centers	Used in determining which activity centers in each category should be given consideration for service (primarily extensions of existing routes)	<ul style="list-style-type: none"> ■ Employers with 350 or more employees in a single location. ■ Shopping centers with more than 100,000 square feet of leased retail space. ■ Medical Facilities/Nursing Homes of 100 beds or more may be considered candidates for service. ■ Colleges and other post-secondary schools with residential populations and with an enrollment of at least 1,000 full-time students. ■ Public agencies, government centers and community facilities generate demand for bus service 	Enhance access to jobs Develop recommended expansions and modifications of fixed route and intercity service
	Bus stop spacing	Used in siting of new bus stops and evaluation of existing bus stop spacing	Varies between 1 – 4 bus stops per mile (every 1,300 to 5,300 feet), no more than 4 stops per mile	Enhance access to jobs Develop recommended expansions and modifications of fixed route and intercity service
	Bus stop amenities	Used for the provision of bus stop amenities	Priority for installation of benches should be given to stops with 50 daily boardings or more while priority for the installation of shelters should be given to stops with 100 daily boardings or more	Develop recommended expansions and modifications of fixed route and intercity service
	Bus passenger information	Used to provide customers with real-time information on bus service	Provide 100% real time info by 2020	Provide a modern, state-of-the art system including reasonable customer amenities

Table 3: Proposed Statewide Bus Service Guidelines (Continued)

Service Standards	Criteria	Purpose of Criteria	Performance Metric	Project Goal Addressed
Schedule Design	Headway	Used in determining service levels based on ridership demand	Schedule service so there are 1.3 passengers for every seat on the bus in peak hours and one passenger per seat in off peak hours at the peak load point Adopt policy headway of between 30-60 minutes for local bus routes only. Other types of bus routes (e.g., express or shuttle bus routes) do not warrant headways of less than 60 minutes. This is an aspirational goal to create a service that meets rider's needs	Develop recommended expansions and modifications of fixed route and intercity service Enhance access to jobs Determine where connectivity between the bus and rail system in Connecticut can be enhanced
	Span of service	Used in determining hours of service, based on ridership during the first and last hours of service on the route	Provide service on all routes between 6:00 AM and 7:00 PM	Develop recommended improvements to service frequency and span to relieve overcrowding and best meet the state's travel needs
Route Productivity	Passenger Trips per revenue mile	Used in evaluating efficiency of routes based on revenue miles (a useful counterpart to passenger trips per revenue hour)	Individual routes that have less than two passenger trips per revenue mile for local routes and one passenger trip per revenue mile for express routes should be examined for potential operating improvements	Develop recommended improvements to service frequency and span of service to relieve overcrowding and best meet the state's travel needs
	Passenger Trips per revenue hour*	Used in evaluating efficiency of route based on revenue hours (a useful counterpart to passenger trips per revenue mile)	Individual routes that have less than 20 passenger trips per revenue hour for local routes and less than 10 passenger trips per revenue hour for express routes should be examined for potential operating improvements	Develop recommended improvements to service frequency and span to relieve overcrowding and best meet the State's travel needs

* This criterion will be included in the Stage 1 Evaluation.

Table 3: Proposed Statewide Bus Service Guidelines (Continued)

Service Standards	Criteria	Purpose of Criteria	Performance Metric	Project Goal Addressed
Route Productivity	Farebox/cost recovery	Used in evaluating how much fare revenue covers the cost of providing service	Individual routes that have a farebox recovery in the bottom 60 th percentile of the agency average should be examined for potential operating improvements	Provide cost-effective service consistent with travel needs and funding
	Ratio of revenue vehicle miles to non-revenue vehicle miles	Used in evaluating efficiency of scheduled service based on amount of non-revenue mileage	Individual local routes with non-revenue mileage that is more than five percent of revenue mileage and individual express routes with non-revenue mileage that is more than 10 percent of revenue mileage should be examined for potential operating improvements	Upgrade and expand maintenance facilities to support improved fleet performance, system reliability and reduce non-revenue trips Provide cost-effective service consistent with travel needs and funding
Service Delivery	On-time performance*	Used in evaluating overall route performance and identification of routes which require modified running times	Routes which fail to operate on-time for 90 percent or better of their runs will be evaluated for further improvements	Develop recommended improvements to service frequency and span to relieve overcrowding and best meet the state's travel needs
	Average time between vehicle failures	Used in evaluating overall fleet availability for revenue service	Systems with mean distance between failures (MDBF) that fall below the statewide average should be investigated for improvements	Upgrade and expand maintenance facilities to support improved fleet performance, system reliability and reduce non-revenue trips
	Fleet average age	Used in evaluating overall fleet performance and its availability for revenue service	Should the average age of the fleet exceed 2/3's of the recommended service life, that agency's replacement schedule and policies should be reviewed	Upgrade and expand maintenance facilities to support improved fleet performance, system reliability and reduce non-revenue trips

* This criterion will be in the Stage 1 Evaluation.

2.2 Route Design Guidelines

Route design guidelines are used to determine where bus routes should operate and how frequently they should operate. This includes service coverage, stop spacing, park and ride locations and reducing non-revenue vehicle miles.

2.2.1 Service Coverage

Service Coverage guidelines are used to identify the balance between coverage and frequency of service every transit system seeks. Because funding is limited, there is always a trade-off required between coverage (route miles) and frequency of service (route hours). The trade-off for users is the average distance walked to a stop versus the length of time between arriving buses.

In urban areas, a dense route structure with infrequent service can be a poorer quality service than a more moderate density of routes with more frequent service. Concentrating bus service in select corridors may mean more people have to walk slightly further, but they have more frequent service upon arrival at their stop, and therefore a reduced overall time before boarding a bus.

In rural or suburban areas with disparate land uses, land use densities make it difficult to serve all passenger trip ends with a dense fixed route network. Bus service should be designed to serve major corridors and land uses, with the addition of park-and-ride locations and other elements that improve access to transit.

Given the infeasibility of providing a highly dense route structure with frequent service, a minimum target density of routes is needed. The following service coverage guidelines (in Section 2.2.1.1 and Section 2.2.1.2) detail.

2.2.1.1 Transit Propensity

To measure transit propensity, a transit score methodology and approach will be utilized. Under this approach, factors for population density, density of zero car households, and density of jobs will be applied to each Census block and assessed as a combined metric.

Transit propensity scores will be broken into five categories (High, Medium-high, Medium, Marginal, and Low). Areas that score higher and fall outside the ½ mile walkshed³ of the existing bus routes will be identified as potential areas for service expansion. Areas within the existing bus walkshed scoring "low" will be reviewed. The proposed formula⁴ that would be applied across the State is:

$$\text{Transit Score} = (0.41 \times \text{Population per Acre}) + (0.09 \times \text{Jobs per Acre}) + (0.74 \times \text{Zero car Households per Acre})$$

³ A ½ mile walkshed is referenced in the *Let's Go CT: Connecticut's Bold Vision for a Transportation Future* (February 2015). The plan calls for a 25% expansion of bus service, providing residents in urbanized areas access to bus within half-mile of home.

⁴ Source: Transit Score: New Jersey's Unique Planning Tool, plan smart nj and URS, March 2011.

To evaluate this guideline, the following data are required:

- Population density (population per acre) by census tract
- Jobs per acre by census tract
- US Census auto-ownership
- Bus route network GIS shapefiles

2.2.1.2 Provision of Service at Major Activity Centers

Commercial developments, employment centers and other uses (such as universities and medical centers) should be served by transit if they are large enough to attract and generate an adequate number of passenger trips to justify service. 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 as well as best practices, will serve as guidelines in determining which activity centers in each category should be given consideration for service (primarily extensions of existing routes). In general, developments as described below could be expected to support transit service with a 30-minute headway or better. Other factors, such as proximity of the activity center to existing bus routes and other site specific conditions should be considered before providing new service to a major activity center.

- **Businesses:** Employers with 350 or more employees in a single location are large enough to warrant consideration for bus service. This guideline applies to either individual employers or groups of employers in a concentrated area (e.g., industrial or office park).
- **Shopping Centers:** Shopping trips constitute a major purpose 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 bus service.
- **Medical Facilities/Nursing Homes:** These usually do not attract a large number of passenger trips. However, they often serve those who depend on transit. Therefore, institutions of 100 beds or more may be considered candidates for service.
- **Colleges/Universities:** Students often comprise a major segment of the transportation dependent population in a community. Colleges and other post-secondary schools with residential populations and with an enrollment of at least 1,000 full-time students warrant consideration for bus service. Commuter schools should be considered where it can be shown through the use of surveys or other instruments that there would be sufficient demand for expanded service. Coordination with university provided transit service is recommended to avoid duplication of public/private services.

- **Social Service/Government Centers:** Public agencies, government centers and community facilities generate demand for bus service. Since the nature and size of these facilities varies greatly, no numerical threshold will be set. Judgment as well as passenger trip purpose and characteristics of the users (e.g., elderly and low income citizens) should be considered in deciding whether to serve such a facility.

If there is a general movement between a single residential area and one of these commercial/industrial/institutional areas along a key commuting route, there is a potential for new express service.

To evaluate this guideline, the following data are required:

- Information on major non-residential land uses, including overall demand generated by the use.

2.2.2 Stop Spacing

Bus stop spacing guidelines seek to balance the need for accessibility with the need for speedy, reliable service. Operating bus service that stops every block to board and discharge passengers limits the amount of walking required to access a bus stop. However, this stopping pattern degrades the overall speed of the bus and increases route travel time, which reduces the attractiveness and convenience of bus travel. Transit providers within Connecticut should provide local fixed route bus service at the following stop spacing based on the household densities shown in Table 4.

Table 4: Bus Stop Spacing Guidelines

Population Density (Households per Acre)			
	Over 10	4 to 9.9	Under 4
Stops per Mile	4 per mile	2 per mile	1 or less (or as needed)

To evaluate this guideline, the following data are required:

- GIS shapefiles for each route
- GIS shapefiles for each stop location

2.2.3 Bus Stop Amenities

Statewide, Connecticut should use ridership information to adopt a formal guideline for passenger amenities at bus stops. These could include (but are not limited to):

- Shelters
- Benches

- Garbage Cans
- Bicycle Storage
- Signage
- Public information displays (route maps, schedules, etc.)

Priority for installation of benches should be given to stops with 50 daily boardings or more while priority for the installation of shelters should be given to stops with 100 daily boardings or more. Priority should also be given to areas that serve a large number of elderly and disabled patrons, and areas that are located near major passenger trip generators. Bicycle racks should be prioritized at stops adjacent to bicycle facilities (bike lanes, trails, designated bike routes) and in dense, urbanized areas or areas with high concentrations of schools and universities. Guidelines should be provided to encourage connectivity of local sidewalks to stops with bus shelters consistent with the State of Connecticut's Complete Streets Policies. It is recognized that Complete Streets apply to State-owned roads. However, the State will desire Complete Street policies be followed on non-State owned roads.

For express service, all park and ride lots should have shelters and benches, as they will be serving a large number of daily commuters. Stops in the central business district for express routes should adhere to the guidelines for local bus routes.

To evaluate this guideline, the following data are required:

- GIS shapefiles for each stop location
- Boardings at each stop
- Inventory of amenities at each stop

2.2.4 Bus Information

Providing accurate and easy-to-access information about bus stop locations, schedules, and real-time arrival information is critical to improving bus riders' experience. Prior to integrating technologies such as Automated Vehicle Location (AVL), Automated Passenger Counting (APC) and other Intelligent Transportation Systems (ITS), (such as real time bus information), transit properties should follow Connecticut's ITS guidelines.

AVL technology and automated stop announcements developed for *CTfastrak* are being expanded to all divisions of *CTtransit*. APC devices are being installed on *CTtransit* buses, most recently on the Hartford Division. The devices will automatically count passengers boarding and alighting and will allow in-depth usage analysis by route.

All *CTtransit* Hartford Division buses are equipped with active AVL and APC. In addition, the state-owned DATTCO bus fleet (Hartford Express and *CTtransit* New

Britain Divisions have AVL and APC installed, however, this equipment is only active on the bus routes that operate on *CTfastrak*.)

The state-owned Collins bus fleet (Hartford Express), the state-owned Kelley Transit bus fleet (Hartford Express) and majority of the state-owned New Britain Transportation Company bus fleet (*CTtransit* New Britain and Bristol Divisions) have AVL and APCs installed on vehicles, however, this equipment is not yet active.

Installation of AVL and APCs is planned on the *CTtransit* New Haven Division, the *CTtransit* Waterbury, and *CTtransit* Meriden Divisions.

The *CTtransit* Stamford Division bus fleet has AVL and APCs installed on vehicles, however, this equipment is not yet active, as this a separate City of Stamford contract and project.

Greater Bridgeport Transit has AVL equipment on board all of its buses. Nearly one-quarter of its fleet is equipped with has APC equipment. Greater Bridgeport Transit desires to expand the number of buses with APC, but funding to purchase this equipment is a constraint.

The Norwalk Transit District has recently installed AVL equipment on all of its vehicles. Approximately 20 percent of the fixed-route fleet has APC equipment installed. However, all future fleet purchases will include APC equipment.

By 2020, all transportation providers should provide 100% real-time information on their systems. This performance guideline is an aspirational goal at this point in time.

2.3 Schedule Design

Schedule design guidelines describe minimum and maximum headways, spans of service and days of operation.

2.3.1 Headway

In general, headways (i.e., the time between buses at the same location) are established to provide enough vehicles past the maximum load point(s) on a route to accommodate the passenger volumes and stay within recommended vehicle loading guidelines.

Time of day is a predominant factor in determining varying headway intervals. The common practice is to have more frequent service during peak hours and less frequent service during off-peak hours. Policy headways are established to provide service in a manner that meets the community's needs. A widely used policy headway is 30 minutes during the peak hours and 60 minutes during off-peak hours. Policy

service levels represent a compromise between economic efficiency and the functionality of the system. If existing service cannot meet the policy headways while adhering to the minimum passenger per hour or trip standards, it should be identified as a candidate for service changes. To preserve a minimal level of service for all users, CTDOT should adopt a statewide policy minimum headway of 30 minute service on weekdays for all local fixed routes in the peak hours, and 60 minutes in the off-peak hours (including weekends) for local routes. Where operationally necessary (such as in sections where short-turns make financial sense, or where buses run-on/run-off from the bus yard/garage), less frequent headways are permitted.

The Transit Capacity and Quality of Service Manual (TCRP Report 100) identifies level-of-service criteria as they relate to overall passenger comfort, as shown in Table 5: Load Factor and Passenger Comfort. To efficiently allocate service, while maintaining passenger comfort, agencies in Connecticut should schedule bus service to meet 1.0 passengers per seat during off-peak times and 1.33 passengers per seat during peak times.

Schedules should be developed using the average peak occupancy rate at the maximum load point in the peak direction⁵ for the time-period/day of the week. Every consideration should be made for variations in peak loading from the average. Routes which see high variation should be candidates for higher capacity vehicles.

⁵ The average peak occupancy rate at the maximum load point (the point along the route that experiences the largest number of passengers) in the peak direction indicates the adequacy of the service provided. If less than 100%, there is surplus capacity in the system. If more than 100%, it may indicate that service is not adequate or there is excess demand with passengers having to wait excessive periods of time before being able to board a bus.

Table 5: Load Factor and Passenger Comfort

SERVICE PERIOD	MAXIMUM LOAD FACTOR (PASSENGERS PER SEAT)	MINIMUM LOAD FACTOR (PASSENGERS PER SEAT)
Weekday Peak	1.33	0.33
Weekday Midday	1.00	0.25
Evening	1.00	0.15
Nights (after 10:00PM)	1.00	0.15
Weekends	1.00	0.20

Routes operating as feeder or Commuter Connection routes connecting with rail transit should have headways that enable the bus to meet each arriving and departing train without excessive wait times for passengers transferring to or from the bus.

Express routes should be scheduled to provide a level of service that allows customers to commute reliably via transit (i.e., multiple morning and evening departures that accommodate flexible schedules, no standees per state law). Service should be scheduled to meet demand, but should also provide at a minimum between 2-4 departures in the morning and evening.

To evaluate this guideline, the following data are required:

- Maximum passenger load by vehicle trip
- Rail transit schedules

2.3.2 Span of Service

Span of service is the hours that a bus route operates each day. The span of service for fixed local routes vary between the different transit agencies across Connecticut. While the size and budget of agencies plays a part in how many daily revenue vehicle hours can be afforded, CTDOT should recommend a minimum span of service for agencies to strive towards. A typical minimum span for local bus service on weekdays is 6:00 AM to 7:00 PM, with later service for primary local routes, and not later than 6:00 PM for express service. Weekend services can vary locally depending on the travel demand on Saturdays, Sundays, and holidays.

Express service spans vary more than those of local fixed routes. If the service is solely focused on commuters, the service can be provided only during peak hours. The span of service will depend on the travel time of the express service. These vehicle trips should aim to provide service that arrive in the central business district between 6:00 AM and 9:00 AM and depart the central business district between 3:00 PM and 6:00 PM.

When loads on the last or first vehicle trip are high (approaching 1.3 passengers per seat), or local agencies identify changes in land use/employment patterns, expanding the overall span of service should be explored.

Bus routes serving major activity centers (malls, houses of worship, and large employment centers) are candidates for weekend service. Limited service should be implemented, starting on Saturdays, and should be monitored closely to determine overall demand.

Routes operating as feeder service or Commuter Connection routes connecting with rail transit at stations should have spans that reasonably match heavy travel periods of the rail transit line.

To evaluate this guideline, the following data are required:

- Maximum load by vehicle trip
- Rail transit schedules

2.4 Route Productivity

Route productivity guidelines describe the overall cost to operate the route or system relative to various other metrics (including number of passenger trips and distance travelled). These guidelines will be used to identify routes that should be examined for potential improvements.

2.4.1 Passenger Trips per Revenue Mile

Passenger trips per revenue mile is a useful metric for measuring the overall efficiency of a route or system compared to the distance operated. This metric can be useful in identifying routes with low farebox recovery ratio⁶, high operating costs/deficits, or low overall utilization. This statistic should be calculated on a route level, for all routes of a specific type (i.e., express versus local routes), and for each agency as a whole. When comparing this metric across the state, agencies should be grouped by overall size, so that smaller systems are compared with other small systems and larger systems are compared with other large systems.

Based upon the best practices review, individual routes that have less than two passenger trips per revenue mile for local routes and less than one passenger trip per revenue mile for express routes will be identified for further examination.

To evaluate this guideline, the following data are required:

⁶ The farebox recovery ratio is the proportion of the amount of revenue generated by paying passengers as a fraction of the cost of the total operating cost.

- Total average weekday, Saturday and Sunday Passenger Trips
- Route statistics

2.4.2 Passenger Trips per Revenue Hour

Passenger trips per revenue hour is a useful metric for measuring the overall efficiency of a route or system compared to the operator pay hours utilized for the route or system. This metric can be useful in identifying routes with low farebox recovery, high costs/deficits, or low overall utilization. This statistic should be calculated on a route level, for all routes of a specific type (i.e., express versus local routes), and for each agency as a whole.

Based upon the best practices review, individual routes that have less than 20 passenger trips per revenue hour for local routes and less than 10 passenger trips per revenue hour for express routes will be identified for further examination.

To evaluate this guideline, the following data are required:

- Total average weekday, Saturday and Sunday Passenger Trips
- Route statistics

2.4.3 Farebox/Cost Recovery

Farebox recovery is the amount of the cost per passenger trip that is covered by the fare paid by the passenger. This statistic should be calculated on a route level, for all routes of a specific type (i.e., express versus local routes), and for each agency as a whole.

Individual routes that have a farebox recovery in the bottom 60th percentile of the agency average should be examined for potential operating improvements

To evaluate this guideline, the following data are required:

- Total average weekday, Saturday and Sunday Passenger Trips
- Route statistics

2.4.4 Ratio of Revenue Miles to Non-Revenue Miles

The ratio of revenue to non-revenue mileage is an important statistic that measures how efficiently the route is scheduled. Non-revenue mileage from the bus maintenance/storage facility to the start of the route is not productive as the transit agency is spending money on fuel and salaries while not carrying passengers or collecting fares. A high ratio of non-revenue to revenue mileage indicates that the

route has to travel a significant distance in non-revenue miles to begin or end revenue service.

Based upon the best practices review, individual local routes where non-revenue mileage is more than five percent of revenue mileage and individual express routes where non-revenue mileage is more than 10 percent of revenue mileage should be examined for potential operating or capital improvements. Specifically, the location of the system's depot(s) with respect to the service area should be investigated for routes with high non-revenue to revenue mileage ratios. Route adjustments might be warranted, if feasible, since it is unlikely that new bus garages would be constructed to improve this metric.

To evaluate this guideline, the following data are required:

- Route statistics
- Location of depots

2.5 Service Delivery

Service delivery guidelines describe the operations of the routes, including travel time and on-time performance. These guidelines affect a customer's day-to-day impression of the system and are very important in projecting an efficient, comfortable and reliable system. Similar to the Productivity Guidelines, service delivery evaluations should be performed annually by each agency. Performance measures related to maintenance are included here to support the statewide *Let's Go CT* goal of providing state-of-the-art service and upgrading bus facilities. While customers do not directly interact with maintenance activities, ensuring these activities are performed on time ensures that there are no interruptions in service. Additionally, the age and condition of the fleet affects the perception of the system and the comfort of the passengers.

2.5.1 On-Time Performance

The passenger's experience with bus service depends highly upon on-time performance, especially on short-distance trips, where consistently late running buses impact travel times and the overall passenger experience. The best way to measure on-time performance is using Automatic Vehicle Locator (AVL) devices. All agencies within Connecticut do not currently have this technology on their vehicles but the technology is being gradually added to the fleet throughout the state (especially on *CTtransit* routes). AVL not only measures on-time performance, but allows the real-time tracking of transit vehicles for improved management and participation in real-time mobile applications for riders. CTDOT should make it a goal for all agencies to have AVLs on each vehicle in service by 2020 so that the on-time performance metric can be assessed at least annually for each route in the future.

All *CTtransit* Hartford Division buses are equipped with active AVL. In addition, the state-owned DATTCO bus fleet (Hartford Express and *CTtransit* New Britain Divisions) have AVL installed, however, this equipment is only active on the bus routes that operate on the *CTfastrak*.

The state-owned Collins bus fleet (Hartford Express), the state-owned Kelley Transit bus fleet (Hartford Express) and majority of the state-owned New Britain Transportation Company bus fleet (*CTtransit* New Britain and Bristol Divisions) have AVL installed on vehicles, however, this equipment is not yet active.

Installation of AVL is planned on the *CTtransit* New Haven Division, the *CTtransit* Waterbury, and *CTtransit* Meriden Divisions.

The *CTtransit* Stamford Division bus fleet has AVL installed on vehicles, however, this equipment is not yet active, as this a separate City of Stamford contract and project.

Greater Bridgeport Transit has AVL equipment on board all of its buses.

The Norwalk Transit District has recently installed AVL equipment on all of its vehicles.

For existing bus systems that utilize AVL technologies and have this data available (either at the route or system level), the on-time performance will be evaluated.

For future state-wide bus system evaluation efforts, it is recommended that the state require transportation providers measure on-time performance data at least annually at the route level, either using AVL technology or the traditional method based on collected data on the street key intermediate time points along the route by Transportation Supervisors or traffic specialists.

Consistent with *CTtransit* guidance, routes which fail to operate on-time 90 percent or better on their runs will be evaluated for further improvements.

To evaluate this guideline, the following data are required:

- On-time performance by route or at system-level (depending on data availability)

2.5.2 Average Time between Failures

A service failure, according to the National Transit Database, is defined as “a failure of some mechanical element of the revenue vehicle that prevents the vehicle from completing a scheduled vehicle trip or from starting the next scheduled vehicle trip because actual movement is limited or because of safety concerns.” To reduce these service failures, each agency should measure the mean distance between failures (MDBF) which is the average distance traveled between these service failures. This should be evaluated by each agency annually, and when MDBF for an agency falls

below the statewide average, the maintenance operations or age of the fleet (see below) should be investigated for potential improvements/replacements.

To evaluate this guideline, the following data are required:

- Mean distance between failures based on National Transit Database data

2.5.3 Fleet Average Age

Tracking the average age of the transit fleet will help agencies meet the statewide *Let's Go CT* goal of providing state-of-the-art service to riders and help transit agencies run efficient systems. Based on vehicle size, there are various categories of recommended vehicle service life, ranging from 12 year/500,000 miles to 4 year/100,000 miles. Each agency will be responsible for annually tracking the average age of their entire bus fleet, and for buses in each category for agencies that operate multiple size buses. Should the average age of the fleet exceed two-thirds of the recommended service life, that agency's replacement schedule and policies should be reviewed⁷.

To evaluate this guideline, the following data are required:

- Average fleet age

⁷ For transit providers with smaller service areas, CTDOT often replaces nearly the entire fleet at once.

Appendix A: Transit Service Guideline Matrix Analysis

This matrix presents the service standards and criteria used to measure bus system performance by various studies undertaken by the state's transportation providers. The data provides an insight into available data and identifies the metrics that were considered key indicators of performance.

Service Guidelines Matrix	REPORT:	2000 Connecticut Statewide Bus Study	2005 Intermodal Connections Study Southeast	2006 HART Harlem Line Shuttle Bus Study	2007 HART Expanding Bus Transport to Bridgeport and Waterbury	2010 HART Bus Service Plan	2010 Missing Links: Prioritized Bus Service Expansion Plan	2011 HART Fixed Route Efficiency Study	2011 Long Range Regional Transportation Plan FY 2011-2040 for Southeastern Connecticut	2011 Riding the Bus: The Pace of Investment in Public Transportation	2012 Coastal Corridor Bus Study	2012 Enfield Transit Study	2012 Windsor Transportation Management Area Final Report	2012 CTtransit Service Guidelines	2013 City of New Haven Comprehensive Plan Update	2013 Connecticut Transportation Survey	2013 Manchester Transit Study	2013 Town of New Milford Transportation Management Plan	2013 Waterbury Regional Bus Ridership Study	2014 City of New Haven Two-Way Conversion	2014 Connecticut Transportation by the Numbers: Meeting the State's Needs for Safe and Efficient Mobility	2014 CTtransit CSA Analysis Existing Conditions & Service Overview	2014 SEAT Bus Study: Transit Market Analysis	2015 Waterbury Area Transit Study: Market Analysis	2015 Westport Bus Operations and Needs Study	% Usage
	Route Design																									
Route coverage at the production end	✓	✓	☐	✓	☐	☐	✓	☐	☐	☐	✓	☐	☐	☐	✓	☐	✓	☐	☐	☐	☐	☐	✓	☐	☐	33%
Route coverage at the attraction end	✓	✓	☐	✓	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	✓	☐	✓	☐	☐	☐	☐	☐	✓	☐	☐	29%
Bus Stop Spacing	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	4%
Overall Route Directness	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	✓	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	17%
Route coverage	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	8%
Service area poverty level	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	✓	☐	☐	13%
Bus stop location guidelines	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	4%
Route design guidelines (limited stop, express)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	0%
Schedule Design	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Frequency/ Headway Guidelines	✓	✓	✓	✓	☐	☐	✓	☐	☐	☐	☐	✓	✓	☐	☐	☐	✓	☐	✓	☐	☐	☐	☐	✓	✓	46%
Span of Service Guidelines	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	✓	✓	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	21%
Vehicle Needs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	4%
Route Run Time	✓	☐	☐	☐	✓	☐	☐	☐	☐	☐	✓	✓	☐	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	21%
Efficiency & Productivity	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fare Structure	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	4%
Farebox Recovery	✓	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	✓	17%
Loading	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	4%
Productivity	☐	☐	✓	✓	✓	☐	✓	☐	☐	☐	✓	✓	✓	☐	✓	☐	☐	☐	✓	☐	☐	☐	☐	✓	✓	46%
Average Fare	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	0%
Operating Efficiency/ Effectiveness	✓	☐	☐	☐	✓	☐	✓	☐	✓	☐	✓	✓	✓	☐	✓	☐	☐	☐	✓	☐	☐	✓	☐	✓	✓	46%

Service Guidelines Matrix	REPORT:	2000 Connecticut Statewide Bus Study	2005 Intermodal Connections Study Southeast	2006 HART Harlem Line Shuttle Bus Study	2007 HART Expanding Bus Transport to Bridgeport and Waterbury	2010 HART Bus Service Plan	2010 Missing Links: Prioritized Bus Service Expansion Plan	2011 HART Fixed Route Efficiency Study	2011 Long Range Regional Transportation Plan FY 2011-2040 for Southeastern Connecticut	2011 Riding the Bus: The Pace of Investment in Public Transportation	2012 Coastal Corridor Bus Study	2012 Enfield Transit Study	2012 Windsor Transportation Management Area Final Report	2012 CTtransit Service Guidelines	2013 City of New Haven Comprehensive Plan Update	2013 Connecticut Transportation Survey	2013 Manchester Transit Study	2013 Town of New Milford Transportation Management Plan	2013 Waterbury Regional Bus Ridership Study	2014 City of New Haven Two-Way Conversion	2014 Connecticut Transportation by the Numbers: Meeting the State's Needs for Safe and Efficient Mobility	2014 CTtransit CSA Analysis Existing Conditions & Service Overview	2014 SEAT Bus Study: Transit Market Analysis	2015 Waterbury Area Transit Study: Market Analysis	2015 Westport Bus Operations and Needs Study	% Usage
	Service Delivery & Maintenance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Running Speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
Vehicle Trips Operated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4%
Pull-Outs Dispatched	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
Miles per Road Call	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
Waiting																										
Shelters/Benches/Area	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13%
Bus Stop Signs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
Revenue Equipment Condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4%
Public Information/Schedules	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8%
Revenue Miles between Failures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
Fleet Spare Ratio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
Rider Characteristics Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17%
Fleet Age	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17%
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0%
TOTAL per REPORT	13	4	2	6	3	0	9	0	1	7	7	8		6	1	6	1	5	0	0	2	3	3	4	<input type="checkbox"/>	