

3 SERVICE MEASURES, SERVICE STANDARDS & DESIGN GUIDELINES

The recommended service measures, service standards, and design guidelines found in this chapter were delivered to GRTA in October 2014. Between October 2014 and January 2016, GRTA's transit operations team and transportation performance team have held a series of workshop sessions to review and build upon the recommendations found in this chapter. With respect to service measures, the focus of these workshops has been to identify multiple tiers of metrics that are relevant to managing the performance of *Xpress* and reporting this performance to stakeholders such as GRTA's Board. Regarding service standards, the primary focus to date has been addressing the requirements of Title VI of the Civil Rights Act, in coordination with GRTA's Title VI program update.

GRTA staff is continuing to use the information in this chapter as the basis for updating *Xpress*-related performance measures, service standards, design guidelines, and analysis methods, as well as using it as a basis for setting various performance targets.

SERVICE STANDARDS AND GUIDELINES

Service standards and service design guidelines, while related, refer to two different components that support overall service efficiency in a transit agency.

- **Service Standards:** Service standards represent quantitative metrics that an agency strives to meet or exceed in terms of performance. Examples of service standards may include meeting or beating a pre-defined *on-time performance* percentage or exceeding a *passengers per trip* threshold on a monthly or annual basis.
- **Service Design Guidelines:** As compared to standards, service design guidelines are not beholden to a specific threshold, instead they provide guidance and suggested best practices to help a transit service achieve service standard goals. Examples of service design guideline standards may include guidance on service deviations, route planning and bus stop spacing.

This chapter uses several terms that often cause confusion:

- A **measure** is a category of comparison; a reference point against which other factors can be evaluated. For this project, an example measure would be the passengers per revenue hour. Measures may or may not have an associated standard.
- A **standard** is a quantities value or threshold that the transit agency intends to achieve. Within the context of this chapter, standards refer to expectations for existing services. "Service standards" is frequently used as a term to reflect both measures and standards in this document.

- A **guideline** is defined as a recommendation that leads or directs a course of action to achieve a certain goal. Within the context of this chapter, guidelines refer to decision tools that facilitate the establishment of new or substantially modified services.

In short, measures and standards set the expectations for existing services and guidelines do the same for new services or service revisions.

Need For Service Standards and Guidelines

Aside from the adage “you can’t manage what you don’t measure”, there are several reasons why service standards and guidelines are critical for a transit agency. Attributes of well-designed policies are described below.

- **Reflect the vision and goals for the agency and system:** Transit service standards are a reflection of the values of the agency and the role that the transit system is intended to play within its service area. An agency that values extensive geographic coverage above concentrating service in high demand corridors will have a very different set of service standards than one that focuses on serving demand. While there is no single “right” set of standards, it is important that the standards consciously reflect the values of the agency.
- **Provide transparency in use of public resources:** Service standards are typically used as benchmarks and performance indicators shared with elected boards and the general public. As such, it is critical to develop standards that are easy to understand, directly relate to agency goals, and instill confidence in the organization as a whole. Service guidelines provide a similar transparency by making it clear how service-related decisions are made by the agency, and under what reasoning.
- **Establish Evaluation Criteria for All Services:** Service standards and design guidelines provide a transit agency with the evaluation metrics and tools necessary to redesign transit services. Service standards help one understand, on a systemwide or route-by-route basis, where improvements are necessary. Service design guidelines provide information on how to effectively make those improvements in a standardized and equitable manner. By having solid standards and guidelines, staff will be prepared to address questions about service changes with a consistent and common basis.
- **Prioritize Funding:** With frequent service evaluation, an agency can identify areas of short-term and ongoing additional funding needs. As an example, longer-term projects such as park and ride expansion may not arise in traditional transit performance measures, but they are critical in ensuring ridership growth if capacity is at its maximum.
- **Support FTA Compliance:** FTA requirements suggest that Title VI monitoring should occur no less than every three years. However, integrating similar service standards into a more regular (annual) process is recommended. This way, preemptive steps are taken to identify any negative impacts to protected groups on an annual basis.

Existing GRTA Xpress Service Standards and Policies

Elements of the goals, measures and standards for Georgia Regional Transportation Authority (GRTA) Xpress service can be found across several documents including:

- GRTA Strategic Plan
- Performance Dashboards
- Xpress Service Standards and Policies

GRTA Strategic Plan

The FY 2014-2016 GRTA Strategic Plan briefly outlines several high-level goals that should be considered in the development of future service standards and design guidance. Goals outlined for *Xpress* include:

- Minimize the level of public investment while providing quality service
- Monitor on-time performance to benefit customers and support operational efficiency
- Proactive preventive maintenance scheduling and adherence

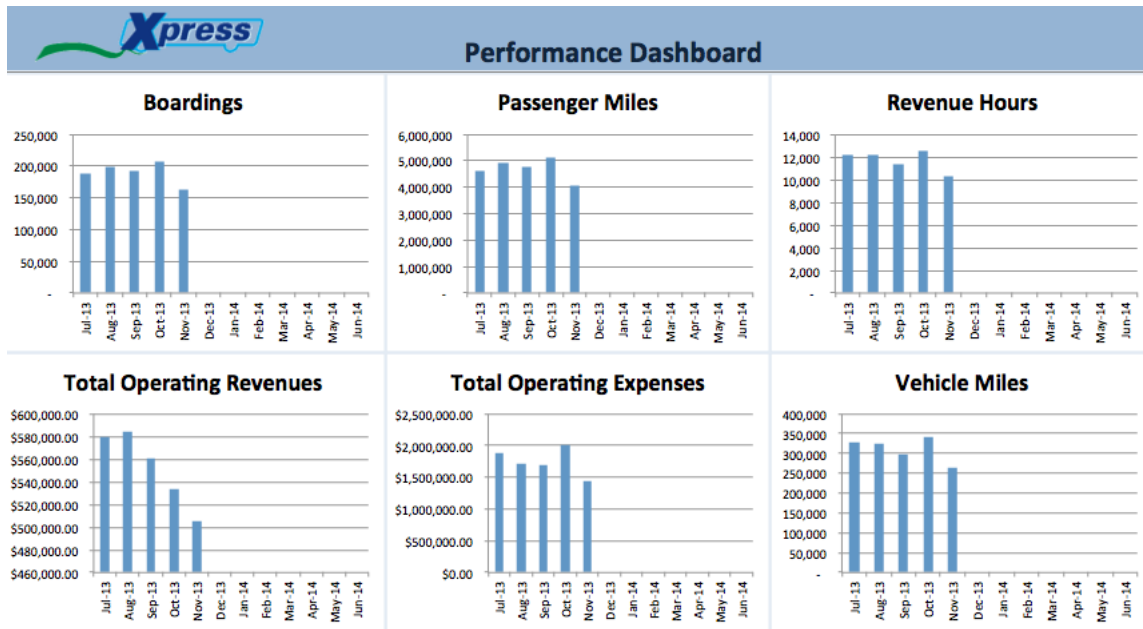
Beyond these overarching goals, several measures are also outlined. Specific standards can be found in the *Xpress* Service Standards and Policies. Measures include:

- Total *Xpress* passenger miles
- Cost recovery
- On-time performance
- Percentage of on-time vehicle preventive maintenance

Performance Dashboard

On a more regular basis, a Performance Dashboard is used to track 18 different systemwide measures of commonly collected transit data. A sample of this Performance Dashboard is shown in Figure 3-1.

Figure 3-1 Existing Xpress Performance Dashboard (Partial Screenshot)



Selected information from the performance dashboard is often used to update the GRTA Board on a quarterly basis in an Operations Statistical Report.

Xpress Service Standards and Policies

The current *Xpress* Service Standards and Policies provide more detailed standards for *Xpress* service on a route-level basis. The document’s four goals include:

- Describing GRTA’s service standards and policies
- Establishing a timeframe for monitoring them
- Defining major service changes¹;
- Establishing policies necessary to ensure the *Xpress* service does not create disparate impacts on minority populations nor pose disproportionate burdens on low-income populations

Any future revisions on existing service standards would retain these overall goals, yet certain elements within the document may be revised to provide additional clarity and to more closely align with *Xpress*’ operating environment. A full version of the existing *Xpress* Service Standards and Policies can be found in Appendix A.

This section is not intended to provide a detailed review of the existing service standards and policies. However, several key elements will be highlighted as these may be areas that will be suggested for future modification. Elements include:

- Trip and Route Productivity Standards
- Trip and Route Productivity Improvement
- On-Time Performance
- Vehicle Assignment
- Maximum Vehicle Load Factor

Figure 3-2 presents an overview of existing trip and route productivity standards for *Xpress* Service. A time-based “tiered” approach is currently used under the assumption that new routes may take time to build ridership and become productive. In addition, peak service and off-peak service (10:00 a.m. – 3:00 p.m.) are also currently categorized separately in terms of service standards. Figure 3-2 also highlights other standards that are currently utilized including on-time performance and vehicle assignment (a standard used to reflect vehicle age).

¹ This chapter does not provide specific guidance on the definition of service changes for FTA Title VI purposes.

Figure 3-2 Existing Trip and Route Productivity Standards

Peak Service				
Years of Operation	Year 1	Year 2	Year 3	Year 4 & Longer
Minimum Fare Box Recovery Ratio	10%	15%	20%	25%
Minimum Customers per Trip	8	11	14	17
Off-Peak Service				
Years of Operation	Year 1	Year 2	Year 3	Year 4 & Longer
Minimum Fare Box Recovery Ratio	5%	7.5%	10%	15%
Minimum Customers per Trip	5	7	9	10
General Standards				
On-time Performance	80% of trips will leave between 0-5 minutes after the scheduled departure time from the first point of departure.			
Vehicle Assignment	No minority route will receive vehicles that on average are more than three years older than the system average for all GRTA operated <i>Xpress</i> routes			
Maximum Vehicle Load Factor	1.00 (maximum vehicle capacity)			

If any given route is not meeting the adopted productivity standards, several corrective actions are suggested based on a route evaluation. Suggested corrective actions include:

- Increase marketing efforts or information dissemination
- Route redesign or segment rerouting
- Change the frequency of service
- Change the hours of service
- Change the days that the service is provided
- Eliminate unproductive service, which may include an entire route, route segment or specific trips operated on a route
- Alter fares or fare structure

Key Service Design Guidance

The current *Xpress* Service Standards and Policies also include several criteria that are more reflective of design guidance and do not contain specific quantitative measures.

- **Vehicle Headway:** GRTA will reduce headways first on trips and/or routes that have the highest vehicle load factors and/or customers per trip and increase headways first on trips and/or routes with the lowest customers per trip and/or farebox recovery ratios.
- **Distribution of Transit Amenities:** GRTA’s facility standard is that newly constructed *Xpress* stations shall all have the same package of amenities with a fare pavilion, passenger pavilions, route and schedule displays, benches, waste receptacles, digital message signs, emergency call boxes, ADA parking spaces and security cameras.

Due to their short-term nature, leased lots do not have the same expectation of transit amenities.

- **Service Availability:** GRTA's service availability policy is to provide at least one route that originates in or within 5 miles of each county in GRTA's jurisdiction.

Service Equity Guidance

Per FTA guidance on Title VI, a service equity analysis is required for all fare changes and major service changes. In addition, guidance recommends that service standards be monitored with special attention to minority and low-income areas at least every three years. The current *Xpress* Service Standards and Policies outline the definition of a major service change and associated impacts as follows:

- **Major Service Change:** Any addition or elimination of a route, or any service change that increases or decreases more than 25% of the total revenue service hours of a route. Temporary changes in service lasting twelve months or less are exempt.
- **Disparate Impact (Associated with Minority Passengers):** Any time the expected distribution of adverse impacts to minority or non-minority passengers is 15 percentage points greater or less than the average distribution of minority and non-minority passengers on GRTA-operated *Xpress* routes, this is statistically significant and such differences in adverse impacts are considered disparate.
- **Disproportional Burden Impact (Associated with Low-income Passengers):** For a major service change effecting existing service, anytime the expected distribution of adverse impacts to low-income and non-low-income passengers is three percentage points greater or less than the average distribution of low-income and non-low-income passengers on GRTA-operated *Xpress* routes, this is statistically significant and such differences in adverse impacts pose a disproportionate burden.

SERVICE STANDARDS DEVELOPMENT

The existing *Xpress* Service Standards and Policies establish a baseline from which to evaluate *Xpress* service. While numerous opportunities exist to expand upon this document, this must be balanced with the accuracy and availability of underlying data used to support those measures. This challenge is particularly relevant with *Xpress* services which rely on data coming in from multiple transportation vendors, some of which operate under different transit agency guidelines, such as Cobb Community Transit (CCT) and Gwinnett County Transit (GCT).

Figure 3-3 provides a high-level overview of the strengths and opportunities for modification of the existing *Xpress* Service Standards and Policies.

Figure 3-3 Strengths and Opportunities for Modification

Existing Strengths	Opportunities for Modification
<ul style="list-style-type: none"> ▪ Approach provides tailored metrics for expansion of services ▪ Covers basic guidelines for Title VI ▪ Provides menu of options for corrective actions to improve route productivity ▪ Provides preliminary service design guidance for route modifications 	<ul style="list-style-type: none"> ▪ Realign and expand on service standards to address broader categories such as trip productivity, cost productivity, customer experience, and service reliability ▪ Establish baseline references for measures based on existing <i>Xpress</i> averages ▪ Define service standard reporting expectations (GRTA Board and frequency of reporting) ▪ Provide expectations for data collection methodologies to ensure consistent data reporting ▪ Refine service standards and service design guidelines to provide stronger evaluation tools for GRTA <i>Xpress</i> staff ▪ Define researched justification for service standards

Transit Service Standard Considerations

Transit agencies typically monitor key route-level and systemwide performance standards for their fixed-route services, using pre-established standards in order to measure organizational success. These allow policy makers to evaluate whether service expectations are being met and help an agency understand where and how it needs to improve on an ongoing basis.² System service standards may cover a wide range of subjects including ridership, safety, reliability, geographic coverage, and customer satisfaction. While there is value in continuity—allowing policy makers to review performance trends over time—many systems also find benefit from adding special measures that consider areas of special emphasis or concern.

There are several key elements that should be considered in developing, implementing and acting upon an organization’s transit service standards. Key questions include:

- What goals does our organization prioritize highest and how do we measure our success?

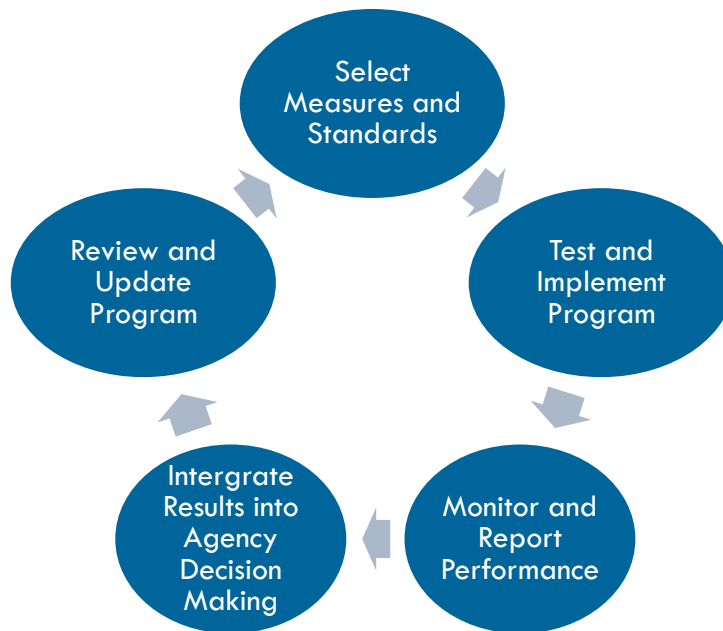
² As derived from TCRP Report 88; A Guidebook for Developing a Transit Performance Measurement System

- What value does a measure provide in making policy or planning level decisions?
- To what extent are data available to calculate a measure efficiently, consistently and accurately?
- How frequently would a decision be made based on the outcomes?
- What audiences would benefit most from the information, and how often?

Service Standards Development

Developing an effective set of service standards is a cyclical process that involves multiple steps. This section focuses on the first step of “selecting measures and standards.”

Figure 3-4 Service Standards Selection, Implementation and Review Process



Selecting Measures

Figure 3-5 presents a broad list of potential measures that could be collected at a system or route-by-route level. While all of these factors could be considered important, depending on an agency’s specific needs, some may be prioritized higher than others.

Figure 3-5 Example Service Standard Measures

Example Measures	Unit	Level of Detail
Jobs Access	Number of Jobs/Year Accessible via Xpress	Systemwide
At Fault Accidents	Number of Accidents	Route or Systemwide
Average Load Factor	Average Load Factor	Route or Systemwide
Average Monthly Out of Service Vehicles	% Out of Service Vehicles	Systemwide
Commendations	Commendation	Route or Systemwide

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Example Measures	Unit	Level of Detail
Competitiveness with Auto Travel Time	Transit as a Percentage of Auto Travel Time	Route or Systemwide
Complaints	Complaints	Route or Systemwide
On-time vehicle inspections	% of Vehicles Serviced On-time, Annual	Systemwide
On-time service performance	% of Trips Leaving "On-time" Based on Agency Definitions	Route or Systemwide
Passenger Miles	Miles	Route or Systemwide
Passenger Trips per Capita	Passengers	Systemwide
Park and Ride Utilization	% Usage	Site-by-Site
Peak Load Factor	% of Vehicle Capacity	Route
Preventable Service Disruptions	Missed Pullouts, Etc.	Route or Systemwide
Revenue Hours	Revenue Hours	Route or Systemwide
Revenue Miles	Revenue Miles	Route or Systemwide
Road Calls	Road Calls	Route or Systemwide
Security Incidents (Including locations, off-board or on-board)	Number of Security Incidents	Route or Systemwide
Systemwide and Route-by-Route Ridership	Boardings	Route or Systemwide
Total Operating Expenses	Operating Expenses	Route or Systemwide
Fare Revenue by Fare Type	Fare Revenue	Route or Systemwide
Total Operating Revenues	Revenues	Route or Systemwide
Vehicle Age	Years	Systemwide
Vehicle Miles	Miles	Systemwide
Single-Occupancy Vehicle Miles Reduced	Miles	Systemwide
Spare Ratio	% of Fleet	Systemwide
Vehicle State of Good Repair Status	% of Fleet	Systemwide

A major consideration is the level of accuracy of these measurements and if they can be provided in a reliable and consistent manner from the various service vendors. As an example, fare revenue by fare type may not be available as buses may not have fareboxes that account for different fare payment types. Another example includes park and ride utilization as this information is currently not collected by GRTA.

Based on these basic measures, numerous permutations of service standards could be adopted. Again, standards should be identified based on *Xpress* priorities and should be categorized to align with *Xpress* goals. Figure 3-6 provides a sample of service standard categories aligned to selected measures.

Figure 3-6 Example Service Standard Categories and Measures

Service Standard Category	Example Measures
Ridership Productivity	<ul style="list-style-type: none"> ▪ Total Ridership ▪ Boardings per Revenue Hour and Revenue Mile ▪ Boardings by Route and Trip
Cost Efficiency	<ul style="list-style-type: none"> ▪ Systemwide and Route-by-Route Farebox Recovery Ratio ▪ Revenue per Boarding ▪ Passengers Miles per Gallon
Capacity Utilization	<ul style="list-style-type: none"> ▪ Average and Peak Load Factor ▪ Average and Peak Park and Ride Utilization
System Reliability	<ul style="list-style-type: none"> ▪ On-time Performance (early and late running trips) ▪ Missed Trips ▪ On-time Vehicle Inspections ▪ Breakdowns per 100,000 miles
System Availability	<ul style="list-style-type: none"> ▪ Population Served within 5 miles (in the same direction of their journey) of an <i>Xpress</i> Pick-up Location ▪ <i>Xpress</i> trips available to Title VI Protected Census Tracts vs. Non-Protected Census Tracts
Community Impact	<ul style="list-style-type: none"> ▪ Single-Occupancy Vehicle Miles Reduced ▪ Jobs Access ▪ Passenger Trips per Capita
Customer Satisfaction and Safety	<ul style="list-style-type: none"> ▪ Competiveness with Auto Travel Times ▪ Customer Commendations and Complaints per 10K boardings ▪ Preventable Accidents per 100,000 miles

Defining Service Standards

The process of establishing specific service standards must include a combination of inputs that reflect local service characteristics and a comparison against other national peer agencies as a “check.” Given that *Xpress* operates only freeway-based *Xpress* bus services, the number of applicable peers is far less than a traditional fixed-route bus operation. However, it also means that *Xpress* service standards can be simpler as there are not numerous types of service categories (e.g., express, local, paratransit, etc.).

For the purpose of establishing service standards, *Xpress* has the benefit of a decade of operational data that helps provide a relative baseline for services. In addition, agencies such as Sound Transit in Seattle and Commuter Express in Los Angeles are peers which offer a basis of comparison to assist in establishing service standard goals across service measures. Figure 3-7 provides a snapshot of regional express bus focused service standards from several agencies around the United States.

Figure 3-7 Example Service Measure, Standard and Sources

Measure	Service Standard	Source
Load Factor	50% (Express Services)	Metrobus (Washington DC) Regional Bus Services Performance Assessment Report (2000)
Cost Recovery and Passengers per Revenue Hour	+120% average and -60% average trigger additional service review.	
Minimum Peak Load Factors	60% Weekday / 50% Weekend	VTA (San Jose, CA) Express Bus Service Design Guidelines (2007)
Farebox Recovery Ratio	20-25%	
Ratio of Total Hours to Service Hours	2.0	Honolulu Transit Performance Standards (2012)
Passenger miles per Revenue Hour	300	
Minimum Passengers per Trip	25 per trip	
Passengers per Revenue Hour and per Trip	Less than 75% of the system average is considered unsatisfactory	
Cost per Boarding	Greater than 125% over the system average is considered unsatisfactory	Sound Transit (Seattle) Express Bus Service Standards (2010)
On-time performance (Trip Origin)	90% of trips should depart the route terminus not more than three minutes late and never early	
On-time performance (Mid-trip)	85% of bus trips on each route should depart each mid-route scheduled time point not more than five minutes late and never early, except for estimated time points, where buses are allowed to depart early	
On-time performance (Trip Terminus)	90% of bus trips on each route should arrive at the route terminus not more than seven minutes late	
Missed Trips	99.8% or more of scheduled trips should be operated	

Peer information can be valuable to help establish a range for service standards and to understand how a group of service standards in tandem may be used for planning and route evaluation purposes. However, the unique characteristics of a transit agency’s operating environment also play a major role in defining service standards that are aspirational yet attainable. Figure 3-8 presents several existing *Xpress* measures and their corresponding

averages based on 2013 data. Given *Xpress*' past decade of service, enough data is likely available to establish reasonable baselines and to determine corresponding service standards.

Figure 3-8 Example Service Measures and FY 2013 Averages

Measure	Fiscal Year 2013 Average
Boardings per Revenue Hour	16.4
Systemwide Recovery Ratio	33.5%
Revenue per Boarding	\$3.04
On-time Performance	86.30% ³
Complaints per 10,000 Boardings	8.00
Miles between Road Calls	19,810

Establishing a Baseline

A reasonable baseline should be based on more than a single snapshot in time and should include multiple data points to ensure that it provides an accurate base from which to measure. There is no single methodology to determine a baseline and one should be aware of potential pitfalls in establishing a baseline. Potential hazards include the potential of outliers or inconsistent environs that might impact the determination of a baseline. Baselines should be updated periodically as practical (see periodic updates below), but not so frequently that it presents an ongoing moving target for evaluating services.

Standards Adoption

Service standards should reflect the best thinking of agency staff members. Yet, it is critically important that they also be understood and adopted by the agency's governing body. If the GRTA Board does not have ownership of the standards and guidelines, they will likely not be motivated to honor those standards when their conclusion differs from their gut instincts. The adoption process can sometimes be eased when members of the policy board understand that well-applied standards and guidelines inform, but do not dictate, decisions.

Remedial Actions

Implementation of a remedial service improvement program is an often overlooked second component of a

Service Standards Case Study: Los Angeles Commuter Express

The Los Angeles Department of Transportation operates a regionally-focused commuter bus service called Commuter Express. To evaluate route-by-route performance and determine if a route warrants further review, each route undergoes an annual performance evaluation based on a composite score including:

- Passengers per revenue hour
- Subsidy per passenger mile
- Farebox recovery ratio

A ratio is developed to compare these factors against the systemwide average. The sum of the three ratios reflects the route's overall performance compared to the system (A sum of 1.0 equates to the systemwide average). Routes whose sum is less than 1.0 are subject to review and service modification.

Source: Los Angeles Department of Transportation Transit Performance Standards and Transit Service Evaluation

³ On-time performance is currently based on spot checking by road supervisors. Late and early running trips are not differentiated in this figure.

performance evaluation program. Service standards have little benefit if they are not used to improve service quality and effectiveness. However, without a recognized and accepted set of criteria that are employed to conduct performance evaluations, any changes may appear arbitrary.

Performing reviews of services that fail to meet adopted standards can be a time consuming process that can lead to difficult decisions that it may seem easier to defer, at least in the near term.

However, if the process is not carried to a conclusion, and unproductive services are allowed to remain without resolution, it may seem that review efforts are being done for without reason.

The reality is that agencies often ignore their own performance standards in good times, when policy makers prefer to avoid the hassle of taking away peoples’ service, or wish to spread the wealth among a

larger number of people rather than focus investment on busy routes. The result can often be that the system never reaches its full potential, allowing weak routes to continue, or even creating new weak routes that must be addressed in the future.

Periodic Updates

Finally, standards (and guidelines) will need to be periodically revisited and updated as operating conditions and community priorities evolve and financial conditions change. Updates to service standards are also contingent on the availability of accurate data to inform those standards. While there are benefits in maintaining consistent standards and guidelines, it is a good idea to consider whether they continue to reflect the community and system’s priorities about every three years. This time period is consistent with the requirement to provide an updated Title VI Program and also ensures that baselines are not “moving targets” that are consistently changing.

Reporting Frequency

Monitoring of service standards must strike a balance between the quantity of information necessary for decision making purposes and the level of detail necessary to make route-level decisions. In the development of service standards, certain route-level measures may only be reported at the staff or manager level. More general systemwide measures necessary to assess overall transit system health and progress towards strategic goals should be presented at higher levels of decision-making responsibility. Figure 3-10 presents a basic relationship between level of detail for service standards and the breadth of responsibility related to agency decision making.

**Service Standards Case Study:
Santa Clara Valley Transportation Authority**

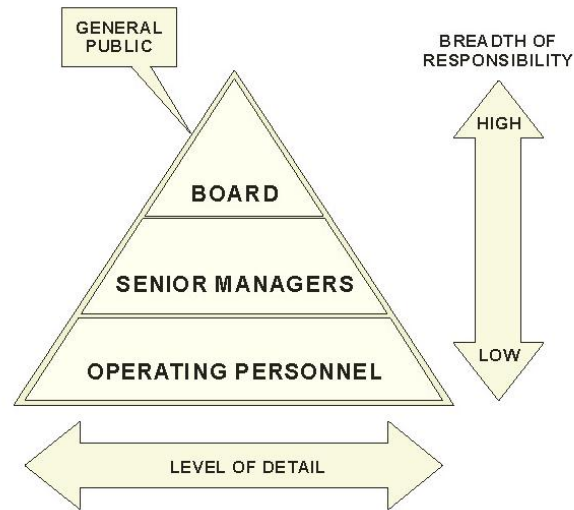
The Santa Clara Valley Transportation Authority (VTA) provides a full array of transit services (fixed route, express, commuter express) in the San Francisco Bay Region. Specific to their express bus services, a tiered service standard has been adopted similar to those defined for Xpress. New or revised routes are expected to be at “maturity” within two years (24 months). Route Performance Expectations for VTA Xpress Bus services include:

Figure 3-9 VTA Route Performance Expectations

Time from Implementation (Months)	% Compliance with New Service Standards
6	60%
12	75%
24	100%

Source: VTA Xpress Bus Service Design Guidelines. 2007

Figure 3-10 Relationship of Service Standard Detail and Decision Responsibility



Source: TCRP Report 88 ; A Guidebook for Developing a Transit Performance Measurement System

Data Collection Consistency

The service standards development process is intended to ensure that data quality is sufficient enough for reporting and decision-making purposes. Therefore, service standards should clearly outline the general process by which data is collected for metrics. This is to ensure that data collection processes remain consistent over time, therefore ensuring that service standard measurements are accurate and provide a formal baseline to make decisions. This practice is especially important in an operation such as *Xpress* where there are numerous vendors involved in the data collection process and where vendors may change over time.

RECOMMENDED SERVICE MEASURES AND STANDARDS

Purpose

Xpress strives to provide quality transit service in a cost-effective manner that is consistent, equitable and a competitive option for the commuting public. To do so, *Xpress* must make a number of decisions regarding where demand is greatest and where limited resources can and should be used.

The recommended service measures and standards are intended to support *Xpress* in the following operational evaluation and planning areas:

- Establish minimum levels of service performance
- Measure service performance
- Revise existing service and design new services
- Determine appropriate service levels

These draft service measures and standards would apply to all general public transit services provided by *Xpress*, regardless of the contract operator. In addition, these measures and standards would be used to develop service change recommendations and be used on an ongoing basis to evaluate, adjust, and improve services as demand and conditions change.

In most cases, service standards define minimum thresholds that must be met. However, the guidelines are also designed to—within limits—provide flexibility to respond to varied customer needs throughout the *Xpress* service area. Design guidelines outlined later in this chapter expand upon the measures listed here by providing recommended service design guidance, which helps guide decisions around designing revised or new services.

Service Measures Categories

Xpress service measures are designed as a way to measure system success against defined performance expectations (standards). System service measures can cover a wide range of subjects including ridership, safety, reliability, and customer satisfaction. Service measures and associated standards are critical to benchmark improvement or decline on a systemwide or route-by-route basis. In addition to system planning and operational management, certain service measures are FTA Title VI requirements. Per FTA requirements these measures are to be evaluated no less than every three years against their adopted standards. Recommendations also include supplementary measures and standards that are intended to be evaluated on a more regular basis. Some measures exist without specific standards as they are intended to serve as a benchmark only. Service measures are divided into several categories.

- Ridership Productivity
- Cost Efficiency
- Capacity Utilization
- System Reliability
- Community Impact
- Customer Satisfaction and Safety

Depending on the nature of the measure, associated standards may come in the form of a standard or simply as a comparison to a pre-determined baseline.

Underperforming or exceeding expectations against these standards may have subsequent follow-up actions which are described in respective sections below. Figure 3-11 identifies the group that is most directly impacted by measures falling under specific categories.

Figure 3-11 Example Service Measure Categories and Audiences Affected

	Ridership Productivity	Cost Efficiency	Capacity Utilization	System Reliability	Community Impact	Customer Satisfaction and Safety
Customer			✓	✓		✓
Community		✓			✓	
Agency	✓	✓	✓	✓	✓	✓

Title VI Compliance

In order to ensure compliance with Title VI regulations, *Xpress* should monitor the performance of *Xpress* routes relative to the below measures and standards at least once every three years. However, more frequent monitoring is recommended for operational management purposes.

Recommended Service Measures and Standards

Ridership Productivity

Data Requirements: Boardings, Total Trips

Xpress must use its resources effectively and all routes should achieve a minimum level of productivity. Ridership productivity should be calculated for each route by Average Boardings per Trip. This measure should be calculated for both peak and off-peak services and be held up against the respective systemwide average (peak or off-peak route averages) to determine if a route requires further review if it falls into a Tier 1, 2, 3 or 4 category. Tier 1 would equate to the most productive service whereas Tier 4 would equate to an underperforming route with respect to ridership productivity.

Total ridership and ridership by route should also be calculated and reported on a quarterly basis to staff as a way to monitor ongoing performance. Figure 3-12 provides a summary of each recommended ridership productivity measure.

Figure 3-12 Ridership Productivity Measures

Measure	Service Standards (if applicable)	Audience and Reporting Frequency
Average Boardings per Trip	<p>Route Minimum Standards</p> <p><u>Peak Direction⁴ Services</u></p> <p>Tier 1: Above 150% of System Average</p> <p>Tier 2: Between 75%-149% of System Average</p> <p>Tier 3: Above 10 riders per trip or below 74% of System Average</p> <p>Tier 4: Below 10 riders per trip</p>	GRTA Board, Staff: Quarterly
Total Ridership	Benchmark with goal to increase	GRTA Board, Staff: Quarterly
Ridership by Route	Benchmark with goal to increase	Staff: Quarterly

All measures with associated standards have further discussion below. Average Boardings per Trip measure requires that all routes regardless of contract operator be compared consistently with one another.

Average Boardings per Trip

Average Boardings per Trip is among the most telling measures of service productivity. Currently, Xpress captures this data in an aggregate (route) and disaggregate (route, trip) manner. Evaluation at the route level may be useful to highlight potential need for route modifications while evaluation at the trip level can be used to help better understand demand patterns (e.g., an exceptional trip at the start of the day may indicate demand for earlier service).

⁴ For reverse commute guidance, see below section.

Routes that rank **Tier 3** for **two years or greater** should undergo a more detailed evaluation that includes an assessment of productivity by time of day, by trip, and by route segment. Routes that rate **Tier 4** for greater than **one year** should undergo a similar evaluation. Corrective action should be taken in the form of the following.

- Increase marketing efforts, information dissemination or temporary fare incentives
- Route redesign or segment rerouting
- Change the frequency of service
- Change the hours of service (service span)
- Change the days that the service is provided
- Eliminate unproductive service, which may include an entire route, route segment or specific trips operated on a route⁵

Routes that rate **Tier 1** should undergo a more detailed evaluation that includes an assessment of productivity by time of day, by trip, and by route segment. Additional transit resources should be considered if available to sustain ridership growth and ongoing route success. In addition, it should be confirmed that any Tier 1 route is not exceeding a load factor of 1.0 (see capacity utilization measures).

Reverse Commute

Reverse commute trips in the peak period that are operated as a means to return a vehicle to a start point are exempt from specific service standards. In other situations, reverse commute trips are held to aforementioned service standards for average boardings per trip.

New Routes

New routes should be held to a graduated standard over time given the time necessary to establish a ridership base. As a result, the following figure should be used for ridership productivity standards of new routes. If new routes fail to meet these minimum standards, similar route evaluation strategies as described above should be undertaken.

Figure 3-13 Ridership Productivity: New Route Standards

Time from Implementation (Months)	Minimum Standard for Average Boardings per Trip
6	At least 25% of systemwide average (peak or off-peak)
12	At least 50% of systemwide average (peak or off-peak)
24	75% of the systemwide average (peak or off-peak)

⁵ Each route should maintain a minimum of at least two trips per service period unless special circumstances exist that justify a route with only one trip per service period similar to a “school tripper”.

Cost Efficiency

Data Requirements: Operational Costs, Boardings, Revenue Miles, Farebox Recovery by Route

The following measures are designed to communicate the ability of Xpress to meet demands for transit services given existing resources. Measures below primarily include cost factors. Similar to ridership productivity, several measures should be completed on a route-by-route basis while others should be determined on a systemwide basis. As an example, average fare per passenger is largely determined by fare policies and fare structures which would not be modified on a route-by-route basis. However, given that different fares exist for different zones, average fare per revenue mile by route should be determined on an as-needed basis to determine if fare zones should be realigned to be more equitable. Operating Cost per Passenger by Route is largely a factor of ridership. However, given Xpress' numerous service vendors, route lengths and associated deadheading, costs may differ by route. This metric is to ensure cost consistency across the service.

Figure 3-14 Cost Efficiency Measures

Measure	Service Standards (if applicable)	Audience and Reporting Frequency
Operating Cost per Passenger by Route	Route Minimum Standards <u>Peak Direction⁶ Services</u> Tier 1: Below 75% of System Average Tier 2: Between 75%-124% of System Average Tier 3: Between 125%-174% of System Average Tier 4: Above 175% of System Average	GRTA Board, Staff: Quarterly
Total Miles per Revenue Miles by Route	Benchmark with goal to reduce	Staff: Annually
Systemwide Farebox Recovery Ratio	Standard: Maintain systemwide average equal or greater to 30% ⁷	GRTA Board, Staff: Annually
Systemwide Average Fare per Boarding	Benchmark with goal to increase	Staff: Annually
Average Fare per Revenue Mile by Route	Benchmark with goal to increase	Staff: Annually
Subsidy per Passenger Mile	Benchmark with goal to decrease	GRTA Board, Staff: Annually

All measures with associated standards have further discussion below.

⁶ For reverse commute guidance, see below section.

⁷ This standard may be revised in the near term pending more updated or validated data. For additional detail, please see farebox recovery ratio section below.

Operating Cost per Passenger and Operating Cost per Revenue Mile

Routes that rate **Tier 3** for **two years or greater** should undergo a more detailed evaluation that includes an assessment of productivity by time of day, by trip, and by route segment. Routes that rate **Tier 4** for **one year or greater** should undergo a similar evaluation. Corrective action should be taken in the form of the following.

- Increase marketing efforts, information dissemination or temporary fare incentives
- Route redesign or segment rerouting
- Change the frequency of service
- Change the hours of service
- Change the days that the service is provided
- Eliminate unproductive service, which may include an entire route, route segment or specific trips operated on a route⁸

Reverse Commute

Reverse Commute trips in the peak period that are operated as a means to return a vehicle to a start point are exempt from specific service standards. In other situations, reverse commute trips are held to aforementioned service standards for average boardings per trip.

New Routes – Operating Cost per Passenger

New routes should be held to a graduated standard over time given the time necessary to establish a ridership base. As a result, the following figure should be used for cost efficiency standards of new routes. If new routes fail to meet these minimum standards, similar evaluation as described above shall be taken.

Figure 3-15 Cost Efficiency - New Route Standards

Time from Implementation (Months)	Minimum Standard for Operating Cost per Passenger
6	Less than 175% of systemwide average
12	Less than 150% of systemwide average
24	Less than 125% of the systemwide average

Systemwide Farebox Recovery Ratio

As compared to typical fixed route transit service, commuter express services typically yield a higher farebox recovery ratio. This is due to a variety of factors, but can mainly be attributed to higher priced fares and no specific requirement to provide discounted fares for disabled riders (because service is typically peak periods only). At this time, a conservative farebox recovery ratio standard of 30% is provided (goal to maintain or exceed 30%). However, it is suggested that this standard be modified upon validation of past farebox recovery ratio data. Currently, the 29-month average (July 2011-November 2013) produces a farebox recovery ratio of 34%. However, farebox recovery ratio has been highly variable during this time period ranging between 46%

⁸ Each route should maintain a minimum of at least two trips per service period unless special circumstances exist that justify a route with only one trip per service period similar to a “school tripper”.

(September 2011) and 25% (June 2012). A standard should be determined upon confirmation of what is considered “normal” for GRTA services.

Capacity Utilization

Data Requirements: Boardings by Route and Trip. Park and Ride Parking Occupancy

To help *Xpress* maintain an understanding of how existing capacity is being utilized, several measures are recommended related to on-board seat availability (load factor) and parking lot utilization. Vehicle load factor is among the only measures that are to be reported monthly, as exceeding the standard may create an unsafe situation and should be corrected immediately.

Figure 3-16 Capacity Utilization Measures

Measure	Service Standards (if applicable)	Audience and Reporting Frequency
Maximum Vehicle Load Factor by Trip	Standard: Maximum of 1.0	Staff: Monthly
Systemwide Average Peak Direction Load Factor	Benchmark with goal to increase	GRTA Board, Staff: Annually
Average Park and Ride Occupancy	Standard: GRTA operated facility utilization should not exceed 90%. ⁹	Staff: Annually

All measures with associated standards have further discussion below. Measures required by Title VI guidance are highlighted in blue.

Maximum Vehicle Load Factor by Trip

Xpress commuter transit service typically relies upon travel at a relatively high speed. In order to maximize safety, standees should be avoided. While up to 15 standees are permitted on an *Xpress* coach, the maximum desired vehicle load factor for an *Xpress* bus on any trip is 1.0. The number of trips for each route where passenger loads are greater than available seats is reviewed each month. Should standing loads occur on average more often than once per week for any route or trip, service modifications will be considered such as frequency increases or other route service enhancements to accommodate passenger demand and ensure on-board safety.

Peak Park and Ride Utilization

For many routes, riders rely on park and ride lots to gain access to *Xpress* services. Thus, it is important to ensure that parking availability does not become a barrier to access the transit system. In the case of *Xpress*-controlled parking facilities, corrective actions should include policies that first consider management strategies for the existing parking supply (preferential spaces, priced parking, better bicycle or pedestrian access, reconfiguration of existing stalls). If management strategies are not a viable option, parking expansion should be considered. If a parking facility is not controlled by *Xpress*, this could result in a renegotiation of a lease or other actions.

⁹ Leased parking facilities are held to an equivalent standard. However, if leased lots are underutilized (less than 50% occupancy), lease renegotiation for less space should be investigated.

Given the cost and effort associated with ongoing parking observations, it is suggested that a parking utilization count be conducted annually for each park and ride facility in the Xpress system. More frequent counts may be necessary if information (anecdotal observations supplied by customers or operators) becomes available that a particular park and ride facility is nearing capacity.

System Reliability

Data Requirements: Time-point Verifications (departure point, mid-route, terminus), Missed Trips, Total Trips, Vehicle Inspection Rates, Breakdowns, Peak Vehicles and Vehicles Available for Service

System reliability measures pertain to the ability of an Xpress bus to pick up a customer on time, and factors that may impact that ability. Measures in this category are associated with on-time performance and vehicle maintenance. Vehicle maintenance issues such as breakdowns or out-of-service vehicles have a negative impact on the ability of Xpress to provide an on-time, reliable service.

Figure 3-17 System Reliability Measures

Measure	Service Standards (if applicable)	Audience and Reporting Frequency
On-Time Performance by Route	Standard 0% trips early <15% trips later than 5 minutes past scheduled time point	GRTA Board, Staff: Quarterly
Travel Time Variability by Route (pending acquisition of CAD/AVL equipment) ¹⁰	Standard Average travel time delay variability no greater than 15 minutes from estimated travel time	Staff: Annually
Missed Trips per Total Trips (any Service Interruptions)	Standard Less than 0.1% of trips	GRTA Board, Staff: Quarterly
On-time Vehicle Inspections (Preventive Maintenance)	Standard 100%	Staff: Quarterly
Breakdowns per 100,000 Vehicle Miles Traveled	Benchmark with goal to reduce	Staff: Quarterly
Vehicle Spare Ratio	Standard At most 20%	Staff: Annually
Average Vehicle Age	Standard No minority route in the Xpress system receives vehicles that on average are more than three years older than fleet average.	Staff: Annually

All measures with associated standards have further discussion below. Measures required by Title VI guidance are highlighted in blue.

¹⁰ Travel Time Variability by Route assumes travel time information would be captured from Computer Aided Dispatch/Automatic Vehicle Locator systems. Average variability means that the average delay deviation from a scheduled speed/distance chart is no greater than 15 minutes over the course of a trip. Potential corrective actions include reevaluating route alignment or rerouting through areas subject to delays.

On-time Performance

In the absence of real-time arrival data, *Xpress* customers must rely on the expectation that their bus will arrive at the scheduled time. In order to identify routes with significant on-time performance issues, on-time performance will be evaluated based on each trip's performance at every timepoint on a quarterly basis. On-time is defined as a bus that departs a stop between zero and five minutes after the scheduled departure time at each timepoint. *Xpress* service is expected to meet this standard for at least 85% of all trips. Trips are not expected to leave early, however, it is acceptable for trips to arrive to the terminus point early.

Routes that do not meet these standards are candidates for further evaluation and corrective action to achieve better on-time performance and schedule reliability. In the absence of automatic vehicle location data, mid-route and terminus on-time performance should be determined quarterly and then averaged for annual reporting purposes.

Missed Trips per Total Trips

A "missed trip" is defined as the percent of scheduled trips that were not completed within the scheduled time because the agency vehicle failed to arrive within a scheduled pickup time window (within 30 minutes of the scheduled arrival time). This time period is intended to equate to the amount of time someone would wait for a trip departure before seeking alternatives. Each quarter, missed trips should not exceed a standard of 0.1% of total trips.

On-time Vehicle Inspections

A well maintained fleet is a critical component of passenger safety and also reduces the opportunity for breakdowns. Thus, vehicle inspections should be conducted in a timely fashion for all *Xpress* vehicles. Each quarter, at least 100% of vehicle inspections should occur on time.

Average Vehicle Age

It is *Xpress* policy that vehicles at each operating location be rotated among routes so that no minority route in the *Xpress* system receives vehicles that on average are more than three years older than the system average for all *Xpress* operated routes. As a part of the service standards monitoring, GRTA staff will select one operating day per calendar quarter for the most recent year. For these four days, GRTA staff will pull the dispatch logs and calculate the average age for buses operating on each route for that year. In addition as a cost saving measure, *Xpress* assigns buses with the lowest operating costs to the longest routes.

Customer Satisfaction and Safety

Data Requirements: Complaints, Commendations, At-fault Accidents

The measures in this category are associated with customer satisfaction and safety focus around subjective factors and the incidence of preventable (at-fault) accidents.

Figure 3-18 Customer Satisfaction and Safety Measures

Measure	Service Standards (if applicable)	Audience and Reporting Frequency
Customer Complaints per 10K Boardings (via phone, in-person email, surveys, social media)	Benchmark Goal to reduce	GRTA Board, Staff: Quarterly
Customer Commendations per 10K Boardings (via phone, in-person, surveys email, social media)	Benchmark Goal to maintain or increase	GRTA Board, Staff: Quarterly
At-fault Accidents per 100,000 miles	Standard Fewer than 1.3	Staff: Quarterly

At-fault Vehicle Accidents per 100,000 miles

As of 2013, *Xpress* has an at-fault accident rate of less than 1.3 per 100,000 miles. It is suggested this be used as a preliminary baseline that should be adjusted over time if needed. However, exceeding this standard for more than six months (two quarters) should prompt a review of existing driver training policies and processes associated with safety. At-fault vehicle accidents include any *Xpress* vehicle associated accidents whether or not the vehicle is in revenue service.

Periodic Updates

The service measures and standards outlined in this chapter should be updated approximately every three years, at a minimum. If a major service change occurs (as defined by *Xpress*'s Major Service Change policy), staff can make a determination if the service change warrants re-evaluating service measures and standards to better align with agency needs.

DESIGN GUIDELINES DEVELOPMENT

Service design guidelines enforce consistency in the service planning process by providing consistent direction on how to allocate, prioritize or deploy services that meet the goals of the community and the agency. Using guidelines in the service planning and allocation process will avoid potentially inequitable, and possibly inefficient, allocations of service. Without these guidelines, there is little rationale on which to base responses to stakeholder requests, telling constituents “yes” or “no” when necessary. Guidelines also assist in creating consistency and predictability of responses to emerging community needs. As decision makers reach conclusions about various aspects of growth in their community, they will have some frame of reference to know how transit will respond to those changes. Guidelines can also provide insights on where to focus transit service reductions or reallocations when those subjects inevitably arise over the life of the long range plan.

Typically, transit agencies need to consider a full range of interrelated social, political and economic factors when they make major service decisions. While ridership is critically important, issues of equity and broader community impacts cannot be ignored. Because, at their core, service design guidelines identify strategies for maximizing ridership, they may not fully address policy makers’ concerns. However, experience suggests that the most successful transit systems place high value on designing services that will increase ridership. Accordingly, the development of a comprehensive set of service design guidelines is recommended.

Key Principles

The following key principles have been shown to be applicable across regional commuter bus services and should be integrated at a high level into future *Xpress* service design guidelines.

Service Should be Simple

For people to use transit, service should be designed so that it is easy to understand. In this way, current and potential riders can grasp and use the transportation options available to take them where and when they want to go with ease. Most of the principles described below are aimed at making service intuitive, logical, and easy to understand.

Routes Should Operate Along a Direct Path

Routes should not deviate from the most direct alignment unless there is a compelling reason. The fewer directional changes a route makes, the easier it is to understand. Conversely, circuitous alignments are disorienting and difficult to remember.

Route Deviations Should be Minimized

As described above, service should be relatively direct. Route deviations—deviations of service off of the most direct route—should be minimized in route service planning. However, there are instances when the deviation of service from the most direct route is appropriate, for example to provide service to major shopping centers, employment sites, schools, etc. In these cases, the benefits of operating the route off of the most direct route must be weighed against the inconvenience caused to passengers already on board from preceding stops.

Route deviation guidelines for regional *Xpress* bus services would be unique and some guidelines may include:

- Overall route productivity (in terms of passengers per vehicle revenue hour) would be better than without the deviation
- The number of new passengers that would be served is equal to or greater than a percentage of the number of passengers who would be inconvenienced
- The deviation does not exceed a certain number of minutes per boarding/alighting along the deviation

In most cases, where route deviations are provided, they should be provided on an all day basis. Exceptions are during times when the sites that the route deviations serve have no activity—for example route deviations to shopping centers do not need to serve those locations early in the morning before employees start commuting to work.

Routes Should be Symmetrical

Routes should operate along the same alignment in both directions to make it easy for riders to know how to return to their location of trip origin. All routes should operate along the same alignment in both directions, except in cases where such operation is not possible due to freeway alignments, one-way streets or turn restrictions. In those cases, routes should be designed so that the opposite directions parallel each other as closely as possible.

Routes Should Serve Well-Defined Markets

To make service easy to understand and to eliminate service duplication, service should be developed to serve clearly defined markets. Ideally, major origin and destination pairs should be served by only one route of each route type—for example, a travel market between a park and ride facilities and a downtown destination should not be served by multiple routes. However, given the freeway-based nature of *Xpress*, multiple routes should logically operate through similar corridors (including managed lanes) to reach their unique destinations.

Service Should be Consistent

Routes should operate along consistent alignments and at regular intervals (headways) when possible. People can easily remember repeating patterns but have difficulty remembering irregular sequences. Following this principle may be challenging in providing commuter bus services as trips are longer in duration and have irregular cycle times. However, regular headways should still remain a goal.

Stops Should be Spaced Appropriately

Transit stop guidelines for *Xpress* services will differ based on the location of the trip. Within the outer reaches of the service area that are more suburban in nature, stops are more likely to be at park and ride facilities or community transit centers. These stops will be primarily market based or dependent on available facilities to capture ridership. However, within areas such as Downtown, Midtown or other commercial areas, stop spacing should be a consideration with stops placed within minimum or maximum spacing guidance.

Typical Guidance

Service design guidelines specific to regional express bus service will often help answer questions regarding the following transit service characteristics.

- **Deviations:** How far can a route deviate from the direct path to pick-up passengers or serve mid-route destinations?
- **Fares:** How should fares for new service be set? What qualifies as a Green Zone or Blue Zone fare?
- **Layover time:** What is the necessary layover time at the end of routes to maximize schedule efficiency?
- **Off-peak and reverse commute services:** Under what criteria can off-peak and/or reverse commute services be implemented?
- **Route Headways:** Under what standard(s) are route headways defined?
- **Routing (Streets versus Highways):** Under what circumstances should routes travel on local streets versus highways?
- **Service Availability and Coverage:** How should new or revised services be designed to increase access to the transit system?
- **Service Design:** How are alignments for new services defined?
- **Service Span:** What defines peak and off-peak services and what characteristics are associated with those service types?
- **Stop Amenities Priority:** How should amenities for capital facilities be prioritized?
- **Stop Spacing:** What are the minimum and maximum spacing requirements in areas with passenger demand.

These categories and questions provide a basis that should be considered in a revised version of transit service design guidelines for *Xpress* services.

RECOMMENDED SERVICE DESIGN GUIDELINES

Purpose

Service design guidelines are planning tools that are used to expand service to new areas or modify existing routes. This section describes practices that will attract the most riders and balance competing demands.

Network Design

Service Type

Xpress routes are designed primarily to provide fast regional commuter service between residential communities and major activity centers in the Atlanta region. These routes generally operate on weekdays only, and most operate only during peak-periods (rush hour commute). However, depending upon demand, some express routes operate for longer hours and may operate on weekends if demand exists. *Xpress* routes typically serve at least one park and ride facility, and may make several stops within the major destination activity center (Midtown, Downtown, etc.). *Xpress* routes also generally cover long distances on limited-access highways or Express Lanes with dynamic tolling. Service is provided by vehicles that provide greater passenger comfort for longer rides such as over-the-road motor coaches.

Service Availability

Service availability is a general measure of the distribution of routes within *Xpress*' jurisdiction. GRTA's jurisdiction includes 13 counties in the metro Atlanta region, and it is *Xpress*' goal to provide service to all of these counties. Based on this goal, GRTA's service availability policy is to provide at least one route that originates in, or within 5 miles of each county in *Xpress*' jurisdiction. *Xpress* service is not intended to fulfill local, intracity trips typically served by local transit operators.

Route Design

Routing on Streets and Highways

Operating speeds are a function of posted speed limits, turning movements, stop spacing, traffic conditions, and routing. Commuter express routes are expected to be designed and operate at speeds comparable with personal automobiles, and thus should utilize the street network that most quickly connects the route's origin to its destination area. *Xpress* routes should utilize high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes and infrastructure (on/off ramps) whenever possible along freeway running portions of its routes as these facilities will contribute to better on-time performance and schedule reliability. When operating on streets, *Xpress* should utilize higher-speed and/or more reliable (in terms of travel time) street facilities (arterials, collectors) when possible and should only travel on smaller streets for short periods of their full running time.

Stop Spacing

Transit stops are among the major reasons that transit service is slower than automobile trips, since each additional stop with activity requires the bus to decelerate, come a complete stop, load

and unload riders, and then accelerate into traffic. Since most riders want service that balances convenience and speed, the number and location of stops is a key component of determining that balance.

Within the *Xpress* service area, suburban bus stops have no strict stop spacing requirements as stop locations are largely dictated by availability of park and ride facilities or other major passenger collection points.

At the destination end of a trip (currently Downtown and Midtown Atlanta), stops should be no closer together than 1/4 mile along any given route. Exceptions to this rule may include stops at major transit transfer locations (MARTA Rail Stations), major employment centers, or destinations with a high percentage of special needs riders (seniors, disabled) as determined by *Xpress* rider surveys. The destination end of a trip should avoid serving an excessive number of stops to ensure service efficiency. Generally, the time between the destination's first stop to last stop should not exceed 20% of overall trip time from origin to destination.

Stop Placement and Amenities

Most *Xpress* bus stops are located at park and ride lots or on-street stops frequently shared with local transit agencies. Bus stops at park and ride lots should be placed in a location that is both safe and convenient for pedestrians to access from surrounding parking and that does not pose pedestrian safety hazards when walking toward the bus. All stops should be fully accessible with a concrete landing and access to sidewalk or pathway. Bus stops should be compatible with adjacent land uses and minimize adverse impacts on the built and natural environment. Exceptions include bus stops where *Xpress* does not have explicit control over policies or construction such as leased park and ride facilities.

On-street bus stops should be placed at intersections to maximize pedestrian safety. Near-side and far-side stops¹¹ at intersections are generally preferred over mid-block stops. Specific ridership generators may determine the placement of a bus stop. Near-side stops allow passengers to board and alight closer to intersection crosswalks, which may facilitate better transfers. Near-side stops should be avoided when traffic in the right-turning lane is very heavy. Far-side stops are preferred at intersections in which buses make left turns and intersections with a high volume of right turning vehicles. Far-side stops encourage pedestrians to cross behind the bus. Far-side stops can also cause a bus to block an intersection if one or more buses are stopped, which is extremely dangerous.

Deviations

Deviations from the direct line of travel between a route's origin (trip start) and destination (last stop within destination area, e.g., Downtown Atlanta) must consider the tradeoff between potential additions in ridership and the reduction of route directness and speed. Deviations that require backtracking or a significant change from the direct route between major travel generators should generally be avoided. In evaluation of a proposed service deviation, the total additional travel time caused by the deviation should not exceed 10 minutes for each boarding and alighting along the deviation. This is shown in the following formula.¹²

¹¹ Near-side refers to a bus stop before the intersection; far-side refers to a bus stop after the intersection.

¹² This deviation formula is referenced from the 2010 Sound Transit Express Bus Service Standards (2010)

$$(Pt * T)/Pd \leq 10$$

Pt = Number of through passengers

T = Additional vehicle travel time to/from destination on deviation

Pd = Number of boardings and alightings on the deviation

If the result of the formula exceeds 10, the deviation is not recommended.

Deviations in the Downtown and Midtown areas must consider trade-offs between providing direct service to major destinations with the added time and delay associated with numerous turning movements. In these environments, assuming a safe, comfortable, and convenient walking network is available, it is preferable to reduce deviations per the above formula and assume passengers can walk to and from their final destination. An exception would be a route that is known to have a high proportion of riders who require special assistance or are disabled.

Travel Time Competitiveness

To attract ridership, *Xpress* must offer a competitive transportation alternative to driving. *Xpress* offers many advantages including cost savings and personal time (not driving) as compared to driving alone. However, this does not mean that *Xpress* travel times can be excessive as compared to the driving equivalent. As a general rule, *Xpress* routes from origin point to destination should be no greater than 150% of the equivalent automobile travel time.

Reverse Commute

Xpress service is generally geared towards peak-direction commutes (e.g., from suburban Atlanta to jobs centers closer to the central business district). However, in certain situations, a suburban jobs center or similar location may warrant the provision of reverse commute service. Reverse commute services should be held to similar standards to peak-direction commute based on ridership potential. However, reverse commute services that are deadheading back to a route's start point are exempt from these standards.

Operational Design

Service Span

The number of hours per day that a route operates plays a role in determining the effectiveness of transit service for potential users. Transit service must be available at the time (within the time window) that a trip is needed in order for transit to be a viable travel option. Weekday routes should permit workers and students to make their morning start times, and should end late enough to provide return trips home for late evening workers. Service oriented to special groups such as student travel can start later and end sooner. *Xpress* primarily operates peak-only service, but does have several trips during the mid-day. In general, service span should be defined by three categories.

- **Peak service: 5 a.m.–10 a.m., 3 p.m.–6:30 p.m.:** A higher frequency of service to cater to peak levels of commuter trips¹³
- **Reduced Service: All other times, weekends and holidays:** Reduced levels of frequency to match lower travel demands

¹³ As defined by the GRTA *Xpress* website

Headways

Service headways are one of the most important determinants of ridership. More frequent service attracts more passengers assuming a market is present. At the same time, headways have a significant impact on operating costs, and service requirements increase significantly with improvements in headways.

Because of the expense of frequent service, headways are normally scheduled based upon existing or potential demand. This may translate into variations in headways throughout the day, with higher frequency in peak periods, and less frequent service outside of the peak. When possible, headways should be “clockface” (e.g., :00, :15, :30, :45) to make departure times easy to remember.

Xpress' vehicle headway standard is related to vehicle load and trip productivity. To this end, *Xpress* will reduce headways first on trips and/or routes that have the highest vehicle load factors and/or customers per trip, and increase headways first on trips and/or routes with the lowest customers per trip and/or farebox recovery ratios. Concurrent headways (back-to-back trips) are not to increase to greater than 60 minutes unless specific demand exists that both justifies the trip and is at a specific time.

Vehicle Usage

Vehicle Assignment

Vehicle assignment refers to the process by which transit vehicles are placed into service on routes throughout the *Xpress* system. As a cost saving measure, *Xpress* assigns buses with the lowest operating costs to the longest routes. In addition, *Xpress* will strive to ensure that no route will disproportionately utilize older vehicles (see “**Average Vehicle Age**” service standard).

Capital Facilities

Park and Ride Location

Park and ride locations serve as the primary passenger collection point for most *Xpress* routes in the Metro Atlanta area. Often, these facilities are located based on availability of land or other land acquisition factors. However, the siting of park and ride facilities play a major role in accessibility to the *Xpress* route network and ability for *Xpress* services to provide fast, direct, and reliable service. The following factors should be considered in the decision of locating a park and ride facility for *Xpress* buses. This applies to new facilities and the use or leasing of existing facilities.

- **Proximity to interstate or limited-access highway:** The competitiveness of *Xpress* services relies heavily on maintaining high travel speeds. Facilities within close proximity to interstates or limited-access highways reduce the need for *Xpress* buses to travel on local roads which may increase delays due to traffic signals or local congestion.
- **Safe access via all modes:** Park and ride facilities should be designed and located to provide the ability for passengers to arrive and depart the facility safely, whether by car, by bicycle, or on foot.
- **Compatibility with local land uses and community goals:** Park and ride lots provide communities a transportation benefit, but this should not be at the expense of other community goals. Given that typical park and ride facilities are expansive sections

of pavement, efforts should be taken to design and build these facilities within the context and need of local jurisdictions. Adjacent considerations should include land-use, local vegetation and sensitive watershed areas, and the existing transportation network (including sidewalks and bicycle facilities).

Differing from on-street bus stops, park and ride locations often have limited non-motorized usage due to the amounts of parking and space requirements. However, they should be located in areas that provide safe bicycle and pedestrian access. Furthermore, park and ride locations should be designed with the potential for future development (such as bus transit-oriented development, or local retail).

Bus Stop Amenities

Xpress must balance the needs of bus passengers with the needs of adjacent landowners, available space, bus stop jurisdiction, and the realities of available funding. In terms of providing transit amenities at bus stops, a tiered system is recommended to provide priority for bus stop improvements.

Bus stop amenity guidance applies to all situations where *Xpress* has direct control or influence over the design and operation of the bus stop facility. In situations where *Xpress* does not have direct control over the facilities (such as leased park and ride facilities or on-street bus stops), the landowner/operator should be encouraged to adhere to these bus stop design standards. However, the decision on the design and placement of amenities at these locations is controlled by the property owner.

Each tier should build upon one another. Thus, no Tier 2 elements should be constructed in the absence of Tier 1. Tier 5 elements are likely to only exist at park and ride facilities, all others could be applied to park and ride or on-street bus stop facilities. The following five-tiers are suggested in Figure 3-19.

Figure 3-19 Bus Stop Amenity Tiers

Tier	Elements	Guidance
Tier 1 – Information, Accessibility	<ul style="list-style-type: none"> ▪ Bus stop signage ▪ Accessible boarding areas ▪ <i>Xpress</i> contact information ▪ Safe paths of travel to/from the bus stop 	<p>No stop should be considered unless Tier 1 elements are provided (see accessibility exceptions)</p> <p>All existing stops should provide Tier 1 elements.</p>
Tier 2 – Lighting	<ul style="list-style-type: none"> ▪ Street lighting ▪ Pedestrian-scale lighting ▪ Fixed lighting from buildings 	<p>Lighting may be provided by direct or indirect lighting. Direct lighting refers to lights installed directly at a stop for the <i>Xpress</i> purpose of illuminating the stop. Indirect lighting can come from sources like overhead streetlamps or lights from an adjacent building.</p>
Tier 3 – Shelters, Benches, Street Furniture	<ul style="list-style-type: none"> ▪ Benches ▪ Lean rails (in constrained areas) ▪ Bus shelters ▪ Trash receptacles ▪ Detailed route schedule information ▪ Bicycle parking (secured or racks) 	<p>Consider installing shelters and benches at bus stops that have an average of 50 or more <i>Xpress</i> boardings per day.</p> <p>Shelters should be designed to serve a functional purpose such as provide shade or provide protection from rain and wind.</p> <p>Trash receptacles should be designed with security and ease of maintenance in mind</p>
Tier 4 – Advanced Passenger Systems	<ul style="list-style-type: none"> ▪ Digital message signs ▪ Transit information “annunciators” ▪ Security cameras¹⁴ ▪ Emergency call boxes 	<p>Tier 4 elements should be considered at stops serving numerous <i>Xpress</i> routes or routes with headways of 20 minutes or less during peak service.</p> <p>Digital message signs should be installed only if content is available for display.</p>
Tier 5 – Transit Hubs or High-volume stops	<ul style="list-style-type: none"> ▪ Fare or staffed information pavilions ▪ Restrooms 	<p>Tier 5 elements are reserved for the busiest of <i>Xpress</i> locations that may justify staffed GRTA representatives to answer questions or sell fare products. Restrooms may be provided on-site for <i>Xpress</i> staff use or use for the general public.</p>

¹⁴ In certain situations, security cameras and emergency call boxes may take precedent over Tier 3 elements. Examples include bus stops with known safety issues such as theft or vandalism.

ADA Parking Availability

At *Xpress* owned and operated park and ride facilities, *Xpress* shall meet all ADA accessible parking space requirements for its facilities based on the total number of parking spaces available for *Xpress* passengers. The minimum number of required ADA Accessible Parking spaces can be found in the 2010 ADA Standards for Accessible Design (208.2 Minimum Number). Exceptions include spaces used exclusively for buses, trucks, other delivery vehicles, and law enforcement vehicles. Spaces should be located in the shortest accessible route to the bus stop platform. In situations where park and ride facilities are leased, *Xpress* should ensure that the landowner has met his ADA parking availability requirements.

Service Consistency

For the benefit of riders, *Xpress* should make it a priority to ensure consistency in various elements of the customer experience. This promotes a consistent brand for *Xpress* services and ensures a sense of equity and consistency between various routes. Currently, this is complicated due to multiple service vendors and shared services between CCT and GCT.

Route Numbering

Route numbering is the primary means that riders and staff use to identify and describe routes. Route numbering can also be used to group routes or provide defining characteristics based on where the routes travel. For example, routes may be grouped by their general cardinal direction (e.g., all westbound routes could begin with 9 based on their clockface direction). Alternatively, routes could be numbered to some extent of the roadway they travel (e.g., I-75 routes may begin in “75”. Regardless, future route numbering should follow a consistent methodology.

Fare Policies

Fare policies across the agency should provide a consistent and clear understanding of how fares are charged and under what reasons. Typically, commuter express bus services charge based on the distance traveled. Currently, *Xpress* provides a Blue Zone (further) and a Green Zone (closer) fare based on the distance from Atlanta. However, CCT and GCT (two zones) are inconsistent with other *Xpress* fare policies. In the future, efforts should be taken to provide a single, unified fare structure that also provides transparency of the methodology of fare differentials.

TITLE VI SYSTEMWIDE SERVICE STANDARDS AND POLICIES

Title VI of the federal Civil Rights Act requires *Xpress* to develop a set of service standards and policies for use in the monitoring of service performance, and service design and operations practices; making sure that protected populations have equitable access to services and transit investments. Figure 3-20 presents the standards and policies that *Xpress* will use when monitoring performance and evaluating potential disparate impacts with respect to performance in minority versus non-minority areas. For Title VI purposes, these elements will be reported at least once every three years.

Figure 3-20 Title VI Systemwide Service Standards and Policies

Required Title VI Systemwide Service Standard or Policy	<i>Xpress</i> Measure or Policy Criteria	Reference Page
Service Standards		
Vehicle load for each mode	Maximum Vehicle Load Factor by Trip	Service Measures and Standards pg. 3-19
Vehicle headway for each mode	Headways	Service Design Guidance pg. 3-29
On-time performance for each mode	On-Time Performance (Departure Point)	Service Measures and Standards pg. 3-21
Service availability for each mode	Service Availability	Service Design Guidance pg. 3-26
Service Policies		
Distribution of transit amenities for each mode	Bus Stop Amenities	Service Design Guidance pg. 3-30
Vehicle assignment for each mode	Vehicle Assignment Average Vehicle Age	Service Design Guidance pg. 3-29 Service Measures and Standards pg. 3-21