



REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA

# Service Performance and Capacity Standards (SPECS)

September 2017

## 1. Introduction

### 1.1. *Overview*

The Regional Transportation Commission of Southern Nevada (RTC) continually evaluates existing and potential transit routes in its efforts to maintain a viable regional transit network. In doing so, the RTC must balance the costs of providing both fixed route and Paratransit services with ridership demand to ensure that its resources are being distributed fairly and efficiently. In order to deploy service in a cost-effective manner and ensure that frequency of service is proportional and equitable throughout the network, the RTC maintains and applies a set of Service Performance and Capacity Standards (SPECS or 'Standards').

The RTC's SPECS are a set of ranges that all urban routes must meet on a continual basis. Routes that fail to meet these targets will be subject to review for possible modifications or even elimination in extreme circumstances. In other cases, these SPECS will help guide the RTC to respond to strong passenger demand by determining the most appropriate means of increasing capacity to meet demand.

### 1.2. *Background*

The RTC first developed and adopted what it labeled Transit Performance Standards for its Fixed Route System in 1991. They were updated in 2004 to reflect the expansion of the transit network, as well as significant regional population growth. The 2004 update attempted to account for the diversification of services by moving away from a "one size

fits all” approach. The current update builds on lessons learned in applying those standards by evaluating routes based on four categories, each determined by frequency of service. To achieve simplicity, preference is given for consistency amongst routes of the same frequency.

The SPECS are helpful for planning as well as for communicating results. They help identify how well service is being provided to the customer, the areas where improvement may be needed, and the effects of actions previously taken to improve performance. Standards also provide reliable information to the RTC’s Board, planners, and policymakers to help them make decisions on where and how much service should be provided and to support actions designed to improve efficiency. The same information can be of value to members of the public regarding the performance of the system and the various tradeoffs the RTC must make to ensure that services are provided in a cost-effective, efficient, and equitable manner.

### **1.3. Categories of RTC Transit Service**

The RTC currently operates routes at various ‘clock face’ and ‘non-clock face’ frequencies throughout the urban area<sup>1</sup>. A frequency is said to be ‘clock face’ if it is evenly divisible by one hour, for example: 60 minutes, 30 minutes, 20 minutes, 15 minutes, 12 minutes, and 10 minutes. The RTC’s preference is to operate clock face frequencies; however, the categories below include ranges to account for the reality of some non-clock face frequencies due to limitations in funding.

The RTC also recognizes that frequency is important for long periods of the service day, not just during traditional peak hours. A consistent, all-day frequency makes transit service more convenient and therefore attracts more riders. However, for the purposes of categorization, the frequency category that a route will be evaluated against is defined as the highest frequency operated by a route continuously for at least five hours each weekday in both directions.

- **60 Minute Routes** (frequency of every 31 to 60 minutes) are designed with the primary purpose of providing lifeline service to a transit-dependent population or express service between distant locations. The goal of these routes is to provide coverage or reduce in-vehicle travel time, not to maximize system ridership.
- **30 Minute Routes** (frequency of every 21 to 30 minutes) form the backbone of the transit system, providing reasonably efficient service on many arterial corridors throughout the Valley.

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<sup>1</sup> RTC also operates fixed-route service in Boulder City, Laughlin and Mesquite; these standards do not apply to service operated outside of the Las Vegas Valley.

- **20 Minute Routes** (frequency of every 16 to 20 minutes) achieve a substantially higher level of ridership than 30 minute routes, but are a more affordable alternative than 15 minute routes.
- **15 Minute Routes** (frequency of every 15 minutes or better) operate to maximize transit ridership. These major transit routes achieve levels of ridership sufficient to justify intense transit investment. 15 minute routes are utilized heavily enough to potentially affect land use in certain circumstances. The RTC’s 15 minute routes are branded as Frequent Service, have a unique logo in the transit guide and are highlighted on network maps.
- **Alternative Options<sup>2</sup>** including Micro Transit and public private partnerships with organizations such as Transportation Network Companies (TNC’s), taxi cab companies, or other similar services are also within the RTC’s toolkit.
  - a. Micro Transit is a solid option when a densely occupied area exists outside of the service area and is separated from the service area by a band of low density development that is not conducive to transit.
    - i. The metrics in Figure 1 below show an estimate of how an entry level service, such as micro transit compares to our fixed route offerings. The 6,205 hours is based on service from 5:00am to 10:00pm seven days a week. The cost is figured based on one bus costing approximately \$350,000/year to operate, thus the cost would need to be less than that amount.
  - b. Other options, such as TNC partnerships, can provide more affordable alternatives to traditional routes in “lifeline” service areas or outlying areas.

**Figure 1: Cost per Service Hour**

Service Type	Annual Service Hours	Annual Cost	Cost per Service Hour
<b>Fixed Route Service</b>	1,361,114	\$81,666,840	\$60.00
<b>Micro Transit</b>	6,205	\$325,000	\$52.38

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<sup>2</sup> The RTC is in the process of having a study done (completion in late 2018) that will determine specific metrics that apply to defining when to implement Micro Transit and other alternative options.

## 2. Description of Service Performance and Capacity Standards

When evaluating the efficiency of its fixed-route transit services, RTC uses Boardings per Revenue Hour (B/RH) standards. When evaluating capacity, RTC uses Average Peak Load (APL) standards.

### 2.1. Boardings per Revenue Hour (B/RH)

Previously labeled by RTC as Passengers Per Service Hour, Boardings per Revenue Hour (B/RH) looks at how many passengers have boarded a route for every hour that a transit vehicle has operated along that route (including “recovery” time at the end of each trip but not including “deadhead” time).

B/RH is a routinely used industry metric and is collected by the Federal Transit Administration (FTA) for all transit systems in the United States. Per the FTA, the RTC operates one of the more productive transit systems in the country. The RTC has routinely ranked in the upper third of large scale transit agencies for B/RH, and then only behind larger, denser cities with well-established transit riding behavior. While this is a testament to RTC’s efficiency, it is also a sign of significant latent demand for additional transit service.

B/RH can be calculated at varying levels by route, hour, trip, or even for the entire transit system. When calculating B/RH by trip, the calculation should include a 15% addition to the runtime of the trip to account for a standardized amount of recovery time. Figure 1 below provides the B/RH standards for fully matured routes.

Figure 1: Boardings per Revenue Hour (B/RH) Standards for Mature<sup>3</sup> Fixed-Routes

Frequency Category	Boardings per Revenue Hour (B/RH)
60 Minute Routes	15 to 25 B/RH
30 Minute Routes	20 to 35 B/RH
20 Minute Routes	30 to 45 B/RH
15 Minute Routes	40+ B/RH

<sup>3</sup> Routes that have been operating for three years or longer are considered mature. See Section 3.1 for more information.

## 2.2 Average Peak Load (APL)<sup>4</sup>

Average Peak Loads (APL) are individual peak loads on each trip and each day type, averaged over a larger period of time (several weeks or months). APL is a measure of how crowded transit vehicles may be at the most crowded point along a route. While strong utilization is desirable, overcrowding is problematic as it results in a poor customer experience and the possibility of not being able to board all waiting passengers.

The RTC uses APL to assess possible route overcrowding. Excessively high APL numbers, especially when relatively consistent over time, are an indication that a route may not have sufficient capacity to meet observed demand.

Figure 2: Average Peak Load (APL) Standards for RTC Routes

Vehicle Type	Maximum APL
40' vehicle	≤45 passengers
60' vehicle (including BRT)	≤75 passengers
Double-deck vehicle <sup>5</sup>	≤80 passengers

For the Deuce and SDX, maximum APL values in Figure 2 apply to a three trip average (the trip being evaluated, as well as the trip before and after it) for the analyzed time period. For all other routes, maximum APL figures pertain to individual trips.

Maximum APL values can be thought of as the planning capacity for RTC fixed-route services. From a technical standpoint, the terms “overcapacity” or “overcrowded” are only applicable if APL values exceed those shown in Figure 2. It’s also important to note that these figures represent the planning capacity; manufacturer’s capacity or real-world practical capacity may be considerably higher than the values in Figure 2.

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<sup>4</sup> Since there are slight variations in the number of seats between vehicles of the same type, RTC has chosen to use actual numbers of passengers as a standard, rather than load factors expressed as a percentage of seats available. Generally, vehicles with fewer seats than another vehicle of the same type are designed to accommodate more standees, meaning the overall acceptable capacity for the vehicles remain similar.

<sup>5</sup> Double-deck vehicles are being retired, with the exception of the Deuce on the Strip; retirement of these vehicles begins in 2018. They will be replaced with 60' vehicles. Thus at the point additional capacity is required over a 60' vehicle additional frequency will be necessary to accommodate.

## 3. Evaluating Routes

### 3.1. *Mature Routes*

Routes that have been operating for three years or longer are considered mature. Mature routes will be evaluated formally on no less than an annual basis for their performance relative to the SPECS described in Section 2, though route statistics will be generated monthly. Statistics from multiple, representative months will be combined for analysis.

#### 3.1.1 Underperforming Routes

Routes that fall below the applicable B/RH standard will be considered for a number of possible modifications or actions, including the following:

1. **Frequency adjustments.** Routes that fall below standard might require a frequency decrease to more appropriately match service levels with observed demand. For example, a route that falls below standard when operating every 20 minutes would likely meet standards once decreased to every 30 minutes, since fewer resources would be used to operate the route.
2. **Route adjustments.** Route segments of mature, underperforming routes will be analyzed for performance. If a major segment is identified as under-performing, planners will consider whether frequency can be reduced on the under-performing segment or if the route can be modified to remove the segment.
3. **Service span adjustments.** Routes that underperform may see adjustments to service span (hours of operation), especially if certain time periods appear to be responsible for the route's poor performance.
4. **Route elimination or consolidation.** In some cases, a route may be recommended for either elimination or to have its most productive segments consolidated with another route.

When routes are modified, their performance will be tracked to ascertain whether they have been brought up to standards or are at least trending that way. Routes that still fail to meet standard within a year will be re-evaluated for potential additional changes.

#### 3.1.2 Over-performing Routes

A route with a B/RH that exceeds the range in Figure 1 for a given frequency category is classified as over-performing. Note that this does not necessarily mean the route is overcapacity (discussed in 3.1.3), but rather that the route is experiencing utilization strong enough to clearly justify a frequency increase, subject to available funding. An increase in frequency could come in one of two ways:

- **Off-peak increase**, meaning extending the current peak frequency for a longer period of the day, or improving the frequency during off-peak hours to be closer to the peak frequency. For example, a route classified as a 30 Minute Route with a B/RH of 40 might still operate 45 minute service on Sundays or 60 minute service during evening hours. Improving frequency during these hours would reduce B/RH, likely bringing the route into compliance with the 30 Minute Route B/RH standards.
- **Peak frequency increase**, resulting in the route being reclassified into a different category. For example, a route classified as a 30 Minute Route with a B/RH of 40 that already operates every 30 minutes on weekdays, weekends, and evenings would likely need to receive a peak frequency increase. If the route were increased to every 20 minutes for at least five continuous hours a day, doing so would result in the route being reclassified as a 20 Minute Route, likely bringing the route into compliance with the 20 Minute Route B/RH standards.

### 3.1.3 Overcapacity Trips

A trip that with an APL that exceeds the capacity shown in Figure 2 of the currently-assigned vehicle type is classified as overcapacity. Overcapacity trips may be remedied in one of two ways:

- The use of higher-capacity vehicles, or
- Increasing service frequency.

Generally speaking, it is more cost-effective to increase vehicle size than it is to add additional vehicles to a route, but there are other advantages to increasing frequencies:

- Shorter passenger wait times, which often results in additional ridership (as the route becomes more attractive and useful to potential riders);
- Reduced running times, as picking up fewer customers per trip reduces the amount of time necessary to perform the trip;
- Easier transfers between routes, due to shorter waiting times; and
- Higher frequency corridors are more likely to shape a variety of secondary factors, such as transit riders choosing where to live.

To respond to the convenience and ridership-building effects of higher frequency, the RTC recognizes it would be ideal to increase route frequencies (if justified by the applicable B/RH standards in Figure 1), rather than adding a larger vehicle, up to the point at which the scheduled frequency reached every 15 minutes. Were a route operating every 15 minutes to require greater capacity, a high-capacity vehicle would then be used; only if the route were still overcapacity with a high-capacity vehicle would frequency improve to better than every 15 minutes. However, while frequency up to every 15 minutes is highly desirable, given the realities of budget constraints, high-capacity vehicles may still be used on routes that operate less frequently than every 15 minutes.

## **3.2 New Routes or Routes Changing to a Different Frequency Category**

### **3.2.1 Justification and Ranking of Potential New Routes**

The goal of the RTC is to operate efficient and sustainable transit services that enable the system to expand while still maintaining no less than the minimum service standards for the level of service provided. The intent of expansion is to not provide coverage service, but rather service that focuses on ridership and is able to grow over time. While minimal frequencies may be operated at the onset, new service should only be created in areas where it could support no worse than 30 minute base frequency at maturation. Potential new routes or significant extensions will be analyzed as follows:

#### **Population and Employment:**

The population and employment within one-half mile of a potential new route or extension will be calculated for both unique and total population and employment served<sup>6</sup>. Unique population or employment refers to those residents or jobs within the one-half mile buffer that are *not within a one-half mile buffer of any other existing transit route*. Total population or employment includes all residents or jobs within the one-half mile buffer, *including those already served by another route(s)*.

#### **Connectivity Improvements:**

A potential new route or extension could improve the overall transit network by reducing out-of-direction distance for customers or by reducing travel time. To fairly recognize such benefits, each candidate will be awarded points based on the amount of out-of-direction distance saved or travel time reduced. The candidate with the highest score in this category will receive full points (100) for the category. All other candidates will receive points based on a percent deviation from the highest score in this category; for example, a new route that would reduce out-of-direction distance by 20% less than the highest scoring candidate would receive 80 out of 100 points.

#### **Service Hour Cost:**

##### **Fixed-Route Service Hours:**

Transit Planning will produce an estimate of the number of service hours required to create a potential new route or significant extension. The number of annualized service hours required will then be multiplied by the average blended service hour rate between all operating contractors for the current or upcoming Fiscal Year.

##### **Paratransit Service Area:**

Due to limited funding availabilities, paratransit service area must be considered when establishing new transit services. While it is largely unknown what the net paratransit

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<sup>6</sup> For potential rapid or Commuter Express routes, residential and employment population calculations may be based on a one-half mile buffer around proposed stops, rather than the route itself, to ensure areas without stops are not considered in the analysis.

usage will be once service is established, a baseline must be factored into the planning of such expansion. The RTC has separately developed a methodology for estimating potential paratransit usage, relying on the number of currently eligible clients within a potential new service area for consistent comparison. This methodology will be used to determine the likely additional paratransit costs associated with a potential new route or significant extension.

**Overall Cost Effectiveness - Ranking and Prioritization:**

Once the calculations above are performed, the annualized fixed-route service hour costs and annualized paratransit costs will be added together to produce an estimate of total annualized service hour costs associated with a potential new route or significant route extension. These costs will then be divided by the unique and total population and employment figures referenced above to produce the following:

- Annual service hour cost per unique person served
- Annual service hour cost per total persons served
- Annual service hour cost per unique job served
- Annual service hour cost per total jobs served

The potential new route or significant extension with the highest score in each category will receive full points (100) in that category. All other candidates will receive points based on a percent deviation from the highest score in each category; for example, when compared to the new route or significant extension that is most efficient (lowest cost), a candidate that would have a 20% higher annual service hour cost per unique person served would receive 80 out of 100 points (80% of the value of the highest score). For each candidate, the total scores in each of these four categories shall then be multiplied by the average number of trips per hour proposed to serve the route. Finally, the score from the Connectivity Improvements section will be added (unweighted by the average number of trips per hour) to produce a total points score.

The RTC will develop and maintain a ranked list of potential new routes or significant extensions based on the total point scores. Each year, as budgetary circumstances allow, the RTC may consider the top candidate(s) from the prioritized list of new services along with the need for improvements to existing routes, including frequency increases (both peak hours and other time periods) and span of service increases. No guarantee is made that a new route or significant route extension will occur in a given year; rather, the agency may choose to focus exclusively on improving existing routes. Also, please note that complex route restructuring packages are not suited to this type of analysis.

Overall, this ranking process provides the RTC and the community with an objective framework with which to compare the needs for new transit service in various places throughout the Las Vegas Valley. Further, it ensures that RTC remains a very productive transit system by only adding service where it is most justified. It is expected that new services on arterial roadways will support a reasonable 30 minute frequency at maturation.

### 3.2.2 Evaluation of New Routes or Routes Changing to a Different Frequency Category

Routes that receive a significant frequency increase (from one frequency category to another) and new routes often take time to achieve a stable ridership level. It would be premature to hold new routes or routes with major changes up to the same standard as mature routes not undergoing significant frequency changes. However, interim standards are still necessary to ensure that a clearly inefficient service is not preserved unaltered for several years.

Consequently, the RTC applies the following standards when assessing the performance of routes after recently changing frequency categories or implementing new routes (Figure 3):

**Figure 3: Boardings per Revenue Hour Standards for New Routes or Routes that Recently Changed Frequency Categories**

<b>Milestone</b>	<b>B/RH Standard</b>
<b>First 6 months</b>	Monitor monthly ridership
<b>6 Months</b>	50% of minimum standard for applicable Frequency Category
<b>12 Months</b>	75% of minimum standard for applicable Frequency Category
<b>2 Years</b>	90% of minimum standard for applicable Frequency Category
<b>3 Years</b>	Fully meet minimum standard for applicable Frequency Category

New or modified routes that fail to meet the B/RH standards described will be considered underperforming, and will then be subject to the possible actions described in section 3.1.1 above.

The RTC Transit Planning team will also consider the likelihood of whether a route can meet the Standards specified in Figure 3 prior to recommending the implementation of a new route or a frequency increase on an existing route. RTC Transit Planning will not recommend starting or increasing a route that is not likely to meet the standards above.

### **3.3. *Span of Service Standards - First and Last Trips***

The RTC recognizes that span of service<sup>7</sup> – the first and/or last trips of a route each day – require special consideration, as they determine whether service is available at a given time. The first/last trips of a route rarely perform as well as trips during peak hours. Nevertheless, many riders depend on having later or earlier trips available in case their plans change, while other riders depend on such trips for their daily commute. Late evening and early morning trips also ensure that a roundtrip that may take place during busier parts of the day can be made using transit. Last trips, especially, often serve as “lifeline” service, and their presence helps reinsure customers that they will not be stranded.

To support the varied workforce of the Las Vegas Valley, RTC’s ideal span of service for all 15 minute routes and 20 minute routes is 24-hours, 7-days a week (with lower frequency during overnight hours). The ideal span of service for 30 minute routes is from 4 a.m. to 1 a.m. These service spans would ensure that workers in the Resort Corridor working swing shifts would be able to use transit to travel home while also ensuring that residents with jobs beginning at 6 a.m. can use transit to travel to work, for example. Adhering to a standardized service span for each frequency category would provide dependable, easy-to-remember operating hours for customers. 60 minute routes do not lend themselves to consistent categorization; service spans for such routes will be determined on a case-by-case basis.

Recognizing the realities of limited funding, some routes may not meet the ideal service spans described above. As funding is available and B/RH of existing first and last trips demonstrates sufficient demand, service may be added in pursuit of the ideal service span.

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<sup>7</sup> Also known as hours of operation.

## 4. Service Reductions Due to Funding Shortfalls

As noted in Sections 1.3 and 3.3, all-day clock face frequencies and long consistent service spans are preferred by the RTC, as both are recognized as being crucial to the nature of the economy in Southern Nevada and to ensure service is as convenient as possible for customers. However, funding shortfalls may require less optimal service to be operated.

When funding is anticipated to be insufficient to continue operating current service levels, RTC will be forced to reduce service using some or all of the following options:

- Frequency decreases within the same frequency category, if capacity permits. For example, a route that operates every 20 minutes Monday-Saturday from 5 a.m. to 9 p.m. could be reduced to every 25 minutes, or could have frequency remain at 20 minutes during weekday afternoon hours but decreased to every 30 minutes during other hours. Preference for frequency decreases would be given to affecting the fewest possible customers and to modest frequency reductions. B/RH would also be considered; a route or time period with a lower B/RH would be more likely to experience a funding-related frequency decrease. However, capacity (as defined by APL in Section 2.3) shall not be exceeded.
- Span of service reductions on very low productivity trips. In this case, individual trip B/RH would be examined for a variety of first trips or last trips of the service day (or overnight hours in the case of 24 hours routes). Early morning, late evening, or overnight trips with very low B/RH could be eliminated.
- Route restructuring or route segment elimination. To reduce costs<sup>8</sup>, a package of routing changes could be assembled to continue providing service to most locations within the analyzed area using fewer resources. For example, increased route branching could be used. Alternatively, if a significant segment of a route is found to be under-performing, it could potentially be eliminated to reduce costs and allow the route to focus on higher-productivity service.
- Any other changes that reduce service hours.

The intention with any such service reductions would be to achieve the necessary budgetary savings while affecting as few customers as possible and/or affecting customers in the least impactful manner. However, some customers will inevitably experience negative impacts from any service reduction.

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<sup>8</sup> Alternatively, route restructuring can also be used to achieve cost-neutral service improvements or to improve service at a lower cost than would otherwise be possible. In such cases, some stops (typically with low ridership) may lose service.