2. SERVICE OPERATIONS GUIDELINES

The Transitway Guidelines are important to frame the region's expectations for service levels during the development phase of a transitway project, to ensure that transitway service meets the greatest number of travel demands in a corridor in a cost-effective manner, and to provide consistent service design across transitways. The service operations guidelines are summarized in Table 2-1. These guidelines should be considered collectively when making service operation decisions for transitways.

2.1. SERVICE AND NETWORK DESIGN DEFINITIONS

Transitway travel time, access, service frequency and span, and reliability make transitway service attractive. Based on these factors, transitway service can be categorized into one of two groups: all-day frequent service or commuter express service. Within these categories, there are five transitway service types defined in Table 2-1 and the remaining Service Operations Guidelines (and some guidelines in other topic areas) specify the expectations for these service types. The five transitway service types are:

- **Arterial BRT (all-day frequent service)**
- **Highway BRT station-to-station (all-day frequent service)**
- **Highway BRT express (commuter express service coordinated with Highway BRT station-to-station service)**
- **LRT (all-day frequent service)**
- **Commuter Rail (commuter express service)**

The primary objective of service operations on a transitway is to be fast and reliable. There are two types of transitways: frequent service operates bi-directionally all day; commuter express service primarily operates in the peak travel direction during peak periods. Transitways have four dimensions of convenience (speed, reliability, availability/frequency and access) that each play an important role in how a transitway functions. Differences in speed and access between transitway modes are the result of the service and network design and strongly impact service operations. Speed is determined by transit advantages such as runningway and technology, fare collection and station spacing. Access is also defined by station spacing. Various transitway modes trade-off varying levels of speed, frequency, and access, but the reliability of a transitway is a constant that cannot be compromised. Speed, frequency, and access need to be coordinated or balanced within the "family of transit services" in a corridor.

Table 2-1 includes service and network design definitions for the various transitway services. These services are defined as follows:

- Arterial BRT service is defined as a single route within a coordinated corridor defined by neighborhood scale infrastructure. It provides service 7 days a week, 16 hours a day, and at least every 10 minutes during peak periods with lower frequencies during mid-day, evenings, and weekends.

- Highway BRT station-to-station service is defined as a coordinated set of routes that stop at all or most stations in the Highway BRT corridor, which is defined by stations and runningway infrastructure. It provides service 7 days a week, 16 hours a day, and at least every 10 minutes during peak periods with lower frequencies during mid-day and evenings. Weekend frequency is based on demand.
- Highway BRT express service is defined as express routes coordinated with station-to-station service, using at least one corridor station, the Highway BRT runningway and park-and- ride facilities. It provides at least 30-minute service during the peak periods in Transit Market Areas 1 and 2 (from the Transportation Policy Plan, Chapter 7) with at least three peak period trips in Transit Market Areas 3 and 4.
- LRT service is defined as a single route with stations, track, and infrastructure. It provides service 7 days a week, 18 hours a day, and at least every 10 minutes during peak periods with lower frequencies during mid-day, evenings, and weekends.
- Commuter Rail service is defined as a single route with associated stations, track (typically owned by others), and infrastructure. It provides at least 30-minute peak period service.

These definitions are meant to help frame the understanding of which services are and are not included in the transitway and the subsequent guideline discussions. For instance, an express bus route that is not coordinated with station-to-station service but runs in a BRT corridor would not be a Highway BRT express service and should operate within other guidelines established for standard express service in the region.

2.2. ROUTE STRUCTURE

The structure of routes in a transitway is important to allow for both service planning flexibility and customer convenience and plays an important role in overall service delivery. Appropriate transitway services include the trunk and branch portions of the transitway, as long as all segments meet the guidelines for service frequency, span, facilities, and runningway. Local tails are strongly discouraged on all bus transitway services except Highway BRT express.

A transitway route has several components. The *trunk* is the segment of the transit route served by all trips on that route. A *branch* is a segment of the transit route that is served by some, but not all, trips on that route. Branches are forks in the main trunk of the route. A *tail* is that portion of an express route where the bus operates as a local route segment traveling through neighborhoods with frequent local stops. LRT and Commuter Rail never have branches or tails because trains cannot turn off the rail corridor onto local streets. The trunk portion of a transitway offers the highest frequency of service with stations and a runningway that meet transitway minimums. The frequency of service on route branches must satisfy transitway minimums, but route branches do not necessarily have to meet the same level of service as the trunk portion. Local tails through neighborhoods are strongly discouraged on transitway services except Highway BRT express. Local tails should not be identified as BRT service since the service characteristics and facilities would not meet the minimum requirements for a premium service.

2.3. COORDINATION OF TRANSIT SERVICE

It is important to coordinate transfers between transit services to increase accessibility and improve the function of the transit network. In all instances, transitway operations should work together with connecting local services at stations. In transitways where different service types operate in conjunction with each other, these services should be coordinated to facilitate convenient and reliable transfers.

To allow for reliable connections, the waiting time between a transitway and a route that is designed to make a connection should be five to 15 minutes.

In order for a connection to be a priority, a significant portion of riders should be making the transfer.

Transitways need to be coordinated with other services sharing the same right-of-way. For example, Commuter Rail schedules need to mesh with freight and Amtrak or other passenger rail, and the trip times for Highway BRT station-to-station service must be planned in conjunction with Highway BRT express and other express service at common stops. In addition, it is important to coordinate different local tails on Highway BRT express.

The relationship between Arterial BRT and local service can vary depending on the individual corridor. In some cases, Arterial BRT functions as an overlay to the local service, with Arterial BRT serving as the primary service and the local service playing a supporting role. In other areas, Arterial BRT may completely replace local service, depending on the bus stop spacing and route geography. Investments made in runningway or amenities for an Arterial BRT service will also benefit local services.

2.4. COMPLEMENTARY AND COMPETING ROUTES

Transitway service planners should identify existing or planned transit routes that compete with transitway service and consider consolidation.

Transitways offer higher travel speeds but fewer access points than local service. Whether an existing route is duplicative or an enhancement depends on the travel patterns in the transitway corridor. A complementary route can serve the same *locations* as the transitway but has a significant difference in travel time, frequency, and/or accessibility. However, a competing route serves the same *market* as the transitway and has no significant difference in travel time, frequency, and/or accessibility. For example, in the Central Corridor transitway, the planned LRT service competes against existing Route 50 limited stop service, but the existing Route 94 express service is complementary because the travel time between downtown Minneapolis and downtown St Paul is much faster and there is only one stop in between the downtowns. A transitway project that does not offer a significant improvement in travel time compared to the existing service should be reconsidered.

2.5. MINIMUM FREQUENCY

Minimum frequency thresholds are meant to establish a consistent service expectation regarding how often the service operates for customers throughout the transitway network. Transitway service frequencies should consistently meet minimum thresholds identified in Table 2-1 to allow customers to establish and maintain service frequency expectations for each type of service.

Frequency refers to the average frequency of service in a corridor for all routes and relates to the amount of time a passenger must wait for the next vehicle trip. Frequencies typically vary for peak periods, mid-day (weekday and weekend), and evening (weekday and weekend). The service frequency guidelines are based on existing services in the region, federal Small Starts and Very Small Starts requirements, and research from other transit systems. The frequency guidelines for Arterial BRT and LRT are consistent with Metro Transit's Hi-Frequency Network standards. These standards help emphasize the "use without a schedule" concept that allows a level of confidence for the transit rider that the wait for the next bus/train will not be significant.

It is important to understand that frequency guidelines on Highway BRT station-to-station and Arterial BRT can be achieved by combining the frequencies of coordinated routes on a mainline trunk. For example, the Arterial BRT guideline of 10-minute service during peak periods can be satisfied either by an Arterial BRT route that operates every 10 minutes or by a combination of 20-minute local and 20-minute Arterial BRT services that results in a combined 10-minute frequency at Arterial BRT stations. The Highway BRT station-to-station peak guideline is 10-minutes combined service and the off-peak guideline is 15-minute combined service.

The minimum frequency guidelines outlined in Table 2-1 refer to the average time between trips, which may not be evenly spaced. For example, service on a 10-minute frequency would provide six trips within an hour. Service planning should strive to achieve a balanced frequency with combined services, when possible. Service levels on the fringe of a time period may differ slightly from the guideline. These guidelines apply primarily to the peak direction of service. The availability of reverse commute service depends on market demand and is not included in these guidelines.

2.6. MINIMUM SPAN OF SERVICE

Minimum span of service thresholds establishes a consistent service expectation regarding the days of the week and hours of the day service is available for customers throughout the transitway network. Transitway service span should consistently meet minimum thresholds identified in Table 2-1 to allow customers to establish and maintain expectations for the days and hours of operation for each type of service.

Span of service refers to the length of time service is provided including the number of hours per day and the number of days per week. The guidelines for minimum span of service are based on existing services in the region, federal Small Starts and Very Small Starts requirements, and research from other transit systems. The span of service guidelines for Arterial BRT, Highway BRT, and LRT are consistent with Metro Transit's Hi-Frequency Network standards.

The Transitway Guidelines recommend that Arterial BRT, Highway BRT, and LRT should operate seven days a week. Weekend service on Highway BRT express and Commuter Rail depends on market demand and availability of local service in the same general corridor. The Transitway Guidelines in Table 2-1 are minimum levels of service. Ridership, passenger loading standards, and service connectivity will help determine span above minimum levels of service.

2.7. TRAVEL TIME

Transitway travel times should be competitive with travel times for pedestrian, bicycle, auto, local bus, and/or express bus modes, depending on the travel markets served. Travel times should at least meet thresholds identified in Table 2-1.

Transitway projects in the planning phases that do not offer a significant improvement in travel time compared to existing service in the corridor should be reconsidered. For new transit markets, the primary comparison mode should be auto travel times, but comparable local routes in other corridors could also be used to determine travel time competitiveness for frequent, all-day service options. For existing express markets, existing transit travel times should be the primary comparison mode.

One of the main attractions for transitway service is faster average travel time, in comparison to traditional local and express buses. Research of other BRT systems in the U.S. found that the average travel time for BRT service was 18 percent faster than on local service operating in the BRT corridor *after* implementation of BRT. The same research found that the average travel time for BRT was 24 percent faster than the local service operating in the corridor *before* BRT was implemented.

All forms of transit compete against the single-occupant vehicle (SOV). All transit service should have a competitive travel time but transitways need to be even more competitive. Appendix G of the Transportation Policy Plan includes travel time competitiveness guidelines for local and express bus. It states that local bus travel time should not exceed 2.0 times average auto time, while express bus travel time should not exceed 1.35 times average auto time. Service planners should use these guidelines as benchmarks to measure travel time on transitways.

2.8. AVERAGE PRODUCTIVITY

Transitway average productivity should be identified during service planning and design and monitored during operation. It should meet or exceed minimum thresholds identified in Table 2-1 to ensure each line's level of service is appropriately matched to the demand of the travel market(s).

Productivity, or the number of passengers served per hour, is an indicator of how effectively a transitway is performing. Appendix G of the Transportation Policy Plan includes an average and a minimum guideline for LRT and regular bus service. The minimum productivity is intended to be a general guideline but individual hours will not be held rigidly to it. Average productivity thresholds are 20 passengers per in-service hour for Arterial BRT, Highway BRT, and Highway BRT express bus. Average productivity thresholds are 70 passengers per hour for LRT and Commuter Rail (see Table 2.1).

2.9. MAXIMUM ACCEPTABLE LOADING PER TRANSITWAY VEHICLE

Transitway service plans should be designed to limit the number of standees to the maximum thresholds identified in Table 2-1, if any, for any time during daily operations.

Maximum acceptable loading guidelines outline a desired range of passengers per vehicle and an acceptable amount of standees. These guidelines help determine whether a bus or train is overloaded and if an appropriate level of frequency is being provided on a transitway. Appendix G of the Transportation Policy Plan includes load standards during peak and off-peak times for express bus, local bus, and LRT by transit market area.

Because loading standards are based on the number of seats, a higher load factor may be acceptable for Arterial BRT and Highway BRT station-to-station than shown in Table 2-1 if the transitway vehicles are not designed to maximize seating capacity. Commuter transitway modes, such as Highway BRT express and Commuter Rail should not have passengers standing due to the long average trip length or traveling conditions. Commuter Rail can have a 200 percent loading guideline for special events.

2.10.TRANSITWAY MARKET AREAS

Transitway service types should be appropriately matched to transit market demand areas established in the Transportation Policy Plan and listed by mode in Table 2-1.

The TPP outlines the types of local and express services appropriate for the various Transit Market Areas in the region. The most recent Transit Market Areas can be found in the Chapter 7 of the Transportation Policy Plan and a more thorough explanation can be found in Appendix G of the Transportation Policy Plan. Using local bus as the benchmark, the same guideline for Arterial BRT, Highway BRT station-to-station, and LRT is recommended: these services are appropriate for market areas 1, 2, and 3. Highway BRT express is similar to express service in terms of market-area characteristics. Highway BRT express is best suited for market areas 2, 3, and 4. Non-downtown Commuter Rail stations are generally only appropriate in market areas 3, 4, and 5 per Chapter 3. Station Spacing and Siting Guidelines, but a market-area specific analysis may be done to justify the viability of a station within market area 2

Table 2-1 – Service Operations Transitway Guidelines

	Local Service (Benchmark)	All-Day Frequent Service			Express Service (Benchmark)	Commuter Express Service	
	Local Bus/Limited Stop	Arterial Bus-Rapid Transit (BRT)	Highway Bus-Rapid Transit (BRT) Station-to-Station	LRT	Express Bus	Highway Bus-Rapid Transit (BRT) Express	Commuter Rail
2.1. Service definition and network design	A single route defined by frequent stops (1/8-1/4 mile) and basic infrastructure	A single route within a coordinated corridor defined by neighborhood-scale infrastructure	A coordinated set of routes that stop at all or most stations in the Highway BRT corridor and all associated stations and runningway infrastructure	A single route and all associated stations, track and infrastructure	A single route with transit advantages	Express routes coordinated with station-to-station service, using at least one corridor station, runningway, and park-and-rides	A single route and all associated stations and infrastructure
2.2. Route Structure	Branches and short lines are acceptable and are an important part of the route structure.	Short lines are acceptable. Branches are acceptable if each branch meets all Arterial BRT guidelines. Tails operating as local service through neighborhoods are strongly discouraged.	Branches and short lines are acceptable. Local tails are discouraged.	Short lines are acceptable. Branches are unlikely but could be acceptable if justified by ridership.	Short lines, branches, and local tails are acceptable.	Short lines, branches, and local tails are acceptable.	Short lines are acceptable. Branches are most likely the result of two rail lines sharing a common section.
2.3. Transit Services Coordination	Transfers with connecting services	Coordination with local service in the same right-of-way; transfers with connecting services	Coordination with express bus in same highway corridor; transfers with connecting services	Coordination with other rail services in corridor; transfers with connecting services	Transfers with connecting services and local tails	Coordination with station-to-station in same highway corridor; transfers with connecting services and local tails	Coordination with other rail services; transfers with connecting services
2.5. Minimum Frequency[4]	Varies by transit market area served and route type	*WEEKDAY* Combined frequency for the station-to station and local services should be 10-min. peak period, 15-min. midday/evening, 30- to 60-min. early/late *WEEKEND* Combined frequency for the station-to-station and local services should be15-min. day/evening, 30- to 60-min. early/late	*WEEKDAY* Combined frequency for the station-to-station and express services should be 10-min. peak period and 15-min. midday[1] *WEEKEND* Frequency based on demand	*WEEKDAY* 10-min. peak period, 15-min. midday/evening, 30- to 60-min. early/late *WEEKEND* 15-min. day/evening, 30- to 60-min. early/late	30-min. in transit market areas 1 and 2. 3 trips each peak period in transit market areas 3 and 4	30-min. in transit market areas 1 and 2. 3 trips each peak period in transit market areas 3 and 4	30-min. peak period. Off-peak frequency to be determined as needed.
2.6. Minimum Span of Service	Varies by transit market area served and route type	7 days a week, 16 hours a day	7 days a week, 16 hours a day	7 days a week, 18 hours a day			Weekdays, 5 trips each peak period
2.7. Travel Time	Baseline	Should be at least 20% faster than local bus	Should be at least 20% faster than local bus	Should be at least 20% faster than local bus	Not more than 35% slower than auto	Not more than 35% slower than auto.	Not more than 35% slower than auto; Competitive with express bus.
2.8. Average Productivity	20 passengers per in-service hour	20 passengers per in-service hour	20 passengers per in-service hour	70 passengers per in-service hour	20 passengers per in-service hour	20 passengers per in-service hour	70 passengers per in-service hour
2.9. Maximum Loading Guidelines[2]	Peak Period 125% Off-Peak 100%	Peak Period 125% Off-Peak 100%	Peak Period 125% Off-Peak 100%	200% Peak Period and Off-Peak	100% Peak Period and Off-Peak	100% Peak Period and Off-Peak	100% Peak Period and Off-Peak 200% Special Events
2.10. Market Area	1,2,3	1,2,3	1,2,3	1,2,3	2,3,4	2,3,4	3,4,5[3]

Competing Routes

Transitways offer higher travel speeds but fewer access points. Therefore, routes that serve the same locations but have significant differences in travel time, frequency, or accessibility may be complementary to a transitway, depending on a corridor's travel patterns. Other routes serving the same market as the transitway in the same manner are considered to be competing routes and should be considered for consolidation. A transitway project that does not offer a significant improvement in travel time compared to the existing service should be reconsidered.

1 These frequencies apply only to the combined frequency of coordinated routes on the mainline trunk portion of the transitway.

2 Loading guidelines are based on a standard vehicle design maximized for seating capacity. Higher load factors may be acceptable if vehicles are specifically designed to have a higher ratio of standees to seats.

3 A market-area specific analysis may be done to justify the viability of a commuter rail station within market area 2.

4 Frequency is expressed as the number of trips per hour and the trips may not necessarily be evenly spaced. Peak period is the 1 to 3 hour period of highest ridership in the AM and PM. Midday is 9:00am-3:00pm. Evening is 6:30pm-9:00pm. Early is 5:00am-6:00am and Late is 9:00pm-1:30am. Service levels on the fringe of these periods may differ slightly from the standard. These guidelines apply primarily to the peak direction of service; the availability of reverse commute service depends on market demand.

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