

Service Design Guidelines

October 2021

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Purpose of the Service Design Guidelines

The Utah Transit Authority Service Planning department maintains the Service Design Guidelines with the following goals in mind:

- Provide the best level of service for the riding customer
- Allocate resources equitably across the system based on transit need and market viability
- Provide a decision making framework for Service Planners to employ in response to internal and external requests for service changes
- Provide a defensible, data-driven paradigm for communication of service planning decisions to stakeholders
- Ensure consistent service planning practices are employed throughout the system
- Guarantee that service levels do not fall below acceptable levels over time or in response to internal or external pressures

Given that UTA may not have resources to accomplish all these goals simultaneously, they will at times necessarily be in tension. Navigating this tension depends in large measure on the considered opinion and professional judgment of UTA Service Planners, in collaboration with internal and external stakeholders, local jurisdictions, and UTA Management.

Levels of Service

Bus Rapid Transit (BRT)

Minimum Level of Service:

Sun	Mon - Fri	Sat
	4 AM – 6 AM 30-min service or better	4 AM – 6 AM 30-min service or better
6AM – 9PM 30-min service or better	6 AM – 7 PM 15-min service or better	6 AM – 7 PM 15-min service or better
	7 PM – 12 AM 30-min service or better	7 PM – 12 AM 30-min service or better

Service Characteristics:

Route must conform to the NTD definition of Bus Rapid Transit (RB): *“Fixed-route bus systems that operate at least 50 percent of the service on fixed guideway. These systems also have defined passenger stations, traffic signal priority or preemption, short headway bidirectional services for a substantial part of weekdays and weekend days; low-floor vehicles or level-platform boarding, and separate branding of the service. Agencies typically use off-board fare collection as well. This is often a lower-cost alternative to light rail.”*

To qualify for BRT service:

- Route must be identified as a BRT project in the Regional Transportation Plan
- Route has a people-based Transit Propensity Index (TPI) per mile greater than 300
- Route carries at least 20 Passengers per Hour (PPH) on weekdays and Saturdays and at least 10 Passengers per Hour (PPH) on Sundays

Services that do not meet the requirements for BRT service but include infrastructure improvements and/or levels of service above the Tier 1 minimum level of service will be analyzed as Tier 1 routes.

Tier 1: Frequent All-Day Service

Minimum Level of Service:

Sun	Mon - Fri	Sat
	4 AM – 6 AM 30-min service	4 AM – 6 AM 30-min service
6 AM – 9 PM 30-min service	6 AM – 7 PM 15-min service	6 AM – 7 PM 15-min service
	7 PM – 12 AM 30-min service	7 PM – 12 AM 30-min service

Service Characteristics:

- Standard UTA vehicle
- Premium/Monument bus stop shelters, may have lighting
- Basic UTA bus stop signage
- On-board fare collection
- May have transit signal priority
- May have targeted capital improvements to improve speed and reliability, such as queue jumps and bulb outs

To qualify for Tier 1 service, one of the following conditions must be met:

- Route has a Transit Propensity Index (TPI) per mile greater than 300
- Route carries at least 20 Passengers per Hour (PPH) on weekdays and Saturdays, and at least 10 Passengers per Hour (PPH) on Sundays
- Route is sponsored by a third party to sustain the level of service

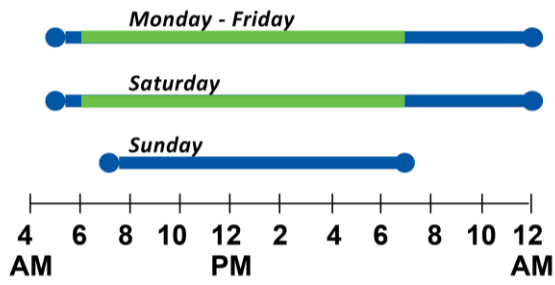
Routes may run above the minimum level of service if system considerations require or productivity levels are met.

Tier 1 routes with sufficient propensity but not productivity will run the minimum level of service and are subject to analysis to determine ways to improve ridership performance.

Changes in TPI and/or PPH due to significant land use, demographic, or other changes in the service area will also be analyzed as part of the Five-Year Service Plan development process to determine if changes to minimum level of service are necessary.

Sponsored routes will run irrespective of TPI and PPH, but UTA may work with sponsors to make adjustments to routes to improve performance.

TIER 1 SERVICE



FREQUENCY

- 15 minutes (or better)
- 30 minutes
- 60 minutes

Tier 2: All-Day Service

Minimum Level of Service:

Sun	Mon - Fri	Sat
	6 AM – 9 PM 30-min service	6 AM – 9 PM 60-min service

Service Characteristics:

- Standard UTA vehicle
- Standard bus stop amenities per Bus Stop Master Plan
- Basic UTA bus stop signage
- On-board fare collection

To qualify for Tier 2 service, one of the following conditions must be met:

- Route has a TPI per mile greater than 200
- Route carries at least 10 PPH on all days
- Route is sponsored by a third party to maintain the level of service

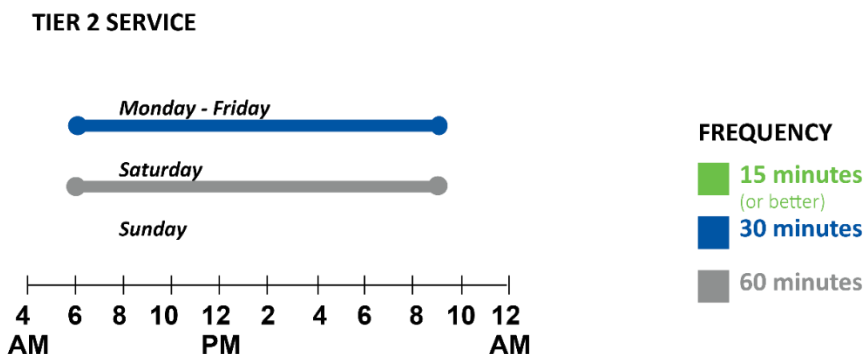
Routes may run above the minimum level of service, including on Sunday, if system considerations require and productivity levels are met.

Routes with sufficient propensity but not productivity will run the minimum level of service and are subject to analysis to determine ways to improve ridership performance.

Tier 2 routes that consistently perform at Tier 1 levels of productivity will be analyzed as part of the Five-Year Service Plan development process to determine the feasibility of increasing minimum level of service.

Changes in TPI due to significant land use, demographic, or other changes in the service area will also be analyzed as part of the Five-Year Service Plan development process to determine if changes to minimum level of service are necessary.

Sponsored routes will run irrespective of TPI and PPH, but UTA may work with sponsors to make adjustments to routes to improve performance.



Tier 3: All-Day Service

Minimum Level of Service:

Sun	Mon - Fri	Sat
	6 AM – 9 PM 60-min service	

Service Characteristics:

- Standard UTA vehicle
- Standard bus stop amenities per Bus Stop Master Plan
- Basic UTA bus stop signage
- On-board fare collection

To qualify for Tier 3 service, one of the following conditions must be met:

- Route has a TPI per mile greater than 100
- Route carries a PPH of 5 or greater:
 - o PPH > 5: Flex Route
 - o PPH > 10: Flex Route or Fixed Route
- Route is sponsored by a third party to maintain the level of service

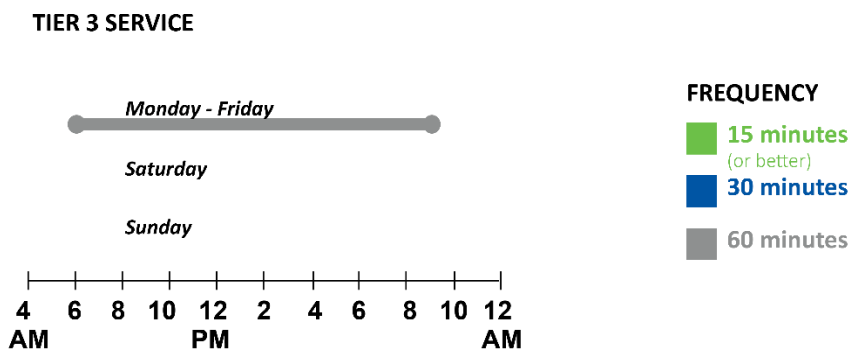
Routes may run above the minimum level of service, including on weekends, if system considerations require and productivity levels are met.

Routes with sufficient propensity but not productivity will run the minimum level of service and are subject to analysis to determine ways to improve ridership performance.

Tier 3 routes that consistently perform at Tier 2 levels of productivity will be analyzed as part of the Five-Year Service Plan development process to determine the feasibility of increasing minimum level of service.

Changes in TPI due to significant land use, demographic, or other changes in the service area will also be analyzed as part of the Five-Year Service Plan development process to determine if changes to minimum level of service are necessary.

Sponsored routes will run irrespective of TPI and PPH, but UTA may work with sponsors to make adjustments to routes to improve performance.



Tier 4: Peak-Hour Service

Minimum Level of Service:

Sun	Mon - Fri	Sat
	6 AM – 9 AM 60-min service	
	3 PM – 6 PM 60-min service	

Peak-Only Service includes the following categories:

- Express bus service
- Employer or school targeted shuttles
- Ski service
- Limited-stop local service that supplements an existing local route on the same corridor

To qualify for Tier 4 service, one of the following conditions must be met:

- Route has a TPI per mile of greater than 100
- Route has a Passenger Miles Traveled (PMT) per mile of 7 or greater
- Route is sponsored by a third party to maintain the level of service

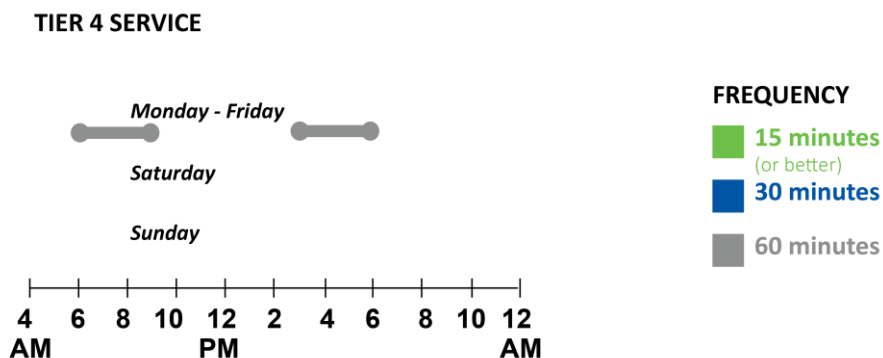
Routes may run above the minimum level of service, including trips outside of peak hours and on weekends, if system considerations require and productivity levels are met.

Routes with sufficient propensity but not productivity will run the minimum level of service and are subject to analysis to determine ways to improve ridership performance.

Tier 4 minimum level of service is determined independently from other tiers; Tier 4 routes are not subject to be upgraded to other tiers unless changes in people-based TPI show that analysis is necessary.

Changes in job-based TPI due to significant land use, demographic, or other changes in the service area will also be analyzed as part of the Five-Year Service Plan development process to determine if changes to minimum level of service are necessary.

Sponsored routes will run irrespective of TPI and PMT/mi, but UTA may work with sponsors to make adjustments to routes to improve performance.



On-Demand Service

Minimum Level of Service:

Sun	Mon - Fri	Sat
	6 AM – 9 PM On-Demand service	

Service Characteristics:

- May be operated by UTA or contractor
- Trips may be scheduled in real time or in advance
- Service between two points within a defined geographical area
- Standard UTA fare—transferable to other modes

NTD defines Demand-Response (DR) as follows: *A transit mode comprised of passenger cars, vans or small buses operating in response to calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick up the passengers and transport them to their destinations. A demand response (DR) operation is characterized by the following:*

a) The vehicles do not operate over a fixed route or on a fixed schedule except, perhaps, on a temporary basis to satisfy a special need, and

b) Typically, the vehicle may be dispatched to pick up several passengers at different pick-up points before taking them to their respective destinations and may even be interrupted en route to these destinations to pick up other passengers. The following types of operations fall under the above definitions provided they are not on a scheduled fixed route basis:

- *Many origins - many destinations*
- *Many origins - one destination*
- *One origin - many destinations, and*
- *One origin - one destination.*

Currently there is no minimum requirement for On-Demand service. During work with a contractor to model On-Demand service throughout UTA’s service area, On-Demand service areas were prioritized based on passenger efficiency, increases to covered populations, and strategic importance; several of these areas were incorporated into UTA’s Five-Year Service Plan in 2021. As UTA works to implement the Five-Year Service Plan, establishing propensity and performance metrics will be an important part of ensuring the success of On-Demand services.

Other Service

Areas that do not have sufficient TPI, productivity, or sponsorship to qualify for any of the above tiers of service will not be served by fixed-route or flex-route transit. UTA will work with local communities and stakeholders to implement other mobility solutions. Other mobility solutions include (but are not limited to):

- UTA Vanpool and/or Ride Van Plus
- Partnership with Transportation Network Company (TNC)
- Employer-sponsored shuttles
- Transportation Management Associations

Service Standards

Vehicle Loads

Bus:

- For Bus Rapid Transit and peak only service, the median maximum load on a trip should not exceed the vehicle seating capacity.
- For other fixed-route bus services and commuter rail, the median maximum load on a trip should not exceed 150% of seating capacity.

Light Rail:

- Average weekly loads on regularly scheduled trips should not exceed 100% of the seating capacity. If the loads regularly exceed capacity, then vehicles will be added to the consist until the maximum consist size is reached. Thereafter loads should not exceed 150% of seating capacity.

Vehicle Headways

Commuter Rail:

- The average number of minutes between regional commuter trains should not exceed 60 minutes.

Light Rail:

- The average number of minutes between light rail trains should not exceed 20 minutes.

Bus:

UTA's Service Design Guidelines identify four tiers or minimum levels of bus service. Route alignments and level of service are based on current or modeled productivity, the propensity of the alignment for transit use, as well as service design guidelines for route spacing, route directness, and stop spacing.

The Transit Propensity Index (TPI) is calculated based on a combination of factors – minority population density, transit supportive population density, job density, intersection density, higher-education student density, intersection density, and zero-car household density.

Operational Performance

On-Time Performance

Commuter Rail, Light Rail, and Fixed-Route Bus:

- On-time is defined as departing stops or stations 0 seconds early and less than 5 minutes late.

Flex Routes:

- On-time is defined as departing stops 0 seconds early and less than 15 minutes late.

Paratransit:

- On-time is defined as at least 90% of customers picked up within 10 minutes before to 20 minutes after the stated pick-up time and 90% of customers dropped off within 30 minutes of any stated appointment time.

UTA regularly evaluates the on-time performance of all services. It is anticipated that Operations Planners will make targeted adjustments to schedules to improve on-time performance as part of the normal course of business. These changes typically do not affect the service plan. Changes to any route to improve on-time performance will be considered as part of the Five-Year Service Plan development process when:

- The on-time performance for the whole route is consistently below 88%
- Running time adjustments to individual trips are so large that they disrupt the cycle time of the whole route

Other Operational Performance Metrics

In addition to on-time reliability, UTA tracks other operational performance metrics such as Miles per Service Interruption and Avoidable Accidents. Performance in these metrics is not typically affected by the design of the service; however, in special cases UTA may evaluate whether changes to the service plan are necessary to improve operational performance without negatively impacting the riding customer.

Route Spacing

Recommended route spacing for fixed and flex routes in the UTA system is as follows:

Environment	Route Spacing
Central Business District	1/8 mile to 1/4 mile
Urban	1/4 mile to 1/2 mile
Suburban	1/2 mile to 1 mile
Rural	(as needed based on surrounding development and activities)

Within UTA's service area, Central Business District refers to downtown Salt Lake City.

Exceptions to route spacing guidelines may be justified to accommodate street grid patterns and/or preserve access to major destinations. Where routes converge on a major destination or transfer point, a small amount of duplication may be necessary.

Bus Route Directness and Deviations

In general, UTA will prioritize direct routing versus deviated routing based on the number of riders impacted. Rider impacts are characterized as follows:

- 1) Impacts to *through riders*, or riders who board the bus before the deviation and alight after the deviation;
- 2) Impacts to *deviation riders*, or riders who board and/or alight at stops within the deviation.

If the number of through riders is greater than the number of deviation riders, UTA will provide bus stops on the main corridor and not serve the deviation. If the number of deviation riders is greater, UTA will provide bus stops in the deviation area if safe and operationally feasible.

Safety and operational feasibility concerns include:

- Turn radii
- Right-of-way availability for ADA-compliant bus stops
- Sight distances
- Lane width
- Road composition
- Unprotected or uncontrolled left turns
- Impacts to layover and cycle time from increased travel time
- Avoidance of parking lots and other off-street spaces

In areas where a deviation is proposed to serve a new development, UTA will assume a 2% mode share based on the number of new potential transit users (i.e. 1,000 new students/employees/residents = 20 new riders/day).

Bus Stop Placement and Spacing

Bus stop placement and spacing is undertaken with the following goals in mind:

- Provide the safest, most pleasant waiting and boarding experience possible for riders
- Provide optimal access to destinations and neighborhoods along the route
- Optimize travel time on the route by preventing excessive stopping and dwell

Because these goals often come into conflict, the exact placement of bus stops along a route is dependent in large measure on the considered opinion and professional judgment of the service planners, with input from UTA Operations, local jurisdictions, and property owners.

In areas with safe crossings, good points of access, and transit supportive land uses, bus stops will generally be no closer than 1/8-mile (660 feet) and no further apart than 1/3-mile (1760 feet) where operationally feasible. Targeted services (Tier 4) will generally stop only at points necessary to provide the service, independent of these guidelines.

Safe crossings include the following:

- Signalized, marked, and/or grade-separated crossings (such as traffic lights, crosswalks, and pedestrian bridges)
- For locations without a signalized, marked, and/or grade-separated crossing:
 - o Roads with a cross-section of three lanes (one travel lane in each direction and a center turn lane) or fewer and a speed limit 35 mph or less

- Appropriate traffic volumes for pedestrians to safely cross, in agreement with applicable jurisdictions

Roads with a cross section of four lanes or more and/or a speed limit of 40 mph or greater should only have stops at signalized, marked, and/or grade-separated crossings. UTA will work with cities and other local jurisdictions to establish safe crossings at good points of access along transit corridors as warranted.

Good points of access include the following:

- Sidewalk access from trip origin to bus stop
- Pedestrian-oriented, connected street network
- Permeable pedestrian access to neighborhoods or apartment complexes

Transit-supportive land uses include the following:

- Schools and universities
- Hospitals and clinics
- Human service providers
- Higher-density, mixed-use, walkable development

Note that having safe crossings, good points of access, or transit supportive land uses does not guarantee that a bus route or stop will be located adjacent to a given facility, only that such locations are where bus stops could be located if needed.

UTA may preserve existing stops that do not meet these guidelines in order to preserve service to existing markets, but will not improve these stops until the conditions in this guideline are met.

On-Demand Service Points

When UTA On Demand service is implemented in an area that was previously served by fixed-route bus or flex bus service, UTA may elect to retain select stops as on-demand service points, provided the following conditions are met:

- The stop is accessible per ADA
- There is a no-parking zone at the stop
- The stop serves a transit-supportive land use as defined in the previous section.

Stops that do not serve a particular destination will not generally be considered for on-demand service points, as the current service model for UTA On Demand involves the use of virtual stops for general coverage purposes.

If fixed bus or flex bus service is introduced in an area served by UTA On Demand, existing on-demand service points may be converted to fixed stops, or retained as on-demand service points if the new route does not serve the service point location or the service point location is not operationally feasible. If on-demand service is discontinued in an area and other service is not implemented, on-demand service points will also be discontinued.

Requests for stop improvements to on-demand service points will be considered on a case-by-case basis. UTA generally will not seek to improve locations that were not previously fixed stops meeting the conditions listed above.

Stop Amenities Distribution

UTA is responsible for establishing a policy for how transit amenities are added to the system and ensuring the equitable distribution of amenities throughout the service area. "Transit amenities" refer to items of comfort, convenience, and safety that are available to the general riding public. They include, but are not limited to items such as seating, shelters, canopies, provisional information, escalators, elevators, and waste receptacles. Additionally, UTA is making efforts to upgrade existing stops to the Americans with Disabilities Act (ADA) standards.

In accordance with this requirement, UTA has developed a master plan outlining all of the criteria involved in prioritizing which stops will receive improvements, what improvements are warranted based on use, and outlines construction specs for improvements. The Bus Stop Master Plan outlines and encourages partnerships with local government and property owners to improve the accessibility, comfort, and convenience of the riding public.

The creation of this document required an extensive inventory of all of UTA's 6,055 bus stops, standardizing the specifications by which all stops would be improved and updating UTA's decision making matrix for prioritizing what amenities will be added to a stop.

When prioritizing bus stop improvements, UTA may apply prioritization criteria to individual stops or to key corridors with large numbers of stops to be improved. In cases where it is necessary for UTA to obtain property to implement the desired level of improvement, a stop may be temporarily improved to Level I in order to achieve ADA compliance while property acquisition processes play out; the stop will be improved to the desired level of improvement once the property is obtained.

For more information on stop amenities, please refer to the Bus Stop Master Plan.

Operator Working Conditions

Restrooms

Article 44 of the 2019-2022 Collective Bargaining Agreement between UTA and the Amalgamated Transit Union (ATU) contains the following language pertinent to the service plan: *“UTA will endeavor to design routes with a UTA approved restroom located at EOL locations, and include adequate recover time during the EOL. If designated routes have 60 continuous minutes of driving time before reaching a scheduled EOL/Recovery location, UTA will endeavor to include reasonable time for restroom stops in the route.”*

In agreement with this language, the availability of operator restrooms is considered a key input in the determination of route alignments. UTA Service Planning will coordinate with UTA’s Capital Projects department to design, fund, and construct additional restroom facilities where needed to facilitate desired route alignments. In cases where a local jurisdiction or other sponsor desires a specific route alignment, UTA may work with the sponsor to design, fund, and construct additional restroom facilities.

Per agreement with UTA’s Labor Relations group, to allow proper spacing of restroom breaks for operators, routes with cycle times longer than three hours will generally not be considered. Service Planners will work with Operations Planners to determine the optimal cycle times that provide adequate layover/recovery time to allow operators to use restroom facilities.

Straight and Split Shifts

Straight shifts for operators consist of a single piece of work, generally near 8 or 10 hours in length; while *split shifts* are composed of two or more pieces of work that together equal the length of a single straight piece with time gaps in between. In UTA’s experience, straight shifts are associated with a higher quality of life and are generally preferred by operators.

Maximizing the number of straight shifts for operators is associated with higher job satisfaction, less turnover, and increased ability for professional development. Lower turnover in turn decreases the costs associated with hiring and training new operators, and decreases the number of avoidable collisions, off-routes, and on-time reliability violations typically associated with new operators.

Creating blocks and runs is the responsibility of the Operations Planners at UTA. However, previous collaboration between Service and Operations Planning has shown that the service plan can influence the Operations Planners’ ability to maximize straight shifts. The Tiers of Service outlined in this document represent the current best practice for creating headways and spans of service to create the largest amount of straight shifts.

In general, UTA Service Planning will treat these Tiers of Service as minima, and not perform individual trip cuts due to low ridership, as these tend to create “orphan” trips or blocks that negatively impact operating efficiencies and lead to unnecessary split shifts. Ridership performance and passenger efficiency will be analyzed at the route level as part of the Five-Year Service Plan development process. If there are concerns about a particular route, the decision will be considered to move the entire route to a different tier of service rather than make trip-level adjustments.

Vehicle Assignment

The guidelines that UTA uses in assigning vehicles to routes are as follows. The quantity of buses in each Business Unit is determined by the demand, which is the peak pull-out for the calendar year. The Operations Planners from each Service Unit generate information regarding routes and schedules that is cut into runs and blocks for Operators to work. This information is shared with the respective Service Units' Maintenance Departments. Buses are assigned within a service area according to the characteristics of the service, such as canyon, commuter express, shuttle or regular transit bus service, passenger loads, and topography of the service area. Specially equipped canyon buses have different specifications than buses that operate in regular transit service in the valley.

Each Maintenance Department determines vehicle assignment based on criteria stipulated by the planners and operational characteristics as to what type of equipment is required for each route or schedule. The vehicle type that can accommodate the runs and blocks is entered into the Fleet Control Sign-out database software program. Also, the status of buses that are out for repair, body work, or temporarily out of service is updated in the database.

Vehicles are assigned on a daily basis through a Sign-out Sheet. All-day blocks (runs that are out around 16 hours or more) are typically assigned the same type of bus each day. Any remaining buses are assigned to tripper blocks (buses sent out during overloads or blocks that are less than 8 hours in duration). Once the sign-out sheet is generated, the sign-out is sent to Operations Dispatch for Operator assignment.