



# Wake Transit Bus Plan

Service Guidelines and Performance Measures (Final)



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# 1 Introduction

## Wake Transit Bus Plan

Wake County residents passed a ballot measure that funded the Wake Transit Plan in November 2016. The Wake Transit Plan recommended a variety of transit services designed to link communities in Wake County and the surrounding region. This Plan will provide a range of solutions from high capacity services, such as frequent bus routes, to lower capacity options, such as demand-response services.

To ensure long-term sustainability of the evolving transit network requires that services are cost-effective and that financial operations are sound. With these goals in mind, the member agencies commissioned development of service design guidelines and performance measures for bus service. It is anticipated that the service design guidelines and performance measures will be approved by both the Wake Transit Governing Boards and individual transit providers and be used to govern investments associated with the Wake Transit Bus Plan

These service guidelines and performance measures will establish a framework and rationale for the operation of transit services in Wake County. Service guidelines provide consistency in the service planning process. Performance measures track and report on the productivity of individual services and the overall network. The combined framework is intended to communicate a clear, consistent, and equitable strategy that is understandable to the Wake Transit Bus Plan's stakeholders: transit riders, transit operators, elected officials, and taxpayers.

Wake County's transit providers—GoRaleigh, GoTriangle, GoCary, and GoWake Access—adhere to service guidelines and performance measures set locally. These locally developed guidelines and measures both shape and communicate development and monitor the performance of transit service funded through local resources. The service guidelines and performance measures recommended as part of the Wake Transit Bus Plan consider—but do not entirely replicate—existing local measures and standards. Instead, the Wake Transit Bus Plan guidelines and measures are intended to supplement local policies and be utilized in parallel with any local measures and standards. The recommended guidelines and measures also reflect best practices developed by transit agencies across the United States.

The service guidelines, route classifications, and performance measures included in this report reflect service operations and development envisioned by the Wake Transit Bus Plan. While the framework is designed to be flexible and accommodate changes, the Transit Planning Advisory Committee (TPAC) recommends that the guidelines, standards, measures, and targets are reviewed at least once every four years to ensure they continue to represent best practices and are successfully guiding development of the Wake Transit Bus Plan.



## Key Terms

To help clarify key terms used throughout the report, below are four important definitions:

- A **guideline** is a recommendation that leads or directs a course of action to achieve a certain goal.
- A **standard** sets the minimum investment required to reach the service classification. For example, this report sets standards for the span of service expected for demand-response service.
- A **measure** is a reference point against which performance is evaluated. Measures can be evaluated against a baseline value or against a specific target.
- A **target** is the defined value set for individual measures. For example, a target might be 20 passengers per revenue hour.

## Transit Service Guidelines and Performance Measure Goals

Aside from the adage “you can’t manage what you don’t measure”, there are several reasons why service guidelines are critical for transit agencies. Transit service guidelines and performance measures should:

- **Reflect the vision and goals of the overall transit network:** Transit service guidelines and performance measures reflect community values for transit service. An agency that values extensive geographic coverage above concentrating service in high-demand corridors will adhere to a different set of service guidelines and performance measures than one that focuses on most-efficiently serving demand. There is not a standard or accepted set of service guidelines and performance measures. However, the Wake Transit Bus Plan service guidelines and performance measures are designed to reflect the values of good transit service. Namely service that is efficient, effective, and customer friendly.
- **Ensure consistency among Wake County transit service providers:** The Wake Transit Bus Plan is in a relatively unique position of developing a network of transit services that will be implemented by multiple independent operators. Establishing overarching service guidelines and performance measures that apply to all operators will set baseline expectations for a consistent, integrated, and coordinated network of services.
- **Provide transparency:** Service guidelines and performance measures provide benchmarks and performance indicators that reflect realistic and appropriate levels of productivity and cost-effectiveness. These indicators track the development of the network and can be shared with elected boards and members of the public. Accordingly, the service guidelines and performance measures must be easy to understand, directly related to network goals, and instill confidence in the stakeholders.
- **Establish evaluation criteria for all services:** Service guidelines and performance measures include evaluation metrics and tools to shape, define, and evaluate individual transit routes and the emerging transit network. The guidelines will direct attention and investments to specific parts of the network. They will also create a clear, consistent, and equitable framework for decision-making and investment.



- **Prioritize funding:** By conducting frequent service evaluations, transit providers can identify areas of short-term and ongoing additional funding needs. As an example, longer-term projects such as expanding park-and-ride facilities may not arise in traditional transit guidelines, standards, and measures, but they are critical in ensuring ridership growth if capacity is maximized.
- **Support Federal Transit Administration (FTA) compliance:** Ultimately, transit service will be implemented using a combination of local and state funding, as well as FTA federal funding. Transit operators who receive FTA funding are required to adhere to a series of policies and regulations, including requirements associated with Title VI of the Civil Rights Act of 1964. The FTA monitors these requirements through a triennial review process. However, by integrating service guidelines and performance measures into management practices, there is an assurance of compliance. The guidelines, standards, measures, and targets included in this document are consistent with the FTA Circular 4702.1B (Title VI), which includes establishing service guidelines for vehicle loads and headways, on-time performance, service availability, and equitable distribution of transit amenities and vehicle assignments.

## Existing Service Policies of Wake County Transit Providers

Four independent transit agencies operate public transportation services in Wake County. Each operator follows prescribed guidelines and performance measures to govern the provision of transit services (Figure 1).

**Figure 1 | Wake County Transit Provider Policy Guidelines**

Transit Provider	Governing Service Guidelines and Performance Measures
GoRaleigh	<ul style="list-style-type: none"> <li>• GoRaleigh Service Change Initiation Policy</li> <li>• GoRaleigh Rider Notification Policy</li> <li>• GoRaleigh Shelter and Bench Policy</li> <li>• GoRaleigh Title VI Program</li> </ul>
GoTriangle	<ul style="list-style-type: none"> <li>• GoTriangle Regional Bus Service Standards</li> <li>• GoTriangle Title VI Program</li> </ul>
GoCary	<ul style="list-style-type: none"> <li>• Town of Cary Fixed Route Transit Service Standards</li> <li>• Town of Cary Title VI Program</li> </ul>
GoWake Access	<ul style="list-style-type: none"> <li>• Wake Coordinated Transportation Service Operations Guide</li> </ul>

### GoRaleigh Policies

Several GoRaleigh policies are related to transit service changes and the provision of transit amenities. GoRaleigh adopted its Service Change Initiation Policy in 2002. The policy states that no changes shall be made to a new route for at least six months after service initiation, unless safety, operational, or productivity issues warrant review by the provider.

GoRaleigh’s Rider Notification Policy defines changes in transit service and outlines the required procedure for handling major service changes. According to GoRaleigh’s Shelter and Bench



Policy, shelters and benches are warranted at bus stops where there are at least 25 and 10 boardings a day, respectively. The policy states that special facilities should be provided, if necessary, at locations such as hospitals, clinics, senior centers, or recreation facilities serving seniors or persons with disabilities.

In addition to these written policies, GoRaleigh tracks:

- Predictive policy: Review routes with farebox revenue less than 50% of the system wide average
- On-time performance: Defined as Zero minutes early and five minutes late. Routes performing at 74.9% or less require review

GoRaleigh also maintains standards based on Title VI requirements. These standards guide Title VI compliance, ensuring that minority and low-income individuals receive equitable transit service. The GoRaleigh Title VI Program defines the following standards:

- Load: Routes experiencing passenger load ratios between 1.01 to greater than 1.50 at any point should be reviewed
- Headway: Headways shall vary between peak periods and off-peak periods where demand dictates in order to minimize operating expenses and provide the most efficient service during weekday peak demand periods.
- On-time performance: 85% of trips should be completed no later than five minutes after the scheduled time point
- Service availability: Evaluate the availability of transit service within Raleigh's minority Census Block Groups
- Passenger amenities: Provide bus shelters for stops with 25 daily boardings or more and benches for stops with 10 boardings or more
- Vehicle assignments: Randomly assign vehicles to routes on a daily basis to ensure that buses are distributed equitably

## **GoTriangle Policies**

GoTriangle's service guidelines are contained within the 2004 GoTriangle Regional Bus Service Standards. This document provides detailed expectations for GoTriangle services and establishes several service performance indicators, including:

- Unlinked Passenger trips per Vehicle Revenue Hour
- Cost Recovery Ratio
- Operating Cost per Unlinked Passenger Trip
- Subsidy per Passenger
- Unlinked Passenger Trips per Vehicle Revenue Mile

GoTriangle classifies routes as Peak Period, Daytime, Evening, or Weekend; routes are also classified as New (in operation for less than six months) or regular (in operation for six months or more) services. For each service standard, GoTriangle sets performance expectations based on the average of all routes in the category. Accordingly, once an average has been calculated, each route can be classified as low-performing (less than 75% of average), average (from 75% to 125% of average), or high-performing (greater than 125% of average).



According to the Regional Bus Service Standards, GoTriangle uses the results of the performance evaluation to address both low-performing routes and high-performing routes. Low-performing routes are defined as routes that score “low” on three to five indicators; depending on the indicators, GoTriangle will consider alignment modifications or schedule changes to improve performance. Passenger amenity improvements are often recommended for high-performing GoTriangle routes.

The Regional Bus Service Standards also guide Title VI compliance. Although Title VI evaluations are processed separately from service standards, GoTriangle evaluates additional indicators to compare predominantly minority Census tracts with predominantly non-minority Census tracts, to ensure they are distributing and allocating services, amenities and other resources equitably. Indicators considered under GoTriangle’s Title VI evaluation include:

- Impact on minority communities and minority-owned businesses during and after construction
- Impacts that may be felt in minority communities, including increased traffic and the amount of available parking
- Transit vehicle load factors between minority and non-minority Census tracts
- Vehicle headways in minority and non-minority Census tracts
- Distribution of amenities (benches, shelters, etc.) in minority and non-minority Census tracts
- Transit access (distribution of transit services, number of people within a one-half mile walking distance to the system) in minority and non-minority Census tracts

## **GoCary Policies**

GoCary developed Fixed Route Transit Service Standards in 2014, in part to ensure that the Town of Cary complies with nondiscrimination laws and regulations, including Title VI. The goal of the service standards is to establish policies necessary to ensure that GoCary service does not create disparate impacts on minority populations nor pose disproportionate burdens on low-income populations. Beyond this overarching goal, the document also outlines several standards:

- Vehicle loads: Vehicle loads should not exceed seating capacity on 30% or more of the trips provided on a given route, or exceed a load factor of 1.30
- Vehicles will be assigned based on ridership demand
- Service frequency: Thirty minute frequency on all routes during peak periods and 60-minute frequency on all fixed loop routes and off-peak period service
- On-time performance: Average system-wide on-time performance of 95%
- Service availability: Provide bus service to at least 50% of Cary residents living within three-quarters of a mile of a bus route
- Distribution of amenities: Provide a shelter at bus stops with over 20 boardings per day



## GoWake Access Policies

GoWake Access's Operations Guide (2015) outlines how the system's coordinated public and human service transportation operations are designed, operated, and delivered. The requirements and standards included in the Operations Guide are specific to coordinated service provision.

GoWake Access's primary service indicator is on-time performance. The Operations Guide states that the contractor is responsible for maintaining a minimum standard of "on-time vehicle trips" of 95% on both a daily trip basis and over the course of the contract period. The operations guide also sets several requirements regarding scheduling and dispatch, including:

- Daily scheduling sets a target that establishes that 99% of all trips (individual riders) not spend more than one hour "in-vehicle" riding time.
- On-time performance measures the actual pick-up time with the scheduled pick-up time, as well as arrival prior to appointment time. A trip is considered "on-time" if the vehicle arrives for the rider within  $\pm 30$  minutes of the scheduled time in addition to arriving at appointment no later than appointment time. A minimum of 95% of all trips within Raleigh should be picked up within 60 minutes.. Outside of Raleigh, a minimum of 95% of all trips should be picked up within 90 minutes..
- The contractor should schedule and dispatch services that average at least 1.5 trips per hour on a monthly basis.





## 2 Transit Service Development

### Overview

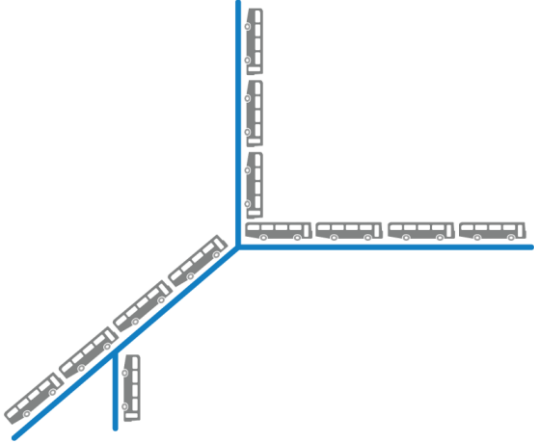
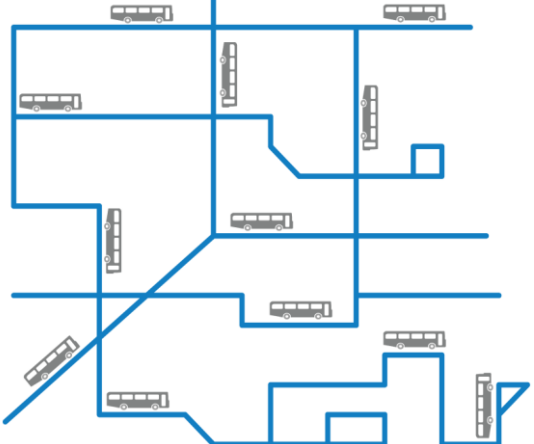
Public transit services typically fall along a spectrum of high-capacity/high-productivity routes that operate in densely populated corridors, to lower-capacity/lower-productivity services that serve large, but less densely inhabited areas (Figure 2). As communities and agencies design and deploy transit services, it is important to match the optimal service types to the individual market so that transit services are efficient, appropriate, and cost-effective.

### Service Allocation Policy

Most transit providers provide a mix of ridership-oriented services and coverage-oriented services. Typically, service types reflect the operating environment, such that high-capacity modes are deployed in higher-density urban areas, and coverage-oriented services operate in rural or lower-density suburban areas. In some areas a combination of services is appropriate, such as complementary paratransit service or local fixed-route bus service combined with BRT. Wake County's challenge is developing a transit network with an appropriate balance between coverage and ridership-oriented services, so people with limited mobility have access to the service they need, while the network is as cost-effective as possible.

The Wake County Transit Plan, based on community feedback and funding allocations, sets a goal for the entire Wake Transit Plan of providing approximately 70% of the Transit Plan's operating dollars to "productivity" services that will be justified by high ridership; the Plan allocates the remaining 30% to coverage-oriented services. This allocation reflects a shift in how transit services are generally allocated in Wake County, with the pre-Wake Transit Plan services broadly categorized at 70% coverage-oriented and 30% ridership-oriented.

Figure 2 | Productivity Model and Coverage Model

PRODUCTIVITY MODEL	COVERAGE MODEL
<p>The <b>productivity model</b> concentrates service on collector streets that feature the highest density of development. As a result, service is more direct, faster, and more productive. Because the bus operates on a handful of main streets, most people will have to walk to and from their bus route. Ridership-oriented services tend to feature higher frequencies, operate longer service spans, and carry more riders than coverage-oriented services. Examples include light rail and bus rapid transit, but also high frequency bus corridors.</p>	<p>The <b>coverage model</b> operates service on many streets, even if service is infrequent. This model ensures that the maximum number of people have nearby access to bus service, and is more likely to provide door-to-door service (even if the overall trip time is longer). Coverage services tend to have lower frequencies and operate on residential streets. As a result, coverage-oriented routes tend to carry fewer riders, as compared with ridership-oriented services. The main advantage of coverage services is the increased geographic accessibility of the network, particularly for people unable to walk longer distances.</p>
	

## Transit Operating Environment

Transit operating environments also influence transit service design and productivity. As discussed, successful transit services match the product (type of service) with the market (who is going to use it). Transit providers directly control the product and set characteristics such as service quality (cleanliness of the vehicle, reliability of service, friendliness of the driver, etc.), service design (how efficiently the service transports passengers to their desired destinations), and the price of the trip or fare.

Transit agencies have less direct control over their operating environments. The most significant factors influencing transit ridership relate to land use, including the number of people within walking distance of a transit route (density); the safety, comfort, and attractiveness of the built environment; the type of development (housing, jobs, shopping, etc.); and the amount and cost of parking. Although transit agencies typically have limited control over their operating environments, transit agencies can develop routes to complement the characteristics of specific environments.



Density is the largest single factor influencing transit demand, as the number of people within walking distance of a bus route determines the overall demand for travel, or market size. Accordingly, if there are more people living or working within walking distance (e.g. denser development), there are more potential users of the service. Further, because land tends to be more expensive in high-density communities, these areas also feature less parking and are more likely to charge for parking. Limited parking and/or parking fees are critical factors to making transit attractive. Corridors with high densities, therefore, can support higher transit frequency and higher capacity transit modes, such as light rail or bus rapid transit. Corridors and communities with lower densities are better matched with lower frequency service types (local bus routes or demand-response service).

Urban form also shapes transit demand, as transit service is more accessible in areas with sidewalks, crosswalks, and manageable street crossings; including these accessibility features can also expand the reach of transit. Land use also shapes transit demand; office space, for example, usually has higher demand on weekdays while shopping areas may have demand on weekdays and weekends.








## **Route Classifications**

Wake County is a large and diverse region. Consequently, the Wake Transit Plan consists of a variety of services, inclusive of high productivity/high-capacity services (frequent transit) to lower productivity, coverage-oriented services (local bus routes or demand-response services). Given these various service types require different levels of investment and have different operating expectations, it is appropriate to define a route classification system. The route classification system facilitates evaluation of routes within the context of similar routes. The classification system also facilitates investment and development of individual routes, by allowing individual routes to move up and down the classification hierarchy. This means that a route that over-performs the expectations for its classification category, it could be “upgraded” with additional investment in service hours and frequency if it can meet the defined performance expectations.

Eight unique service types are identified in the Wake Transit Bus Plan: frequent routes; local routes; community routes; demand-response services; core regional routes; express routes, and shuttle services (Figure 3 |). Each service type is linked with service level guidelines and productivity measures in Sections 4 and 5.

Transit service design principles generally discourage route branches and service deviations because they complicate rather than simplify service. As a result, branches and deviations should be justified based on ridership or coverage goals and be judged according to the same standards as other similar routes when they are required.

Figure 3 | Transit Services Types in the Wake Transit Bus Plan

Service Type	Characteristics
<p><b>Frequent Route</b></p> 	<p>Frequent routes are high-capacity, high productivity services that should operate along densely developed primary arterials and offer a high level of frequency. They form the “backbone” of the service network and provide connections to network hubs. Most other routes will connect to them. Bus stops will be spaced farther apart as compared with other services, and routes should be simple and direct.</p>
<p><b>Local Routes</b></p> 	<p>Local routes also operate along primary arterials, but in areas of less dense development patterns. They also typically are anchored at a transit hub, either in downtown or at the end of a frequent route or BRT. These routes offer relatively frequent, simple, and direct service. Routes are typically productive with relatively high ridership.</p>
<p><b>Community Routes</b></p> 	<p>Community routes serve low-density communities and neighborhoods, bringing passengers to transit hubs or higher capacity services. Community routes typically make very frequent stops and focus on extending service coverage and offering basic transportation to individuals that lack mobility options. Community routes are exclusively focused on widening geographic service coverage, or “filling in the gaps” of the transit network. Productivity is usually low.</p>
<p><b>Demand-Response Services</b></p> 	<p>Demand-response service offers curb-to-curb or door-to-door service upon request. Services are well suited for serving low-density areas and can be provided by a range of providers, from traditional transit agencies to app-based ride-hailing providers. Demand-response service typically operates within a geographically limited area, and provides pick up and drop off services within a defined zone. Demand-response service includes ADA paratransit service, which operates under specific FTA guidelines, serving individuals with disabilities and older adults. Demand-response service also includes emerging mobility options such as microtransit, which is an IT-enabled private multi-passenger transportation service that serve passengers using dynamically generated routes.</p>
<p><b>Core Regional Routes</b></p> 	<p>Core regional routes provide longer-distance service connecting the major activity centers across jurisdictions on weekdays and weekends. They provide the backbone of the region’s transit network, and prioritize connecting transit centers to facilitate transfers. They have limited stops to provide fast travel times and use freeways and expressways where appropriate.</p>
<p><b>Express Routes</b></p> 	<p>Express routes are services specifically designed to bring people from residential areas to employment centers. They operate during peak commute periods and make few stops, often at park &amp; ride facilities or transit centers, before traveling non-stop to the employment center via highways or freeways. Service may operate on weekdays or weekends.</p>
<p><b>Shuttle Services</b></p> 	<p>Shuttles offer connections between a small number of activity centers, such as between an airport and a transit hub or rental car center. These routes are typically very simple and easy to use, and are often fare-free. Shuttles may also be scheduled to provide additional transportation during special events, such as sporting events, concerts, or parades.</p>



## 3 Transit Service Design

Transit service design reflects the fact that successful transit services must be intuitive for riders to understand and use. Likewise, transit services designed to be simple and logical for riders are almost always easier for transit operators to implement. The following transit service design principles are intended to help service providers develop a network of logical, consistent, and user-friendly services.

The service design guidelines are not required per se, but are intended to enforce consistency in the service planning process by providing direction on how to allocate, prioritize, or deploy services in a way that is consistent with the Research Triangle’s values and service goals. Guidelines also help avoid potentially inequitable, and possibly inefficient, allocations of service. Without guidelines, there is little rationale on which to base responses to requests for service or to agree or disagree to service requests. Service guidelines also ensure transit agencies respond to emerging needs in a way that is consistent and predictable and communicate how transit services will respond to changing land uses or development patterns. Guidelines can also direct service investments or disinvestment over the lifetime of transit service development.

### ➔ Service Should be Simple

To encourage people to use transit, services should be easy to understand. The way service is designed influences how easy it is for people to understand the available transportation options. Most of the guidelines in this section aim to make service intuitive, logical, and easy to understand.

### ➔ Routes Should Operate Along a Direct Path

Passengers and potential passengers alike prefer faster, more direct transit services. In order to remain competitive with personal vehicles, special attention should be placed on designing routes to operate as directly as possible. Direct routes maximize average speed for the bus and minimize travel time for passengers while maintaining access to service. Routes should not deviate from the most direct alignment unless there is a compelling reason to do so.

### ➔ Route Deviations Should be Minimized

As described above, service should be as direct as possible. Consistent with this idea, the use of route deviations—traveling off the most direct route—should be minimized.

There are instances when deviating service from the most direct route is appropriate, such as avoiding a bottleneck or to provide service to major shopping centers, employment sites, medical centers, schools, etc. In these cases, the benefits of deviating service from the main



route must be weighed against the inconvenience caused to passengers already on board. Route deviations should be implemented only if:

- The deviation will increase the route’s overall productivity
- The number of new passengers served is equal to or greater than 25% of the number of passengers inconvenienced by the additional travel time on any particular deviated trip
- The deviation does not interfere with the provision of regular service frequencies and/or the provision of coordinated service with other routes operating in the same corridor
- Pedestrian access to a large trip generator is unsafe due to a lack of infrastructure, or inaccessible due to a dendritic street pattern

In most cases, where route deviations are provided, they should operate for the entire service period. 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.

### ➤ Major Routes Should Operate Along Arterials

Frequent and local routes should operate on major roadways and should avoid deviations to provide local circulation. Riders and potential transit users typically have a general knowledge of an area’s arterial road system and use that knowledge for geographic points of reference. The operation of bus service along arterials makes transit service faster and easier for riders to understand and use. This principle applies only to routes with a productivity-based strategy.

### ➤ 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 trip origin location. For example, if a route follows 4<sup>th</sup> Street into downtown, it should use 4<sup>th</sup> Street on its outbound trip. Exceptions can be made in cases where such operation is not possible due to one-way streets or turn restrictions. In those cases, routes should be designed so that the opposite direction alignments run parallel as closely as possible.

### ➤ Routes Should Serve Well-Defined Markets

Service should be developed to serve well-defined markets. Ideally, major corridors should be served by only one route of each service type—for example, one frequent route and one local route, and not by multiple frequent routes or multiple local routes. Exceptions can and should be made when multiple routes should logically operate through the same corridor to unique destinations.

### ➤ Services Should be Well-Coordinated

When multiple routes operate through the same corridor but serve different destinations, service should be coordinated to maximize utility and minimize redundancy. To avoid bunching of buses and to balance loads, major routes of the same service type using the same corridor



should be scheduled to operate at similar frequencies and should alternate trips at even intervals.

Most routes intersect with other routes at transfer centers, stations, and street intersections. At major transfer locations, schedules should be coordinated to the greatest extent possible to minimize connection times for the predominant transfer flows.

### ➔ **Service Should be Consistent**

Routes should operate along consistent alignments and at regular intervals (headways). People can easily remember repeating patterns but have difficulty remembering irregular ones. For example, routes that provide four trips an hour should depart every 15 minutes. Limited exceptions can be made in cases where demand spikes during a short period in order to eliminate or reduce crowding on individual trips.

### ➔ **Service Design Should Maximize Service**

The distance and travel time of a route determine how efficiently a bus can operate. Service should be designed to maximize the time a vehicle is in service, and minimize the amount of time it is out-of-service. In other words, the length of the route and the time it takes to make each trip impacts the layover required at each end of the route, and how many buses are needed to provide service. Often, it may be more efficient to extend a route to pick up a few more passengers and limit the amount of layover time.

### ➔ **Vehicle Type Should be Appropriate for Service**

Transit vehicles should be matched to service types by vehicle type and capacity. For example, the standard fixed-route transit vehicle is typically a 40' transit bus and is appropriate for most services. However, high ridership routes may warrant 60' articulated vehicles, and conversely, lower ridership routes such as local routes or shuttles may only require 30' vehicles. Flex service and demand-response vehicles typically utilize smaller vehicles.

Additionally, as required by Title VI, transit providers must distribute vehicle assignments evenly throughout the system so newer vehicles are equitably deployed across the service area

## 4 Service Level Standards

Service level standards help transit providers determine how much transit service to actually provide, given the underlying local market and operating conditions. Setting expectations for service levels also creates a coordinated and consistent network of service by establishing uniform standards for each service type.

The service level standards work in concert with the service productivity measures (Section 5) to create a network that is easy for operators to communicate to riders and stakeholders. Concurrently, the standards should result in a transit network that is productive and efficient. The combined standards and measures also create a framework for expanding and contracting service. Transit operators are able to provide more service on any particular route or market, as deemed appropriate, but must provide at least the minimum proposed standard to meet the service type requirements.

The service level standards are determined based on five standards:

1. **Service Coverage/Availability:** Aligns service types with markets and operating conditions.
2. **Span of Service:** Sets route start and end times.
3. **Service Frequencies:** Recommends how often transit service is operated.
4. **Passenger Loads:** Establishes acceptable levels of passenger volumes relative to the number of available seats.
5. **Bus Stop Spacing and Amenities:** Recommends stop spacing and amenity investments.

As discussed, service level standards set required *minimum* service levels for each route type. They also establish the minimum hours of service and service frequencies, as well as acceptable passenger loads. Investments in a route may be increased (longer service span or increased frequency), if or when ridership increases to levels that exceed maximum loading standards. Conversely, service may be reduced when ridership falls below the minimum productivity measures. Likewise, service spans may be lengthened to extend service earlier in the morning and later at night, if minimum productivity targets can be met.

### ➔ Service Coverage/Availability

Service coverage standards guide the development of new services, not existing service. They are used to evaluate when to provide new services, including the characteristics of any new service, such as the service type and quantity. **The Wake Transit Plan has set a strategic direction for new services, so that transit service will be available to 54% of the population and 80% of the jobs within Wake County.** Obtaining this goal and maintaining productivity standards will require matching transit services with markets.



Fixed-route transit service is not effective and productive in every environment. Population and employment densities are the strongest indicators of potential transit demand, and national experience has helped develop standards for the amount and type of fixed-route transit service based on density (Figure 4). Generally speaking, areas with densities of less than three to six households per acre, or four jobs per acre, cannot successfully support fixed-route transit, unless other factors exist (see below). Once densities exceed three to six households per acre or four jobs per acre, fixed-route bus services may be viable. Areas with higher densities may warrant higher levels of transit service.

While population and employment densities are a good method to evaluate the potential for service, there are other factors to consider when planning service for an area, such as corridor demographic data (i.e. household incomes), the supply and/or cost of parking, or excessive traffic congestion. In communities and areas where one or more of these conditions exist, transit service may be effective even if densities are low.

Figure 4 | Transit Supportive Population and Employment Densities



Source: Composite data compiled by Nelson\Nygaard from various sources.

## ➔ Minimum Span of Service

The span of service is determined by the length of time a route operates, typically the time a route begins and the time it ends. The span of service determines how usable a service is for riders. It is also an important consideration for the overall network of services. Setting standards and expectations for the length of service for all types of routes ensures riders will be able to make connections and transfers between routes. However, service span is also one of the most important factors in determining how much a route will cost to operate. Developing an appropriate span of service—one that will meet rider and network needs, but not result in empty buses—is an essential component of an effective transit network.

Service standards establish the required base span of service for each route type (Figure 5). The span of service varies by day of the week (weekdays, Saturdays, and Sundays), recognizing that the amount of activity, and consequently the need or demand for transit service, varies by day of the week. The standard reflects the *shortest* period of time that different route types of service should operate. The span of service for any individual route can be greater—but not less—than the standard. While transit operators may extend the span of service for any



particular route, these trips must meet the minimum productivity and efficiency expectations for that category of service (see Section 4).

Figure 5 | Minimum Span of Service

	Frequent Route	Local Route	Community Route	Demand-Response Service <sup>1</sup>	Core Regional Route	Express Route	Shuttle Service
<b>Weekdays</b>							
<b>Begin</b>	6:00 AM	6:00 AM	7:00 AM	7:00 AM	6:00 AM	7:00 AM	—
<b>End</b>	12:00 AM	10:00 PM	9:00 PM	6:00 PM	10:00 PM	7:00 PM	—
<b>Saturdays</b>							
<b>Begin</b>	6:00 AM	6:00 AM	7:00 AM	<i>Saturday service may be provided, if warranted, but is not required.</i>	10:00 AM	<i>Saturday service may be provided, if warranted, but is not required.</i>	—
<b>End</b>	12:00 AM	10:00 PM	7:00 PM		10:00 PM		—
<b>Sundays</b>							
<b>Begin</b>	7:00 AM	10:00 AM	10:00 AM	<i>Sunday service may be provided, if warranted, but is not required.</i>	10:00 AM	<i>Sunday service may be provided, if warranted, but is not required.</i>	—
<b>End</b>	12:00 AM	10:00 PM	7:00 PM		10:00 PM		—

Notes: The beginning span of service refers to the departure of the first inbound trip, and the ending span of service refers to the departure time of the last peak direction trip.

<sup>1</sup> Does not supersede ADA paratransit legal requirements

## ➔ Minimum Service Frequencies

Service frequency reflects the time interval between two vehicles traveling in the same direction on the same route, or how often the bus serves a particular stop. Service frequency is a critical to establish transit service as an attractive and viable travel mode, and significantly influences transit ridership. Alternatively, frequency has a significant impact on operating costs. Improving a route from a 60-minute frequency to a 30 minute-frequency doubles the route’s operating costs. Because operating high-frequency service is so expensive, transit service frequency can vary throughout the day (i.e. peak and off-peak periods) to reflect existing or potential demand. Service frequencies are also set to ensure there are enough vehicles on the route to accommodate passenger volumes while not exceeding recommended loading standards.

The required service frequencies for routes in the Wake Transit Bus Plan are shown in Figure 6. These service frequencies set the *minimum* expectation for the frequency of bus service to ensure network compatibility. Consistent with the span of service expectations, transit operators are permitted to provide higher service frequencies. However, these additional trips are expected to meet the minimum productivity expectations for the category of service (see Section 5).

Service frequencies are listed in terms of “clock face intervals” (e.g. every 10, 15, 20, 30, or 60 minutes) as these intervals are easier for passengers to remember and can help facilitate better



transfer connections between routes. Whenever possible, frequencies should be set at regular clock-face intervals. However, there are two key exceptions:

- Where individual trips must be adjusted away from clock face intervals to meet shift times, work times, transfer connections, coordinate with pulse schedules, or other special circumstances;
- Where the desired frequency of service causes round trip recovery time to exceed 20% of the total round trip vehicle time. In such cases, the inefficiency of the schedule outweighs the benefit of a clock face schedule.

**Figure 6 | Minimum Service Frequency (Frequency in Minutes)**

	Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
<b>Weekdays</b>							
Early AM	30	60	60	—	60	—	60
AM Peak	15	30	60	—	30	3 peak direction trips	60
Midday	30	30	60	—	30	—	60
PM Peak	15	30	60	—	30	3 peak direction trips	60
Night	30	60	60	—	60	—	60
<b>Saturdays</b>							
All Day	30	60	60	—	60	<i>Saturday service may be provided, if warranted, but is not required.</i>	
<b>Sundays</b>							
All Day	30	60	60	—	60	<i>Sunday service may be provided, if warranted, but is not required.</i>	

Note: “—” indicates that the standard does not apply. Also, the standard applies to services that are provided, and do not imply that all services will be provided at all times.

## **Vehicle Loadings**

Vehicle loadings refer to the number of riders on the bus relative to the seating capacity of the vehicle. Vehicle loadings are typically measured in terms of maximum standards to capture the time (or portion of the route) when the greatest number of riders are on the vehicle at the same time. Transit providers can adjust services to keep the number of passengers on its vehicles at a comfortable level, always within the limits of safety. In peak periods, this means that some passengers may be expected to stand for a portion of the trip. In off-peak periods and for service that operates longer distances, service will be designed to try to provide a seat to all customers. Transit operators maintain passenger loads within acceptable levels by matching capacity to demand. They can accomplish this by matching vehicle types with ridership levels (i.e. assign larger vehicles to higher ridership routes) by increasing (or decreasing) the frequency of service.



Service standards set requirements for the maximum average vehicle loads by service type and time of day (Figure 7 |). The standard reflects the average number of passengers relative to seating capacity for both the peak and off-peak periods, at the busiest point on the route.

**Figure 7 | Average Vehicle Loading Maximums**

	Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
<b>Peak</b>	120%	120%	100%	100%	100%	100%	100%
<b>Off-Peak</b>	100%	100%	100%	100%	100%	100%	100%

Note: Maximums are averages over one-hour periods; individual trips may exceed averages.

### **Bus Stop Spacing and Amenities**

The distance between bus stops is of key concern to providing effective transit service. More closely spaced stops provide customers more convenient access, as they are likely to experience a shorter walk to the nearest bus stop. However, transit stops are also a major reason that transit service is slower than personal vehicle trips, as each additional stop requires the bus to decelerate, come to a complete stop, load and unload riders, and then accelerate and re-merge 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.

Transit services are tailored toward serving different types of trips and needs. In general, services that emphasize speed and productivity (e.g., frequent routes) should have fewer stops, while services that emphasize accessibility (e.g., community routes) may have more frequent stops.

Standards for minimum stop spacing (or maximum stops per mile) are shown in Figure 8 |. Where multiple routes operate in the same corridor, the standard for the highest level of service operation applies. Core regional route services are not required to serve every stop in a corridor. Exceptions to these standards should only be made in locations where walking conditions are particularly dangerous, significant topographical challenges impede pedestrian access, or factors compromise safe bus operations and dwelling. This includes level of walkability, the absence of pedestrian accommodations, and the presence of a dendritic street network throughout much of the region.



**Figure 8 | Industry Standard Bus Stop Spacing Standards**

	Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
<b>Minimum Stop Spacing in Feet</b>							
Moderate to High Density Areas	1,300	1,300	1,300	—	2,640	—	1,300
Low Density Areas	2,600	2,600	1,300	—	2,640	—	1,300
<b>Maximum Number of Stop Per Mile</b>							
Moderate to High Density Areas	4	4	4	—	2	—	4
Low Density Areas	2	2	4	—	2	—	4

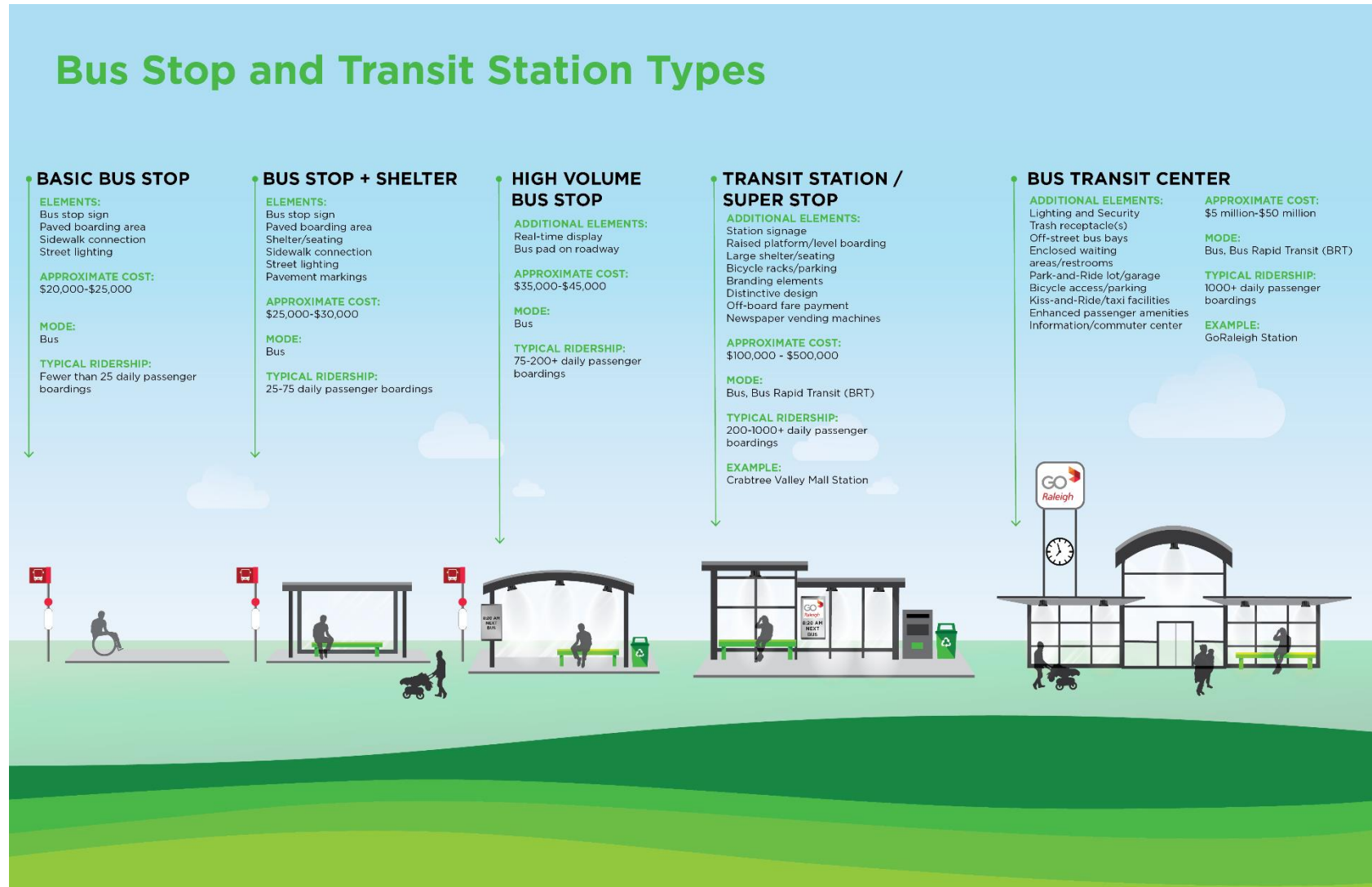
Notes: Moderate to high density defined as greater than or equal to 4,000 persons per square mile; low density defined as less than 4,000 persons per square mile

In addition to stop spacing, stops should include amenities that are appropriate for the level of passenger activity occurring at each stop. This standard serves several purposes: it ensures amenities are distributed with equity, as required by Title VI, as well as ensuring transit providers are efficiently investing capital resources in locations where it is most appropriate. Since passenger amenities enhance multiple routes, these standards are not specific to the type of service, only the total number of boardings, as described.

Where practicable, all new or improved bus stops and passenger waiting areas must conform to the ADA requirements as laid out in the Department of Transportation ADA standards for Transportation Facilities (2006). These standards specify a variety of requirements for platform surface, widths, and connectivity to surrounding sidewalk infrastructure and shelter facilities. As funds are available, existing bus stops and passenger waiting areas should be updated to meet ADA requirements.

Additionally, all stops should include clear signage. Additional amenities such as benches should be provided, as appropriate, depending on the level of passenger activity. Figure 9 provides a description of recommended amenities by type of stop.

Figure 9 | Bus Stop and Transit Station Types





## 5 Performance Measures

### Overview

Wake County is investing in new and enhanced transit services. As these investments develop and strengthen the transit network, people will have more options for how and where they travel using public transportation. Transit ridership and productivity will strengthen as investment increases and land use patterns change and Wake County residents start to rely on public transportation for more of their travel needs. However, the transformation of the transit network will be gradual rather than immediate and individual transit services will grow into the established performance measures over time. This means that the network overall, as well as individual routes, should not be expected to consistently achieve all of the recommended performance measures in the short-term.

The performance measures in this report were developed by:

- 1) Considering the existing performance measures and productivity levels of similar services currently operated within Wake County
- 2) Reviewing performance measures and productivity levels used by peer agencies, including both peers of the current network as well as peers applicable to the evolving transit network

### Recommended Performance Measures

This document includes a combination of network-level and route specific performance measures. Network-level performance measures will measure progress towards overall goals and guide investment at a strategic level. Route-level performance measures will identify over- and under-performing routes and determine when it is appropriate to change investments associated with an individual route. Accordingly, route-level performance measures are defined for each type of service, recognizing that expectations for service productivity will be shaped by the underlying market and operating characteristics.

Performance measures consist of a limited set of focused measures that capture the critical aspects of service productivity, efficiency, and effectiveness; at the same time, these performance measures can be easily reproduced and communicated. The following four route-level-performance measures are recommended:

- ➔ **Operating Cost per Passenger Boarding:** The operating cost per passenger boarding reflects the cost of serving each passenger boarding. It is calculated by dividing operating and administrative costs by the total number of passenger boardings.



- **Passenger Boardings per Revenue Hour:** The number of passenger boardings per revenue hour measures how well the service is being used. It can be measured for the overall network as well as on a route-by-route basis by dividing the number of passenger boardings by the number of vehicle revenue hours. For core and suburban regional service this is measured as passenger boardings per trip (the one-way operation of a vehicle between two endpoints on a route) due to the longer distance trips and unique service characteristics.
- **Farebox Recovery:** Farebox recovery is the ratio of revenue earned at the farebox divided by operating costs. It is a similar measure as the subsidy per passenger boarding, but is a relative indicator rather than absolute measure.
- **On-Time Performance:** Measures how closely a transit service adheres to the published schedule. It is an important measure for transit users because it directly impacts service reliability. On-time performance is measured by comparing scheduled and actual bus departure and arrival times at fixed time points (bus stops). Most transit operators set bands around scheduled times to allow for some variation in the schedule, so that service is considered on time if the vehicle arrives no more than one minute before and five minutes after the published schedule at designated timepoints. On-time performance is typically measured as a percentage (i.e. 85% of all routes are on-time).

These performance measures are designed to evaluate routes in year 2027 of the Wake Transit Plan. Individual route performance is expected to improve as the overall network of transit service expands and improves. The standards set out in this document reflect the productivity expected from a mature and complete transit network. Bus services associated with the Wake Transit Bus Plan will be phased in over time as are the expectations associated with individual routes. This approach ensures the performance targets will be appropriate for the life of the Wake Transit Plan.

The performance standards, excluding on-time performance, will be phased in over time, such that in the initial years, individual routes and services will be evaluated according to the following schedule:

- Fiscal Years 2017-2021 – 80% of target
- Fiscal Years 2022-2026 – 90% of target
- Fiscal Year 2027 and beyond – 100% of target

Operating cost per passenger boarding is expected to decrease as service improves and ridership increases. For that reason, the phased schedule is the inverse for this performance standard and should be evaluated according to the following schedule:

- Fiscal Years 2017-2021 – 120% of target
- Fiscal Years 2022-2026 – 110% of target
- Fiscal Year 2027 and beyond – 100% of target

## Peer Review

Peer transit systems were identified through the National Transit Database (NTD) to determine appropriate performance measures for the Wake Transit Bus Plan. This process identified 11 peers, including four North Carolina agencies (Charlotte, Durham, Greensboro, and Winston-Salem); and seven national peers (Charleston, SC; Fort Wright, KY; Indianapolis, IN; Little Rock,





AR; Madison, WI; Nashville, TN; and Richmond, VA). As a reference, the document also includes standards used by national leaders in transit service development and aspirational peers for Wake County. These agencies include the Regional Transit District in Denver; Tri-Met in Portland, Oregon; and Miami-Dade Transit in Miami.

The information obtained in this peer review:

- Identifies best practices used in the setting and development of performance measures by transit agencies
- Explores the existing productivity levels of transit providers operating service within Wake County
- Considers the performance standards achieved by similarly sized and positioned peer transit agencies, as well as three aspirational peers.

### **Best Practices**

This review of transit performance measures identified best practices that ensure performance measures are used in a constructive and appropriate way and work to encourage ongoing improvement and development. The most relevant of these best practices include:

- Setting performance standards based on route type
- Adjusting performance expectations to reflect new and existing services
- Calculating performance based on specific standards, not averages, which by design are continually shifting and result in an unstable baseline and target that can never be achieved
- Collecting data on route performance quarterly, but evaluating routes annually

### **Peer Systems and Underlying Operating Characteristics**

The peer review includes operating characteristics (service area, service area population, annual operating costs, and peak vehicles) to help interpret relative performance (Figure 10 |). Data on both the operating characteristics and performance measures were compiled using the National Transit Database (NTD) (2016 reporting data). Figure 11 compares GoTriangle, GoRaleigh, and GoCary to the selected peers on a number of measures of service performance and efficiency, while Figure 12 provides the same information for GoWake Access.

As part of setting performance measures this document balances what is realistic in Wake County today (2017) with the future expected investment in the transit network. As seen in Figure 13, the frequent and regional bus service operated by agencies in Denver, Portland, Miami, and Seattle are monitored under standards comparable to the standards proposed in this document.



**Service Guidelines and Performance Measures (Final)**  
**Wake Transit Plan – Wake Transit Bus Plan**

**Figure 10 | Wake County Transit Providers and Peer Systems – Fixed Route Service Statistics**

City	Service Provider	Service Area Size (sq. mi.)	Service Area Population (2010)	Annual Operating Costs (in millions)	Fixed-Route Vehicles in Peak Service
<b>Transit Agencies Operating in Wake County</b>					
Triangle Region, NC <sup>1</sup>	GoTriangle	1,519	1,402,824	\$19.6	57
Raleigh, NC	GoRaleigh	125	347,729	\$22.9	65
Cary, NC	GoCary	55	157,259	\$1.8	9
<b>Peer Agencies</b>					
Charleston, SC	Charleston Area Regional Transportation Authority	137	543,209	\$14.0	87
Charlotte, NC	CATS	688	1,098,944	\$80.5	198
Durham, NC	Durham Area Transit Authority	93	240,017	\$18.3	45
Fort Wright, KY	TANK	267	278,653	\$18.8	91
Greensboro, NC	Greensboro Transit Authority	127	269,666	\$14.0	41
Indianapolis, IN	IndyGo	396	928,281	\$57.9	136
Little Rock, AR	Rock Region Metro	100	165,255	\$13.5	49
Madison, WI	Metro Transit	72	256,150	\$46.9	182
Nashville, TN	Metropolitan Transit Authority	484	655,900	\$47.5	124
Nashville, TN	Middle Tennessee Regional Transit Authority	750	1,583,115	\$9.1	56
Phoenix, AZ	Valley Metro	732	3,629,114	\$83.1	282
Richmond, VA	GRTC	227	449,572	\$37.6	121
Winston-Salem, NC	Winston-Salem Transit Authority	108	199,555	\$11.5	36
<b>Peer Average</b>		<b>246</b>	<b>462,291</b>	<b>\$32.8</b>	<b>101</b>

Source: National Transit Database (2016), U.S. Census and local provider data

<sup>1</sup> Includes service outside of Wake County



**Service Guidelines and Performance Measures (Final)**  
**Wake Transit Plan – Wake Transit Bus Plan**

**Figure 11 | Wake County Transit Providers and Peer Systems – Fixed Route Operating Statistics**

City	Service Provider	Passenger Boardings per Revenue Hour	Passenger Boardings per Revenue Mile	Operating Cost per Passenger Boarding	Cost per Revenue Hour	Farebox Recovery (%)
<b>Transit Agencies Operating in Wake County</b>						
Triangle Region, NC <sup>2</sup>	GoTriangle	13.0	0.6	\$10.99	\$142.83	10.3%
Raleigh, NC	GoRaleigh	22.9	1.8	\$4.27	\$97.67	14.2%
Cary, NC	GoCary	7.0	0.5	\$7.26	\$50.53	9.5%
<b>Peer Agencies</b>						
Charleston, SC	Charleston Area Regional Transportation Authority	20.2	1.5	\$3.62	\$73.06	31.8%
Charlotte, NC	CATS	24.5	1.9	\$4.13	\$101.37	23.0%
Durham, NC	Durham Area Transit Authority	30.0	2.2	\$3.09	\$92.81	15.0%
Fort Wright, KY	TANK	15.6	1.1	\$5.44	\$84.69	22.0%
Greensboro, NC	Greensboro Transit Authority	24.2	1.9	\$3.32	\$88.74	21.4%
Indianapolis, IN	IndyGo	17.7	1.3	\$6.30	\$111.71	17.1%
Little Rock, AR	Rock Region Metro	14.3	1.0	\$5.41	\$77.47	13.2%
Madison, WI	Metro Transit	32.9	2.6	\$3.53	\$116.19	27.3%
Nashville, TN	Metropolitan Transit Authority	20.2	1.7	\$5.20	\$104.89	18.8%
Nashville, TN	Middle Tennessee Regional Transit Authority	18.1	0.5	\$14.35	\$259.45	18.7%
Phoenix, AZ	Valley Metro	18.4	1.4	\$4.84	\$89.11	20.7%
Richmond, VA	GRTC	22.0	2.0	\$4.34	\$95.41	21.4%
Winston-Salem, NC	Winston-Salem Transit Authority	21.9	1.9	\$3.81	\$83.49	13.9%
<b>Peer Average</b>		<b>22.1</b>	<b>1.7</b>	<b>\$4.38</b>	<b>\$93.62</b>	<b>20.4%</b>

Source: National Transit Database (2015) and local provider data

<sup>2</sup> Includes service outside of Wake County



Figure 12 | Wake County Transit Providers and Peer Systems – Demand-Response and ADA Paratransit Statistics

City	Service Provider	Passenger Boardings per Revenue Hour	Passenger Boardings per Revenue Mile	Operating Cost per Passenger Boarding	Cost per Revenue Hour	Farebox Recovery (%)
<b>Transit Agencies Operating in Wake County</b>						
Wake County, NC	GoWake Access	1.6	0.1	\$27.00	\$31.72	11.0%
Triangle Region, NC <sup>3</sup>	GoTriangle	1.5	0.07	\$73.42	\$129.82	3.56%
Raleigh, NC	GoRaleigh	1.3	0.1	\$25.45	\$33.44	9.1%
Cary, NC	GoCary	1.5	0.1	\$32.12	\$50.14	13.7%
<b>Peer Agencies</b>						
Charleston, SC	Charleston Area Regional Transportation Authority	1.9	0.1	\$36.13	\$67.79	24.1%
Charlotte, NC	CATS	1.8	0.1	\$37.35	\$68.54	10.9%
Durham, NC	Durham Area Transit Authority	2.2	0.1	\$25.38	\$56.10	4.5%
Fort Wright, KY	TANK	1.9	0.1	\$33.30	\$61.87	6.8%
Greensboro, NC	Greensboro Transit Authority	2.2	0.1	\$31.78	\$69.17	3.6%
Indianapolis, IN	IndyGo	1.8	0.1	\$31.79	\$56.31	11.5%
Little Rock, AR	Rock Region Metro	2.3	0.1	\$24.99	\$56.57	10.7%
Madison, WI	Metro Transit	2.3	0.2	\$42.22	\$98.68	4.3%
Nashville, TN	Metropolitan Transit Authority	2.2	0.1	\$54.88	\$119.52	5.1%
Phoenix, AZ	Valley Metro	1.3	0.1	\$47.61	\$62.35	6.0%
Richmond, VA	GRTC	2.5	0.1	\$18.50	\$45.67	12.5%
Winston-Salem, NC	Winston-Salem Transit Authority	3.0	0.2	\$15.64	\$47.08	18.8%
<b>Peer Average</b>		<b>2.1</b>	<b>0.1</b>	<b>\$33.30</b>	<b>\$67.47</b>	<b>9.9%</b>

Source: National Transit Database (2015) and local provider data

<sup>3</sup> Includes service outside of Wake County



Figure 13 | Performance Standards Reported by Aspirational Peers

Frequent Route Performance Standards				
City	Service Provider	Passenger Boardings per Revenue Hour	Operating Cost per Passenger Boarding	Farebox Recovery (%)
Denver, CO	RTD	25	\$6.28	30%
Portland, OR	Tri-Met	15	--	--
Miami, FL	Miami-Dade County	30	--	20%
Seattle, WA	Sound Transit	N/A	N/A	N/A
Wake County, NC	Wake Transit Bus Plan (Proposed)	25	\$6.00	20%
Core Regional Route Performance Standards				
City	Service Provider	Passenger Boardings per Revenue Hour	Operating Cost per Passenger Boarding	Farebox Recovery (%)
Denver, CO	RTD	--	--	--
Portland, OR	Tri-Met	15	--	--
Miami, FL	Miami-Dade County	30 <sup>4</sup>	--	--
Seattle, WA	Sound Transit	25 (all day), 15 (limited service)	--	--
Wake County, NC	Wake Transit Bus Plan (Proposed)	20 <sup>5</sup>	\$6	20%
Demand-Response Performance Standards				
City	Service Provider	Passenger Boardings per Revenue Hour	Operating Cost per Passenger Boarding	Farebox Recovery (%)
Denver, CO	RTD	1.5	--	--
Portland, OR	Tri-Met	--	--	--
Miami, FL	Miami-Dade County	--	--	--
Seattle, WA	Sound Transit	N/A	N/A	N/A
Wake County, NC	Wake Transit Bus Plan (Proposed)	1.5	\$30	5%

Sources: TriMet Service Guidelines Framework (2014), RTD Transit Service Policies and Standards (2016), Miami-Dade Transit Service Standards (2009)

<sup>4</sup> Passengers per trip

<sup>5</sup> Passengers per trip



## Performance and Productivity Measures

This document recommends five network-wide and four route-level performance measures. Performance measures are designed to track progress towards established goals and the cost-effectiveness of the overall network. These performance metrics are not measured against a standard, but rather are tracked over time to ensure network productivity is improving and transit service is advancing the goals of the Wake Transit Bus Plan in a cost-effective manner. Network-wide performance measures include:

- Percentage of Wake County residents within walking distance (3/4 of a mile) of all-day service
- Percentage of Wake County jobs within walking distance (3/4 of a mile) of all-day service
- Percentage of ridership-oriented routes, as measured by total service cost
- Network-wide farebox recovery ratio (average total network)
- Operating cost per revenue hour (average total network)

Route level performance measures are intended to facilitate management and oversight of individual routes and support additional service reporting requirements, including Title VI requirements. Each performance measure includes a standard or expectation for productivity. Productivity standards are developed for each performance measure and for each route classification. The performance measures are intended to be realistically achievable within the local operating characteristics and land use patterns of Wake County while also meeting the standards achieved by peer agencies. The four recommended measures are:

- Passenger boardings per revenue hour (or trip, the one-way operation of a vehicle between two endpoints on a route), depending on route classification
- Operating cost per passenger boarding
- Farebox recovery ratio
- On-time performance

### ➔ Passenger Boardings per Revenue Hour (or per Trip)

The most common and reliable way to track transit service productivity is the number of passenger boardings for each hour of active service, or passenger boardings per revenue service hour. An exception to this rule is for core regional routes and express routes, which often travel for longer distances with fewer stops; productivity on these routes is measured as passenger boardings per bus trip, the one-way operation of a vehicle between two endpoints on a route.

The standard sets a minimum for the average number of passenger boardings that a route should generate for each service hour (Figure 14). The standards vary by service type and by day of the week and time of day.



Figure 14 | Minimum Productivity Levels (Passenger boardings per Revenue Vehicle Hour)

	REVENUE VEHICLE HOUR					REVENUE VEHICLE TRIP	
	Frequent Route	Local Route	Community Route	Demand-Response Service	Shuttle Service	Core Regional Route	Express Route
<b>Weekdays</b>							
All Day	25	20	10	1.5	10	20	10
Early Morning	15	10	10	1.5	10	10	–
Late Night	15	10	10	1.5	10	10	–
<b>Saturdays</b>							
All Day	20	15	10	1.5	10	15	–
<b>Sundays</b>							
All Day	15	10	10	1.5	10	10	–

Note: “Early morning” and “Late Night” refers to service before and after the minimum span of service. All day refers to the complete span of service, including early morning and late night service. “–” indicates that the standard does not apply. \*core regional and express route productivity is measured as a minimum number of passengers per trip.

## ➔ Operating Cost per Passenger Boarding

The operating cost to transport each passenger boarding is a key metric to understand the absolute and relative performance of the Wake Transit Bus Plan’s funded services. The minimum standard for operating cost per passenger boarding varies by route type is defined in Figure 15.

Figure 15 | Operating Cost per Boarding

Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
\$6.00	\$6.00	\$10.00	\$30.00	\$6.00	\$10.00	\$10.00

## ➔ Farebox Recovery

Farebox recovery is the percentage of operating expenses recouped by farebox revenues. Performance measures applies only to routes and services where fares are collected. Standards for minimum farebox recovery percentages are set by route type (Figure 16).

Figure 16 | Minimum Farebox Recovery

Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
20%	15%	10%	5%	20%	15%	15%

## ➔ On-Time Performance

On-time performance is a measure of the reliability of route operations. Measuring an individual route’s schedule adherence provides information on whether a customer can count on a bus being there as scheduled. Minimum on-time performance percentages are defined in Figure 17. To precisely measure on-time performance, a definition of on-time must be established. The most widely accepted fixed route measure of on-time is up to one minute earlier and no more than five minutes later (-1 minute to +5 minutes) than the scheduled arrival time at all time points. The only exception to this measure would include early arrivals on express routes to their final destinations. Demand response and ADA measure on-time for both pickups and drop-offs. The most widely accepted measure of on-time is +/-20 minutes of the scheduled pickup and drop-off time.

Figure 17 | Minimum On-Time Performance

Frequent Route	Local Route	Community Route	Demand-Response Service	Core Regional Route	Express Route	Shuttle Service
85%	85%	85%	85%	85%	85%	85%





## Over- and Under-Performing Routes

The TPAC understands that transit providers are solely responsible for operating their services. As such, **transit providers have discretion to recommend and implement changes to their routes as needed.** Transit providers are encouraged to integrate the Service Guidelines and Performance Measures as they review and evaluate their transit services. This internal review process, as proposed for the Wake Transit Bus Plan, should consider transit operations as well as the impact of exogenous variables that may impact route productivity, such as gas prices.

However, the TPAC designed these performance standards and measures to strike a balance between setting realistic and achievable goals with a desire to encourage ongoing improvement. As such, the TPAC recommends that transit providers compare and contrast route performance relative to the Wake Transit Bus Plan standards. Routes that consistently over-perform relative to their standards may warrant additional investment; and conversely routes that consistently under-perform relative to their standard may warrant a reduced investment. It's necessary to recognize that not every route will meet all of the established standards, all of the time. Recognizing this, over-performing routes are defined as services that surpass at least three performance measures for three or more consecutive quarters. Under-performing routes are defined as routes that fall below the minimum standards for three or more performance measures for a period of three or more consecutive quarters.

Local transit providers will develop a report submitted to the TPAC quarterly that shows performance on individual performance measures at a route level. This report will also include information on the number of consecutive quarters the route has over- or under-performed relative to the standards. The TPAC will not be taking action on the routes on a quarterly basis, but transit providers will make the information available on a quarterly basis.

The TPAC recommends a tiered system for addressing over- and under- performing routes. This process is designed to be clear, consistent, and fair while ensuring the most cost-effective investments are prioritized.

1. New routes or routes undergoing significant changes (defined as a 20% change in revenue miles or hours) will be classified as new and exempt from performance measures services for a period of 18 months to build ridership and the market for transit services. This grace period is intended to reflect the major changes in transit service development in Wake County. The time period is longer than the one currently adopted by GoTriangle and GoRaleigh.
2. Local transit providers will review route productivity annually (in conjunction with the annual work plan process). **Routes identified as under- or over-performing will be considered as part of the local transit provider's existing route review process.** This process will be conducted in advance of the annual work plan development process and may consider corrective actions such as minor changes to include service design, strengthening connections, coordination with other routes; and/or marketing or information systems. Any actions resulting from this are at the discretion of the transit providers.
3. **Any significant changes to the funding of individual routes will be recommended as part of the update to the Wake Transit Bus Plan,** a process that is envisioned to occur at least once every four years. As part of this process, routes that have over- or under-



performed relative to at least three of their respective standards for the past three or more consecutive quarters will be subjected to more strenuous review. This process will include reviewing:

- The specific performance measures where over- or under-performance has been recorded, including duration and the magnitude of the gap.
- Exogenous variables out of the transit providers' control that may have contributed to over- or under-performance.
- Efforts under-taken by the transit provider to address over- or under-performance.

Routes that consistently over-perform set targets and have not received additional investment **may** be considered for additional resources. Additional resources may be used to advance the route classification to a higher tier or service (i.e. graduate service from a local route to a frequent route).

Likewise, routes that have exhausted their route development period and have not improved with annual adjustments **may** be recommended for a reduction or elimination of funding. For example, a reduction in funding may be used to move a route down a classification tier (i.e. from a community route to a demand response service).



## 6 Measuring Customer Satisfaction

Customer satisfaction is a critical element of the Wake Transit Plan as the vision adopted by the voters includes clear guidelines for enhancing customer service. The goal with these guidelines is a transit system that prioritizes accessibility, comfort, security, reliability, cleanliness, courtesy, and communication. Customer satisfaction measures also allow TPAC member agencies to understand if complaints are incidental to a particular individual or systemic to the overall network. Regular, periodic customer satisfaction surveys also allow Wake Transit Governing Boards to track satisfaction in the overall transit network as it evolves.

### Customer Satisfaction Survey

To effectively measure customer satisfaction, transit partners providing public transportation services should incorporate customer satisfaction questions as part of the budgeted triannual survey. The first survey year should be used to establish the customer satisfaction baseline. Results in subsequent years should be measured against this baseline to ensure satisfaction at a minimum remains constant. Figure 18 provides a list of recommended customer satisfaction questions.

As a matter of policy, each of the transit providers in Wake County should jointly administer an annual customer satisfaction survey to gauge rider satisfaction. It is important that the same questions be asked across all transit riders in Wake County, so that progress and results can be compared and contrasted across services and operator. Wake County transit providers are scheduled to implement new services annually in late summer/early fall; to provide adequate time for customers to adjust to new services, the optimal period to conduct a customer satisfaction survey is likely spring of the following year. This will allow riders and transit providers to adjust to new routes and changes in existing services.

To effectively measure customer satisfaction, it is imperative that this survey features the same questions each year and is comprised of a statistically valid sample with a confidence level of at least 90% at the individual route level. This level of precision is required to utilize customer feedback as a measure; less rigorous intercept and online surveys can be biased and should not be used as a measurement. If additional surveys or more detailed triannual surveys are developed as part of other planning efforts they should coordinate with this customer satisfaction survey (as appropriate).

Survey results should be reported annually to the TPAC, along with the network-level performance measures. Success or challenges identified in the survey process can be incorporated into the annual work plan review process to make minor adjustments as needed. Recommendations for major changes that result from the customer satisfaction survey process should be included in the major review process schedule.



**Figure 18 | Example Customer Satisfaction Rating**

Please Rate the following:	Excellent-----Poor				
How long it takes to complete this trip?	1	2	3	4	5
Buses running on-time	1	2	3	4	5
Time buses stop running in the evening	1	2	3	4	5
Frequency of service	1	2	3	4	5
The distance from your home to the closest bus stop	1	2	3	4	5
Personal safety at bus stop	1	2	3	4	5
Operator courtesy	1	2	3	4	5
Comfort while waiting for your bus	1	2	3	4	5
Vehicle cleanliness	1	2	3	4	5
OVERALL, how do you rate transit service?	1	2	3	4	5

Source: CJI Research Onboard Survey