Long Range Transit Plan

Appendix II

Community Transit Service Guidelines

Snohomish County, Washington

Final March 3, 2011

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Section 1 - Introduction

Why Guidelines?

This technical memorandum is one part of Community Transit's development of a long range plan that will guide and direct agency activities through the year 2030. The project's objectives are intended to allow the delivery of transit services that:

- Enable more people in Snohomish County to "Think Transit First"
- Are efficient and sustainable
- Increase transit mode share
- Provide equitable and just transportation options to a diverse traveling public
- Integrate with other local and regional transit services

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

This report leans heavily on two sources, "*The Transit Capacity and Quality of Service Manual,"* (TCQSM) and ***"****A Guidebook for Developing a Transit Performance-Measurement System."* Both are described in Section 9, the References portion of this report.

Project Description

This report serves as a summary of the proposed service guidelines that have been developed as part of a joint effort between Community Transit staff members and their consultant team. Throughout, it uses two terms:

- A ***measure*** is a basis for comparison; a reference point against which other factors can be evaluated. For this project, an example measure would be the population or employment density along a bus route.
- A ***guideline*** is defined as a recommendation that leads or directs a course of action to achieve a certain goal. An example guideline might be that, to be successful, bus rapid transit routes will need a combination of employment and residents totaling at least 30 persons per acre within ½ mile of the service. Transit operators' approaches to the design and application of guidelines vary depending upon local conditions and expectations. Community Transit will most benefit from a set of guidelines that outline goals for the design and operation of fixed route bus services.

Section 2 - Community Transit's Adopted Performance Measures

This plan builds on the measures being used as system performance indicators, which are outlined in Section 3 of the *2008-13 Transit Development Plan.* That plan's goals are to increase ridership, improve customer satisfaction and be effective stewards of public funds. The following action items are provided to measure progress toward reaching these goals:

- Increase annual system-wide boardings on Bus, DART paratransit, and Vanpool to 13 million by the year 2012.
- Measure annual boardings per capita in the PBTA and track the trend over time.
- Annually measure system-wide boardings per revenue hour, and track the trend over time.
- Annually measure customer commendations per 100,000 boardings and track the trend over time.
- Annually measure customer complaints per 100,000 boardings and track the trend over time.
- Annually measure the voluntary employee turnover and track the trend over time.
- Annually measure fully allocated costs per passenger mile traveled on Community Transit Services, and track the changes over time.
- Annually measure the fully-allocated costs per revenue hour of service provided, and track changes over time. Provide analysis of cost areas that can be controlled by Community Transit (e.g. non-fuel expenses).
- Annually measure the proportion of operating costs supported by fare revenues, and track changes over time relative to Community Transit Board goals for farebox cost recovery.

In addition, nine measures, listed below, are identified in that document:

Table 1
Summary of TDP Goals & Measures

Measure	Baseline (2006)	Definition of Success
Goal: Customer Satisfaction and Ridership Growth		
Boardings per Capita	21.1	Increase over Baseline
Boardings per Revenue Hour	15.2	Increase over Baseline
Customer Commendations per 100,000 Boardings	2.6	Increase over Baseline
Customer Complaints per 100,000 Boardings	31.0	Decrease over Baseline
Voluntary Employee Turnover	0.06	Decrease over Baseline
Goal: Good Stewards of Public Funds		
Cost per Passenger Mile	$0.75	Decrease over Baseline
Cost per Revenue Hour (adjusted for inflation)	$142	Decrease over Baseline
Farebox Recovery	17%	Movement towards 20% goal
Revenue Hour per Employee	1.069	Increase over Baseline

All these goals exclude Sound Transit services operated by Community Transit

All these measures are designed to move Community Transit towards the larger BHAG (Big, Hairy, Audacious Goal) of 'Think Transit First.' While each is appropriate to system-wide reviews, most are less applicable to the operation of individual routes. Accordingly, route-level measures vary from the system-wide criteria but are intended to facilitate their accomplishment.

Section 3 - Community Transit Service Classifications

Recognizing the huge impacts that local development practices have on the ultimate success of transit services, Community Transit is closely coordinating with local jurisdictions to ensure that core services are planned in areas where the most intensive development will take place. In turn, the Service Guidelines are designed to follow the Service Classifications that were developed earlier in this project and link transit service levels to the form of the communities being served. The Service Classifications are broken into three main categories - Core Services, Community Based Services, and Specialized Commuter Services.

- **Core Services --** routes that form the structural framework of Community Transit's network of services. They are frequent, all-day, bi-directional services focused on transit emphasis corridors that link centers. These core services are divided into Bus Rapid Transit and Corridor Services.
- **Community-based Services** -- connect two or more urban, suburban, or rural activity centers, normally separate jurisdictions. They may operate outside transit emphasis corridors and at lower service levels than core services. Community-based services must connect with the core service network.
- **Specialized Commuter Services** -- are designed to provide fast and convenient transportation to/from major employment sites throughout the Puget Sound region.

It is important to note that the Service Classifications and Guidelines address bus services only. Community Transit also operates vanpool and DART paratransit services – important transportation options for many residents in our service area. Policies and plans related to these non-bus services are discussed elsewhere in the Long Range Transit Plan and in other agency plans.

The following section describes each of the bus service classifications, their design orientation, and the operating parameters that are applied to each. Subsequent sections discuss the derivation of operating parameters associated with each.

Core Services

Bus Rapid Transit (BRT) Routes

These are Community Transit's most frequent and highest quality services, with service levels that compare with light rail transit. BRT services are intended to provide frequent, fast and reliable transportation with average speeds and travel times that compare favorably with private autos. BRT serves dedicated stations with large, branded shelters, raised platforms, off-board fare collection and real-time electronic customer information. Stations are spaced at approximately one mile intervals along the route. Generally, BRT will operate in tandem with other corridor based services that provide shorter stop spacing and better neighborhood access than the higher-level BRT they supplement. BRT routes will generally operate along a transit emphasis corridor. In order to achieve the travel time savings needed to compete with private autos, transit priority treatments are an essential element of all BRT services.

Bus Rapid Transit (BRT)	
Measure	**Guideline**
Regional Policy Framework	
PSRC ServiceTypology (Transportation 2040 plan)	Core
System/Network Context	Ultimate Corridor Buildout
Growth Management	Only available within UGA
Travel Time (door-to-door)	No more than 30% greater than auto drive time
Service Design	
Frequency (headway) Peak/Off-Peak	5-10 min / 10-20 min
Hours of Service (Span)	16-20 hours / 7 days
Station/Stop Spacing	0.75+ mile, stop at all stations
Directness	Straight, on-corridor with few direction changes. Bi-directional service.
Branding	Distinct Branding: *Swift*
Type of Vehicles	Distinctive, high capacity, low floor
Fare Collection	Off-Vehicle, ORCA paid at Station or cash ticket purchased at Station TVM
Stations/Customer Info	Landmark Station with: branding, unique shelters, real-time info, fare payment equipment, posted maps
Built Environment	
Transit Priority Treatment	Required. Dedicated (BAT or better) lane, signal priority, queue jump lanes, access/driveway consolidation, etc.
Street Type	Arterial/Highway
Parking	Limit parking through supply measures or pricing. Prioritize buildings close to corridor, parking behind. Pricing/supply policies highly desirable along corridor and especially at stations.
Land Use	Mixed use with balance of housing and jobs. Transit integrated into design. Major trip producers located within ¼ mile of Transit Emphasis Corridor. Required: established transit-supportive land use and/or policy framework that encourages development of transit-supportive land use.
Travel Market/Density	15 dwelling units per acre or 15,079 persons/jobs within 1/2 mile of station translating to (30+ persons or jobs per acre)
Pedestrian connectivity	Complete pedestrian network within ½ mile of route
Operating Parameters	
Boardings/Revenue Hour	35+
Reliability (on-time performance)	Headway Management – Exceed published headway by no more than 20% at least 95% of the time
Seated Load	Standees up to 1.5 load factor are expected. Should not exceed 2.0 on any trip

Corridor Based Routes

While Community Transit's ultimate goal is to provide a network of BRT routes throughout much of urbanized Snohomish County, many corridor-based services will not have either the levels of service or patronage associated with BRT for many years. There are some corridors that will never evolve to BRT for which high-frequency corridor-based transit will represent the ultimate transit implementation.

Corridor-based services are composed both of routes that operate along adopted transit emphasis corridors but do not yet have the features that identify them as bus rapid transit services and routes that supplement established BRT services, providing local neighborhood access. In many cases, corridor based services may benefit from features of BRT routes such as transit priority treatments that improve speed and reliability of transit. Typically, service levels on corridor based routes will increase as they approach BRT status and then may fall off as BRT services operating in the same corridor begin operation. Accordingly, policies for appropriate service levels are broad, and actual service levels are determined by demand, not policy.

Corridor Based Routes	
Measure	**Guideline**
Regional Policy Framework	
PSRC Service Typology (Transportation 2040 plan)	Core
System/Network Context	Ultimate Corridor Buildout / Progression to BRT
Growth Management	Only available within UGA
Travel Time (door-to-door)	No more than 50% greater than auto drive time
Service Design	
Frequency (headway) Peak/Off-Peak	10-15 min / 15-30 min depending upon demand
Hours of Service (Span)	16-24 hours / 7 days depending upon demand
Station/Stop Spacing	0.10 - 0.75 mile, stop on demand
Directness	Straight, on-corridor with few direction changes. Bi-directional service.
Branding	Standard
Type of Vehicles	Low Floor
Fare Collection	On-board, ORCA or cash
Stations/Customer Info	Standard shelter, some with real-time information, posted maps and schedules
Built Environment	
Transit Priority Treatment	Desired. Dedicated lane (BAT or HOV/HOT), signal priority, queue jump lanes, etc.
Street Type	Arterial/Highway
Parking	Limit parking through supply measures or pricing. Prioritize buildings close to corridor, parking behind. Pricing/supply policies desirable along corridor.
Land Use	Mixed use with balance of housing and jobs. Transit integrated into design. Major trip producers located within ¼ mile of Transit Emphasis Corridor. Desirable: established transit-supportive land use and/or policy framework that encourages development of transit-supportive land use.
Travel Market/Density	15 dwelling units per acre or 15,079 persons/jobs within 1/2 mile of station (30+ persons or jobs per acre)
Pedestrian connectivity	Complete pedestrian network within ¼-1/2 mile of route
Operating Parameters	
Boardings/Revenue Hour	Group = 25 to 35, no route below 20
Reliability (on-time performance)	Meets schedule 90%+
Seated Load	Load factor should not exceed 1.25 on any trip

Community Based Services

While the network of core routes will form the backbone of Community Transit's system, they will be supplemented by a group of routes that feed those mainline services. Local routes serve residential and light employment districts within the urban growth area that do not have the potential to support core route service. Suburban and rural routes operate primarily outside the UGA.

Local Routes

These are services that connect two or more urban activity centers, normally in separate jurisdictions, but outside adopted corridors and at lower service levels than corridor based services. Often they provide lifeline transportation services and also feed core services. They will generally have the following features:

- Provide days of operation and span of service that are tailored to meet the needs of the communities served
- Generally operate at least every sixty minutes
- Maintain direct orientation of route, avoiding off-direction travel unless justified by market demand that meets a cost-benefit test considering the overall route.
- When appropriate, may operate deviated-fixed route segments but these routes will be subject to the same performance expectations as other community routes.

Much of Community Transit's existing route network is comprised of local routes. In the future, many of these routes will be modified to supplement corridor based services and feed Link light rail stations. While local routes generally operate all day, this may sometimes be accomplished through a combination of several associated routes that share a similar, but not exact, travel path and where some of those routes only operate during commute periods. Normally, such routes are considered a 'package' that and, even though they may operate only during commute hours, individual routes in that package are not considered commuter services.

Local Routes	
Measure	**Guideline**
Regional Policy Framework	
PSRC Service Typology (Transportation 2040 plan)	Community-Based
System/Network Context	Feeding BRT and Corridor Based Services. Must connect to core network.
Growth Management	UGA and Rural Areas
Travel Time (door-to-door)	N/A
Service Design	
Frequency (headway) Peak/Off-Peak	20-30 min / 30-60 min
Hours of Service (Span)	12 – 18 hours / 5 – 7 days
Station/Stop Spacing	0.10 - 0.50 mile, stop on demand
Directness	Direction changes warranted by demand. Bi-directional service.
Branding	Standard
Type of Vehicles	Low Floor
Fare Collection	On-board
Stations/Customer Info	Some standard shelters, posted schedules
Built Environment	
Transit Priority Treatment	None
Street Type	Arterial/Collector
Parking	N/A
Land Use	Residential and lower-density employment areas
Travel Market/Density	7 dwelling units per acre or 7,540 persons/jobs within 1/2 mile of station (15+ persons or jobs per acre)
Pedestrian connectivity	Complete pedestrian network within ¼ mile of bus stops
Operating Parameters	
Boardings/Revenue Hour	Group = 15 to 20, no route below 10
Reliability (on-time performance)	Meets schedule 90%+
Seated Load	Load factor should not exceed 1.15 on any trip

Suburban/Rural Routes

These are services that connect rural and suburban communities located outside the southwest urban growth area within urbanized portions of Snohomish County. They operate outside adopted corridors and at lower service levels than corridor based services. Often they provide lifeline transportation services for small communities. They generally have the following features:

- Local routes are held to a productivity standard. As policy-based services, performance of Suburban/Rural routes may be evaluated based on other factors.

- Local service not meeting standard will likely be reallocated elsewhere or significantly restructured. Because there are often no transit alternatives available, low productive Suburban/Rural routes may be retained even when they do not meet established performance standards.
- Suburban/Rural routes typically operate on 60 minute or longer headways.
- Suburban/Rural routes may be either bidirectional or unidirectional peak only services.

Suburban/Rural Routes	
Measure	**Guideline**
Regional Policy Framework	
PSRC Service Typology (Transportation 2040 plan)	Community-Based
System/Network Context	Basic connectivity in lower-demand markets. Must connect to core network.
Growth Management	UGA and Rural Areas
Travel Time (door-to-door)	N/A
Service Design	
Frequency (headway) Peak/Off-Peak	60 min +
Hours of Service (Span)	Per demand and available resources
Station/Stop Spacing	0.10 - 1.0 mile, stop on demand
Directness	Direction changes warranted by demand. Bi-directional service or peak-direction service.
Branding	Standard
Type of Vehicles	Low Floor
Fare Collection	On-board
Stations/Customer Info	Some standard shelters, posted schedules
Built Environment	
Transit Priority Treatment	None
Street Type	Arterial/Collector
Parking	N/A
Travel Market/Density	N/A
Land Use	N/A
Pedestrian connectivity	Complete pedestrian network within ¼ mile of bus stops
Operating Parameters	
Boardings/Revenue Hour	Goal = 10+
Reliability (on-time performance)	Meets schedule 90%+
Seated Load	Load factor should not exceed 1.00 on any trip

Commuter Routes

These routes can be any services that are specifically designed to link residential neighborhoods or park-and-ride facilities with major employment sites throughout the Puget Sound region.

Commuter Routes	
Measure	**Guideline**
Regional Policy Framework	
PSRC Service Typology (Transportation 2040 plan)	Specialized
System/Network Context	Geographically focused commute market
Growth Management	UGA and Rural Areas
Travel Time (door-to-door)	No more than 20% greater than auto drive time
Service Design	
Frequency (headway) Peak/Off-Peak	At least every 30 min (or to match shifts/class times)
Hours of Service (Span)	3- 8 hours (to match shifts) / weekdays
Station/Stop Spacing	Park & Ride/Transit Center based, stop on demand and at park & rides/transit centers
Directness	Straight, on-corridor with few direction changes. Peak-direction service.
Branding	Express
Type of Vehicles	High Capacity, articulated or double-deck, low floor
Fare Collection	On-board
Stations/Customer Info	Standard shelter, some with real-time information, posted schedules
Built Environment	
Transit Priority Treatment	Required: HOV/HOT lanes managed to minimum 45 mph.
Street Type	Freeway/Highway
Parking	Limit parking through supply measures or pricing. Prioritize buildings close to corridor, parking behind. Pricing/supply policies required at destination.
Land Use	Destination is Regional Center or Manufacturing and Industrial Center (MIC)
Travel Market/Density	2,800 jobs within 1/4 mile of destination (15 jobs per acre); or a park-n-ride or major transfer location
Pedestrian connectivity	Complete pedestrian network within 1/2 mile of bus stops, ½ mile of park & rides.
Operating Parameters	
Boardings/Revenue Hour	No specific guideline established. Commuter services attempt to have seated loads within the range identified below.
Reliability (on-time performance)	95% Scheduled departure time
Seated Load	Load factor should not exceed 1.00 on any trip

Table 2 summarizes the general character of Community Transit's current network of fixed route services. For ease of comparison, routes that operate as a single service have been grouped into a single listing.

Table 2
Character of Existing Community Transit Routes

Route(s)	Communities Served	Frequency/Trips	Comments
Corridor Based Routes			
101	Shoreline, Edmonds, Mountlake Terrace, Lynnwood, Mukilteo, Everett	30 minutes	Supplements Swift BRT in same corridor
105	Bothell, Mill Creek, South Everett	20 minutes peak/30 minutes mid-day	
201/202	Lynnwood, Everett, Marysville, Arlington	15 minutes	While providing frequent service during much of the day, this route set is not entirely consistent with identified transit emphasis corridors.
115/116	Edmonds, Lynnwood, Mill Creek	15 minutes	Routes combine for 15 minute headway between Mill Creek Town Center and downtown Edmonds.
Local Routes			
106	Canyon Park – UW Bothell	2 round trips	Localized peak-direction
110	Edmonds, Mountlake Terrace, Lynnwood	30 minutes	
112	Edmonds, Mountlake Terrace, Lynnwood	20 minutes	
113	Mountlake Terrace, Lynnwood, Mukilteo, Everett	20 minutes	While providing frequent service during much of the day, Route 113 does not have a corridor orientation.
118	Edmonds, Lynnwood	30 minutes	
119	Lynnwood	30 minutes peak/60 minutes mid-day	
120	Lynnwood, Bothell	30 minutes	
121	Canyon Park – UW Bothell	2 round trips	Localized peak-direction
130	Shoreline, Lynnwood, Mountlake Terrace	30 minutes	
131	Shoreline, Edmonds, Lynnwood	30 minutes	
221	Lake Stevens, Marysville	60 minutes	
270/271/275	Everett, Snohomish, Monroe, Sultan, Gold Bar	30 minutes west of Monroe/60 minutes east of Monroe	Portions of this route operate at service levels associated with suburban routes.
Suburban/Rural Routes			
222	Marysville, Tulalip	60 minutes	
230	Arlington, Darrington	2+ hours	Peak hours only
240	Arlington, Stanwood	60 minutes	
280	Granite Falls, Lake Stevens, Everett	30 minutes peak/60 minutes mid-day	Selected trips also operate as commuter to Boeing (Everett)

Route(s)	Communities Served	Frequency/Trips	Comments
Commuter Routes			
227	Arlington to Boeing (Everett)	Two A.M./Two P.M. trips	
247	Stanwood, Tulalip, Marysville to Boeing (Everett)	Two A.M./Two P.M. trips	
277	Gold Bar, Sultan, Monroe, Snohomish, Boeing (Everett)	Two A.M./Two P.M. trips	
401/402	Lynnwood to Downtown Seattle	19 A.M./18 P.M. trips, 5-10 minute peak frequency	
405	Edmonds, Mountlake Terrace to Downtown Seattle	Five A.M./Seven P.M. trips	
406	Edmonds, Mountlake Terrace to Downtown Seattle	Four A.M./Six P.M. trips	
408	Mountlake Terrace to Downtown Seattle	Seven A.M./Seven P.M. trips	
410	South Everett to Downtown Seattle	Eight A.M./Eight P.M. trips	
412	Silver Firs, Mill Creek to Downtown Seattle	Ten A.M./Nine P.M. trips	
413	Lynnwood to Downtown Seattle	Nine A.M./Ten P.M. trips	
414	Everett, Mill Creek, Lynnwood, Mountlake Terrace to Downtown Seattle	Two A.M./Two Mid-Day/Two Late Evening trips	Mid-Day/Off-Peak route to commuter destination
415	Mukilteo, Lynnwood to Downtown Seattle	Seven A.M./Seven P.M. trips	
416	Edmonds to Downtown Seattle	Six A.M./Six P.M. trips	
417	Mukilteo to Downtown Seattle	Five A.M./Seven P.M. trips	
421	Marysville to Downtown Seattle	Eight A.M./Nine P.M. trips	Freeway stop in Lynnwood
422	Stanwood, Tulalip, Marysville to Downtown Seattle	Three A.M./Three P.M. trips	Freeway stop in Lynnwood
424	Snohomish, Monroe to East Side and Downtown Seattle	Three A.M./Three P.M. trips	
425	Lake Stevens to Downtown Seattle	Four A.M./Five P.M. trips	Freeway stop in Lynnwood
435	Mill Creek, Bothell to Downtown Seattle	Seven A.M./Seven P.M. trips	
477	Brier, Mountlake Terrace to Downtown Seattle	Five A.M./Six P.M. trips	
810	South Everett, Mill Creek, Lynnwood, Mountlake Terrace to University District	Two A.M./Two P.M. trips	

Route(s)	Communities Served	Frequency/Trips	Comments
Commuter Routes (Cont.)			
821	Marysville to University District	Four A.M./Three P.M. trips	Freeway stop in Lynnwood
855	Lynnwood to University District	Seven A.M./Eight P.M. trips	
860	South Everett to University District	Seven A.M./Nine P.M. trips	
871	Lynnwood, Mountlake Terrace to University District	Nine A.M./Ten P.M. trips	
880	Mukilteo, Lynnwood to University District	Seven A.M./Five P.M. trips	
885	Lynnwood to University District	One A.M./Two P.M. trips	

Section 4 - Service Design Parameters

This section considers the rationale for six of the guidelines employed by Community Transit. These guidelines are based in part on the Level of Service standards found in TCRP Report 100 *Transit Capacity and Quality of Service Manual*. Chapter 3 of that manual provides an extended discussion of the various performance measures that are in common use and the standards (called levels of service in the report) that have been adopted around the country. They were included in the TCQSM to guide transit agency decision-making rather than being applied as hard and fast rules. While the guidelines outlined in this memorandum do not employ the letters – A through F – as are common in highway facilities, they adhere to the idea that the highest level of service should be afforded the most heavily patronized facilities.

Travel Market Density

Perhaps most important of the service design guidelines, the density of the neighborhoods being served is a critical factor in the future success of any transit service. The following table summarizes research that was conducted during the 1970's and still considered valid. It relates residential densities to the type of transit service that is appropriate for neighborhoods.

Transit Density Requirements (based on Pushkarev and Zupan, 1977)

Mode	Service Type	Minimum Density (Dwelling Units Per Acre)	Area and Location
Dial-a-Bus	Demand response serving general public (not just people with disabilities.	3.5 to 6	Community-wide
"Minimum" Local Bus	1/2-mile route spacing, 20 buses per day	4	Neighborhood
"Intermediate" Local Bus	1/2-mile route spacing, 40 buses per day	7	Neighborhood
"Frequent" Local Bus	1/2-mile route spacing, 120 buses per day	15	Neighborhood
Express Bus – Foot access	Five buses during two-hour peak period	15	Average density over 20-square-mile area within 10 to 15 miles of a large downtown
Express Bus – Auto access	Five to ten buses during two-hour peak period	15	Average density over 20-square-mile tributary area, within 10 to 15 miles of a large downtown
Light Rail	Five minute headways or better during peak hour.	9	Within walking distance of transit line, serving large downtown.
Rapid Transit	Five minute headways or better during peak hour.	12	Within walking distance of transit stations serving large downtown.
Commuter Rail	Twenty trains a day.	1 to 2	Serving very large downtown.

In adapting these guidelines to local conditions, Community Transit has combined residential and employment densities. Using this measure, the number of residents and employees within one-half mile on each side of a corridor's travel-way is divided by the area incorporated in the corridor. This approach suggests that the following densities are needed to support local transit services.

Service Type	Design Headway/ Buses per Day	Dwelling Units per Acre	Comparable Pop + Empl Acre
BRT	10 min / 200 per day	15	30
Corridor	15 min / 150 per day	15	30
Local	30 min / 75 per day	7	15
Suburban/Rural	60 minute / 25 per day	4	8

(For example, a ten mile long corridor will typically will have an area of about 10.8 square miles.) While a broad rule of thumb suggests that effective Bus Rapid Transit services will need about 15 dwelling units or 30 residents/employees within a corridor, a host of other factors influence the actual densities that will be needed in order to meet the performance guidelines outlined in the previous section. In general order of impact that they can have on transit market potential, these other considerations include:

- Fees for Parking – Studies suggest that nothing encourages transit use more than charging a fee for auto parking.
- Transit Priority Facilities – This includes HOV freeway interchanges, queue jumps, transit signal priority, plus arterial and freeway HOV/Business Access and Transit (BAT) or Bus Only lanes.
- Quality Pedestrian Access – This includes continuous sidewalks, an absence of barriers, safe crosswalks, low vehicular speeds, pedestrian refuges when crossing multi-lane streets, and appropriate scale aesthetics.
- Pleasant and convenient pathways from bus stops to nearby businesses – Avoiding the trek through parking lots provides a safer and more pleasant experience for transit patrons.
- Mixed Land Use – The presence of residential, commercial, and employment uses along a corridor.
- Presence of a Street Grid – Side streets allow people to access transit services operating along a corridor. Without them people may not be able to reach bus stops, even when they are nearby.
- Park-and-Ride Facilities – Park-and-Ride facilities compensate for dispersed residential patterns, allowing a low-density housing pattern to be served. These may be particularly appropriate at transit emphasis corridor end points in the urban-rural transition area where development densities are lower.
- Bicycle Facilities – Like park-and-ride lots, bike facilities allow potential customers to reach bus facilities that would otherwise be unavailable. Bicycles can be an important option in bridging the "last mile" between transit service and the final destination.

While these service design guidelines begin with density requirements that are consistent with research in other communities, they recognize that supportive community infrastructure improvements have the potential to influence the success of transit along a given corridor. These factors are identified in the 'Built Environment' section of the guidelines for each category of service.

Recognizing the huge impacts that local development practices have on the ultimate success of transit services, Community Transit is closely coordinating with local jurisdictions to ensure that core services are planned in areas where the most intensive development will take place. In turn,

jurisdictions can assist in this process by insuring that transit supportive development, including the practices outlined above, is advanced in identified transit emphasis corridors. This partnership is discussed again in Chapter 8, with a checklist for local jurisdiction provided in Attachment 2.

Frequency

From the user's perspective, *service frequency* determines how many times an hour a user has access to the transit mode. Service frequency measures the convenience of transit service and is one component of overall transit trip time (helping to determine the wait time at a stop). There is a considerable body of evidence suggesting that service frequency is a powerful attractor for individuals with transportation choices. When bus service runs at least every fifteen minutes a person can walk out to a bus stop and be assured that a bus will arrive within a few minutes. Ten minute service is even better, while at thirty minutes a schedule becomes a necessity. Accordingly, both Bus Rapid Transit and Corridor Based routes are designed to provide fifteen minute headways or better whenever possible. Meanwhile, when service operates at frequencies greater than 1 hour, users are required to engage in highly creative planning or waste considerable time.

Hours of Service

Hours of service, also known as "service span," is simply the number of hours during the day when transit service is provided along a route, a segment of a route, or between two locations. It plays as important a role as *frequency* in determining the availability of transit service to potential users: if transit service is not provided at the time of day a potential passenger needs to take a trip, it does not matter where or how often transit service is provided the rest of the day.

Bus Rapid Transit and Corridor Based routes are designed to be available for most or all of the day. Workers who do not work traditional 8 to 5 jobs receive service and all riders are assured that they will not be stranded until the next morning if a late-evening transit vehicle is missed. While Local Routes have a shorter service span, it is still long enough to accommodate most commute trips. The service span for Suburban/Rural routes is determined by demand and available funding and may not meet all commute needs.

Station/Stop Spacing

The location of bus stops always entails a tradeoff between convenient access for people getting on and off a bus and those riding through. With improved passenger facilities, and their focus on speedy travel, BRT routes will have more broadly spaced stops. A safe pedestrian environment, with sidewalks and lighting, is one prerequisite for these services.

Directness

The more that speed is emphasized in a route's design, operation, and marketing, the more important it is that the route operates along a direct path, with off-direction travel minimized. Accordingly, both BRT and Corridor routes do not permit off-direction travel in any but very unusual circumstances. Local and suburban/rural services may have direction changes when demand warrants.

Branding

Community Transit employs three brands that carry into the public face of bus services being offered – *Swift* BRT, local, and commuter. These three branding approaches are carried into the service design guidelines.

Vehicle Type

Community Transit's core and local service fleet consists of 30 foot, 40 foot and 60 foot low-floor buses with ultra-low sulfur diesel propulsion. Over time, 30 foot buses will be replaced with 40 foot buses.

Swift BRT utilizes 62 foot low-floor articulated buses with ultra-low sulfur diesel-electric hybrid propulsion.

Inter-county commuter services use 40 and 60 foot low-floor and 42 foot double-decker buses with ultra-low sulfur diesel propulsion.

With *Swift* BRT, Community Transit began operating its first hybrid-electric buses. Studies have identified operating cost and environmental savings associated with use of hybrid-electric buses over conventional diesel buses. While there is a significant additional capital cost, Community Transit is committed to replacing the existing core/local service fleet with hybrid-electric buses, provided that sufficient grant funding can be secured to purchase the more expensive vehicles.

Fare Collection

Community Transit utilizes both on-board and off-board fare collection.

Swift BRT fares are collected off-board at *Swift* stations. *Swift* customers are encouraged to use ORCA electronic fare payment, tapping the card at ORCA readers located at each station before boarding. *Swift* customers who do not use ORCA can purchase a paper ticket using cash or credit card at ticket vending machines located on station platforms.

All other Community Transit bus services collect fares on-board using either ORCA or cash. Customers should either tap their ORCA card or pay cash fare upon boarding the bus. While ORCA card users will receive an electronic fare credit valid for travel on additional buses within a two hour window, cash paying customers receive no transfer credit and must pay a new fare with each boarding.

Fare rates are structured according to passenger type (adult, youth, reduced) and route length. Adults aged 19 to 64 pay full fare. Youth aged 6 to 18 pay a discounted fare. Seniors, disabled customers and customers with a Medicare card are eligible for Reduced fare which is typically no more than half of Adult fare.

Routes that operate wholly in Snohomish County (to include Aurora Village Transit Center and the King County portion of Bothell) are priced at the agency's base fare ($1.50 in 2009). Swift BRT service is included in this base fare category. Commuter routes from south Snohomish County to King County destinations are priced at a premium commuter fare ($3.50 in 2009). Commuter routes from north and east Snohomish County to King County destinations are priced at a higher premium commuter fare due to the long-distance nature of this service ($4.50 in 2009).

Bus Stops/Shelters/Stations

Community Transit serves approximately 2,000 bus stops in Snohomish and King Counties. All bus stops maintained by Community Transit have a pole-mounted "flag" with numbers indicating routes that service that stop as well as a printed schedule in a weather-resistant holder providing departure times for buses at that particular location. Most Community Transit bus stops are compliant with Americans with Disabilities Act (ADA) standards, having sufficient space to accommodate deployment of a wheelchair ramp and safe access for ADA customers.

Bus stops with sufficient levels of activity and space may also be equipped with benches or "simme seats" providing customers with a place to sit while waiting for the bus.

More than 10% of Community Transit's bus stops are equipped with a shelter, protecting customers from inclement weather. Shelters are typically provided in high-traffic locations and where significant transfer activity is expected between buses.

Swift stations represent the highest level of on-street transit infrastructure. These stations provide shelter, seating and service information to help *Swift* riders get to their destinations quickly.

Larger than a standard bus shelter, *Swift* stations are identified by a distinct roadside marker that stands out along the corridor. The stations are designed with ample lighting and translucent weather barriers that are graffiti-resistant. Frequent visits by transit police as well as regular upkeep of the facility help riders feel safe and secure during their brief waits.

Ticket vending machines allow those without transit passes to purchase a ticket in advance and board the bus through any of three doors. A raised curb allows for easy access onto the low-floor *Swift* buses, and inlaid icons indicate where riders should wait to board the bus, for example, people who use wheelchairs board at the first door.

Large information kiosks at the stations provide easy-to-understand information about how to ride *Swift*, how to make connections onto other transit modes and directional information to familiarize yourself with the area around that station. In addition, each station has creative features inlaid in the concrete that identify them with that community and help to make each station unique.

Section 5 - Operating Parameters for Individual Routes

As noted in Section 3, transit agencies employ a variety of performance measures when they evaluate the performance of the entire system. This is also true when they evaluate the performance of individual routes. Community Transit has elected to focus on three measures, which are intended to address issues central to transit operations.

- Is the service productive?
- Do buses run on time?
- Does everybody have a seat?

The methodology for addressing productivity is adapted from current practice at Community Transit and at other agencies. The last two are adapted from the TCQSM.

Service Productivity

The most common performance measure is the number of passengers boarding in an hour of service. Some operators employ passengers per total service hour, which includes deadhead. Community Transit and the National Transit Database employ passengers per revenue hour, which excludes deadheads. Given its common usage, general understandability, and long history, Community Transit will continue to use Passengers per Revenue Hour as its prime route evaluation criteria.

Guidelines for each route classification outlined in Chapter 4 are based upon realistic performance expectations for this type of service. Corridors that hold more than 30 persons/jobs per acre, the Travel Market/Density guideline for BRT services, should be capable of supporting BRT services

that carry more than 35 passengers per revenue hour. Similarly corridors with 10-20 person/jobs per acre should be able to support local routes that meet Community Transit's service guidelines, but probably do not have the potential to support a corridor based route. *If experience shows that the density and productivity guidelines are inconsistent, one or the other should be modified in order to eliminate this issue*.

While 'passengers per hour' serves as a means of comparing the performance of routes within a particular service classification, it can be deceptive when comparing different types of routes. For example, using 'passengers per hour' to compare the productivity of a peak commuter route that links Snohomish County with Downtown Seattle with a local route operating inside Lynnwood might provide misleading results. People likely stay on the express route for an hour or more, while travel times on the local route would likely average just a few minutes. This means a full express bus might have lower passengers per hour numbers than a local route that seldom has more than a dozen riders at any one time. This is why passenger load information, discussed later in this section, is important.

On-time Performance

The second building block of quality transit service is on-time performance. On-time performance is typically measured over a series of days (either over consecutive days or as a monthly sampling of each trip) or as a system-wide value and requires an on-going commitment to monitoring service delivery. Accurate monitoring of on-time performance will become much easier once Community Transit's Advanced Public Transportation System (APTS) with Automated Vehicle Locating (AVL) is operational.

Community Transit is moving towards headway based service on its *Swift* BRT routes. Because service is frequent, every 10 minutes or less, the proper interval between buses becomes more important than their actual arrival time. If buses are regular, customers will be able to walk out to a bus stop, knowing that a bus will arrive within a few minutes. Thus, it will become important that time intervals between buses are maintained, and that bus 'bunching' is avoided.

Passenger Load

From the passenger's perspective, passenger loads reflect the comfort level of the on-board vehicle portion of a transit trip—both in terms of being able to find a seat and in overall crowding levels within the vehicle. On a short trip, which is common on BRT services, finding a seat is less important than on an intercounty commute trip. Accordingly, BRT vehicles are designed to maximize standing capacity. Conversely, vehicles operating longer routes focus more on seats and less on aisle space.

Load factor of a trip represents the maximum number of people who are on a bus at one time during a trip divided by the number of seats. Thus, when the load factor exceeds 1.0, people are standing. This is acceptable for short distances, so long as individuals are not crushed together. Thus, both BRT and Corridor Based Routes will accept some standing passengers. This is less desirable if the standing load lasts for prolonged periods of time.

Table 3 summarizes these operating parameters when applied to Community Transit's services.

Table 3 Summary of Operating Parameters

Type of Service	Boardings/Revenue Hour	Reliability (on-time performance)	Seated Load
Bus Rapid Transit	35+	Headway Management – Exceed published headway by no more than 20% at least 95% of the time	Standees up to 1.5 load factor are expected. Should not exceed 2.0 on any trip
Corridor Based Routes	Group = 25 to 35, no route below 20	Meets schedule 90%+	Load factor should not exceed 1.25 on any trip
Local Routes	Group = 15 to 20, no route below 10	Meets schedule 90%+	Load factor should not exceed 1.15 on any trip
Suburban/ Rural Routes	Goal = 10+	Meets schedule 90%+	Load factor should not exceed 1.00 on any trip
Commuter Routes	No specific guideline established. Commuter services attempt to have seated loads within the appropriate headway range.	95% Scheduled departure time	Load factor should not exceed 1.00 on any trip

Section 6 - Implementation

Coordination for Transit Supportive Urban Design

The service design and operating measures outlined in sections 4 and 5 identify the types of community design landforms that are needed to support each category of transit service. While these are beyond Community Transit's responsibility, much of the transit system's ultimate success will depend upon whether transit supportive development practices are conscientiously followed by local jurisdictions. If they are, a vibrant network of corridors will be able to support high quality and productive public transportation services. Without such corridors the operation of productive transit services will prove impossible.

Attachment 2 is a checklist of transit supportive measures that will assist in the development of productive transit corridors. It is specifically intended to assist local jurisdictions as they evaluate their local street grid and help them determine whether they are ready for high level transit service.

While land use regulation is the responsibility of local cities, towns, and the county, most transit corridors serve more than one jurisdiction. As with the underlying street facilities they operate on, the successful implementation of transit emphasis corridors will require careful coordination between each of the communities being served.

Other Factors

In the same way that Community Transit is not alone in building transit-supportive communities; these guidelines are not the only ways that the system's success is measured. Other policies, procedures, and legislative requirements are also employed. These include:

- Bus Stop Standards: The location of a bus stop must meet a variety of requirements, including the safe loading and unloading of passengers, street configuration, the ability to cross streets safely, and access to pedestrian facilities.

- On-Street Operations: These include operational policies, such as having vehicles stop in-lane to load and unload passengers (in conjunction with curb extensions) to speed operations, rather than using a pull-out which requires a vehicle to merge back into traffic.
- Route Design: The need for bus deviation off of arterials at the end of a route may be required as a turn-around area or to access operator layover facilities.
- Legislative Requirements: The requirements of the Americans with Disabilities Act, Title VI to the Civil Rights Act of 1964, and other mandated programs take precedence over the Service Guidelines.

In addition to the above policies and measures, new measures may evolve as the system grows and technology is deployed. For example, BRT operating at headways of 10 minutes or better on-time performance could be headway-based where the guideline is the percentage of vehicles maintaining a 10-minute headway, rather than the percentage arriving within a specified scheduled time. This may require a significant increase in technology and shift in operations, and should therefore be considered as option in the future.

Section 7 - References

National Transit Database (NTD)
Federal Transit Administration http://www.ntdprogram.gov/ntdprogram/. March 2009.

The National Transit Database (NTD) *(Reference 2)* is a web-based resource established by Congress to provide the United States with information and statistics on the transit systems nationwide. Annual transit profiles are available containing financial, operational, and modal data. Profiles for Community Transit were reviewed to understand operational characteristics over that past several years. The NTD was used to obtain similar operating characteristics from other transit properties to provide a comparison to Community Transit.

Transit Capacity and Quality of Service Manual
Transit Cooperative Research Program (TCRP) Report 100, *2nd Edition.* Washington, D.C., 2003

The *Transit Capacity and Quality of Service Manual (TCQSM) (Reference 3)* is the transit counterpart to the *Highway Capacity Manual (HCM)*. The manual contains background, statistics, and graphics on the various types of public transportation, and provides a framework for measuring transit availability, comfort, and convenience from the passenger point-of-view. The manual also provides quantitative techniques for calculating the capacity of bus, rail, and ferry transit services, and transit stops, stations, and terminals. This resource was consulted in the development of Community Transit's long range service guidelines in order to provide consistency with typically accepted levels-of-service on transit vehicles and networks. Additional details about the application of the *TCQSM* recommendations are provided in Chapter 4, "Development of Guidelines."

A Guidebook for Developing a Transit Performance-Measurement System
Transit Cooperative Research Program (TCRP) Report 88 , Washington, D.C., 2003.

This guidebook is the result of a customer-oriented project to provide context and framework in the development of appropriate performance measures for a transit system. This resource was also consulted in the development of Community Transit's long range service guidelines to ensure that customer and community characteristics are incorporated into the plan. The guidebook contains references to numerous resources, case studies, and suggested performance measures to help quantify transit performance.

Attachment 1

Service Design Guidelines – Bus Services

Measure	Bus Rapid Transit (BRT)	*Corridor Based Routes*	Local Routes	Suburban/Rural Routes	Commuter Routes
Policy Framework					
PSRC Service Typology (Transportation 2040 plan)	Core	Core	Community-Based	Community-Based	Specialized
System/Network Context	Ultimate Corridor Buildout	Ultimate Corridor Buildout / Progression to BRT	Feeding BRT and Corridor Based Services	Basic connectivity in lower-demand markets	Geographically focused commute market
Growth Management	Only available within UGA	Only available within UGA	UGA and Rural Areas	UGA and Rural Areas	UGA and Rural Areas
Travel Time (door-to-door)	No more than 30% greater than auto drive time	No more than 50% greater than auto drive time	N/A	N/A	No more than 20% greater than auto drive time
Service Design					
Frequency (headway) Peak/Off-Peak	5-10 min / 10-20 min	10-15 min / 15-30 min depending upon demand	20-30 min / 30-60 min	60 min +	At least every 30 min (or to match shifts/class times)
Hours of Service (Span)	16-20 hours / 7 days	16-24 hours / 7 days depending upon demand	12 – 18 hours / 5 – 7 days	Per demand and available resources	3- 8 hours (to match shifts) / 5 days
Station/Stop Spacing	0.75+ mile, stop at all stations	0.10 - 0.75 mile, stop on demand	0.10 - 0.50 mile, stop on demand	0.10 - 1.0 mile, stop on demand	Park & Ride/Transit Center based, stop on demand and at park & rides/transit centers
Directness	Straight, on-corridor with few direction changes. Bi-directional service.	Straight, on-corridor with few direction changes. Bi-directional service.	Direction changes warranted by demand. Bi-directional service.	Direction changes warranted by demand. Bi-directional service or peak-direction service.	Straight, on-corridor with few direction changes. Peak-direction service.
Branding	Distinct Branding: Swift	Standard	Standard	Standard	Express
Type of Vehicles	Distinctive, high capacity, low floor	Low Floor	Low Floor	Low Floor	High Capacity, articulated or double-deck low floor
Fare Collection	Off-Vehicle, ORCA paid at Station or cash ticket purchased at Station TVM	On-board, ORCA or cash	On-board, ORCA or cash	On-board, ORCA or cash	On-board, ORCA or cash
Stations/Customer Info	Landmark Station with: branding, unique shelters, real-time info, fare payment equipment, posted maps	Standard shelter, some with real-time information, posted maps and schedules	Some standard shelters, posted schedules	Some standard shelters, posted schedules	Standard shelter, some with real-time information, posted schedules
Built Environment					
Transit Priority Treatment	Required. Dedicated (BAT or better) lane, signal priority, queue jump lanes, access/driveway consolidation, etc.	Desired. Dedicated lane (BAT or HOV/HOT), signal priority, queue jump lanes, etc.	None	None	Required: HOV/HOT lanes managed to minimum 45 mph.
Street Type	Arterial/Highway	Arterial/Highway	Arterial/Collector	Arterial/Collector	Freeway/Highway

Built Environment(Cont.)					
Parking	Limit parking through supply measures or pricing. Prioritize buildings close to corridor, parking behind. Pricing/supply policies highly desirable along corridor and especially at stations.	Limit parking through supply measures or pricing. Prioritize buildings close to corridor, parking behind. Pricing/supply policies desirable along corridor.	N/A	N/A	Limit parking through supply measures or pricing. Prioritize buildings close to corridor, parking behind. Pricing/supply policies required at destination.
Land Use	Mixed use with balance of housing and jobs. Transit integrated into design. Major trip producers located within ¼ mile of Transit Emphasis Corridor. Required: established transit-supportive land use and/or policy framework that encourages development of transit-supportive land use.	Mixed use with balance of housing and jobs. Transit integrated into design. Major trip producers located within ¼ mile of Transit Emphasis Corridor. Desirable: established transit-supportive land use and/or policy framework that encourages development of transit-supportive land use.	Residential and lower-density employment areas	N/A	Destination is Regional Center or Manufacturing and Industrial Center (MIC)
Travel Market/Density	15 dwelling units per acre or 15,079 persons/jobs within 1/2 mile of station (30+ persons or jobs per acre)	15 dwelling units per acre or 15,079 persons/jobs within 1/2 mile of station (30+ persons or jobs per acre)	7 dwelling units per acre or 7,540 persons/jobs within 1/2 mile of station (15+ persons or jobs per acre)	N/A	2,800 jobs within 1/4 mile of destination (15 jobs per acre); or a park-n-ride or major transfer location
Pedestrian connectivity	Complete pedestrian network within ½ mile of route	Complete pedestrian network within ¼-1/2 mile of route	Complete pedestrian network within ¼ mile of bus stops	Complete pedestrian network within ¼ mile of bus stops	Complete pedestrian network within 1/2 mile of bus stops, ½ mile of park & rides.
Operating Parameters					
Boardings/Revenue Hour	35+	Group = 25 to 35, no route below 20	Group = 15 to 20, no route below 10	Goal = 10+	No specific guideline established. Commuter services attempt to have seated loads within the range identified below.
Reliability (on-time performance)	Headway Management – Exceed published headway by no more than 20% at least 95% of the time	Meets schedule 90%+	Meets schedule 90%+	Meets schedule 90%+	95% Scheduled departure time
Seated Load	Standees up to 1.5 load factor are expected. Should not exceed 2.0 on any trip	Load factor should not exceed 1.25 on any trip	Load factor should not exceed 1.15 on any trip	Load factor should not exceed 1.00 on any trip	Load factor should not exceed 1.00 on any trip

Attachment 2

A Checklist for Local Community Corridors

Successful urban transit services cannot exist in a vacuum. They depend upon compact development patterns that provide a measure of density, along with pedestrian-friendly infrastructure.

The following checklist is intended to assist jurisdictions when they evaluate the potential of individual travel corridors to support public transportation services. It begins with an assessment of current and likely future population along a one mile wide corridor. Research has shown that, other things being equal, it requires about 15 jobs/residents per acre to support full-fledged transit service. This required density level can be reduced by the factors identified in Section 2. Section 3 assesses the presence of the required elements for the operation of BRT.

Current	Planned Future	
Section 1 - Calculation of Current and Projected Densities		
		Length of the Corridor (Miles)
		Area of Corridor (Square Miles)
		Total residents living within ½ mile of the corridor
		Number of jobs within ½ mile of the corridor (Community Transit can assist if you are unsure how to estimate either jobs or residents)
		Residents/jobs per square mile (Divide the sum of total residents and jobs by the length of the corridor)
		Residents/jobs per acre (Divide residents/jobs per square mile by 640)
If the result of this calculation is greater than 30 the corridor is probably capable of supporting high quality transit services. Improvements listed in the next section may help less dense corridors succeed, but 15 residents/jobs per acre is a minimum density that is always required.		
Section 2 - Transit-Supportive Features Does the Corridor Include?		
		Does/will a significant fraction (25% or more) of the commercial parking along the corridor charge a fee?
		Do zoning codes and development regulations governing the corridor place limits on the maximum number of parking spaces that are allowed?
		Are there continuous sidewalks along the length of the corridor?
		Are there pedestrian crossings at least every half mile with pedestrian refuges in the middle of the crossing?
		Does the corridor include pedestrian level lighting and landscaping along its length?
		Are pedestrians able to access more than 70% of the retail establishments along the corridor without walking through a parking lot or making an extensive detour?
		Is there a mix of residential and commercial, uses along a corridor?
		Do side streets provide access to the corridor at least every half mile, on average?
		Is there a park-and-ride lot with more than 100 stalls along the corridor?
		Are there dedicated bicycle facilities that allow access to the corridor?
Section 3 – Transit Priority Features Transit Priority Can Be Obtained Using One or More of the Following		
		HOV/HOT/BAT/Bus-Only Lanes – Along Entire Corridor?
		Transit Queue Jumps – Where?
		Transit Signal Priority Treatments – Where?

Attachment 3

System Performance Measures in Other Communities

Transit performance measures have been extensively researched and many transit agencies have established performance measurement systems that include adopted performance measures. This section reviews the measures employed by various transit agencies to evaluate system-wide performance. Subsequent sections will consider measures employed to evaluate the performance of individual routes and the suitability of neighborhoods for the initiation of transit service.

Six transit systems were included in this first analysis, either because they were from the Seattle region, they provided similar type of service (local service and express service to an urban center), or they had well developed service standards.

Sacramento Regional Transit District

The Sacramento Regional Transit District operates light rail and buses year-round, with steadily increasing annual ridership since 1987 within the Sacramento County service area. The established network and ridership demand has allowed the agency to develop distinct performance measures and standards for each type of service, in addition to desired characteristics for station amenities, types of vehicles, passenger information, and vehicle branding. Although these guidelines do not follow the TCQSM parameters explicitly, valuable additional performance parameters for each type of transit service provide a good starting point for defining Community Transit measures and future guidelines.

Fresno Area Express

Fresno's transit system is slightly smaller than Community Transit, operating 92 peak hour vehicles in 2007, with about 75% of Community Transit's revenue hours. It was chosen because it operates a predominately local fixed route system, operating along major corridors. In that sense, it displays some of the operating characteristics of future corridor based routes.

Sam Trans (San Mateo, CA)

Sam Trans is larger than Community Transit but has a strong base of express services. Also, like Community Transit, it interfaces with numerous other transit operators. Sam Trans was included to illustrate a less structured approach, where performance is tracked but rigid standards have not been applied.

Santa Clara Valley Transit Authority (VTA)

The Santa Clara Valley Transit Authority was also reviewed for potential similarities in guidelines and standards for Community Transit's long range plan. VTA provides not only transit services to the Santa Clara County area, but has also made a commitment to manage the County's blueprint to reduce congestion and improve air quality. With a system that includes local buses, express/limited service buses, light rail, and heavy rail, VTA has developed a set of performance guidelines that is consistent with TCQSM and also characterizes the various corridor qualities for each type of service.

Alameda-Contra Costa (AC) Transit District

AC Transit provides a wide range of transit service to commuters, schools, senior citizens, and disabled residents in the East Bay area in California. The publicly-owned agency dates back to 1959, and is now currently the third largest public bus system in California, serving up to 13 cities with the continuing goal of providing safe, convenient, courteous, and reliable service. With these goals in mind, a review of the current operating standards and guidelines provide a strong resource for developing sustainable and practical operating guidelines for Community Transit. In addition to transit guidelines consistent with the Transit Capacity and Quality of Service Manual (TCQSM), AC Transit also provides guidelines for station distances, types of vehicles, boardings per revenue hour, and farebox recovery rates. AC Transit also provides guidelines for types of traveler information systems (TIS) as well as opportunities to implement Transit Signal Priority (TSP). The service guidelines reflect the hierarchy of transit services provided.

Pierce Transit

Pierce Transit is located south of Seattle and is the second largest transit agency in Washington, providing vital links in the regional transportation system. A review of this agency's performance standards revealed several similar performance measures and guidelines to those in the TCQSM, and provided more detailed service coverage information than seen in other agencies' plans. For example, for commuter routes, Pierce County indicates that a workforce destination should exceed 5,000 persons and that vanpool services would be used to test demand prior to installing service on a new commuter route.

PERFORMANCE MEASURES EMPLOYED

Table 4 summarizes the performance measures that each system actually uses to evaluate its overall performance. Every attempt was made to include the measures each agency actually uses to evaluate performance of the entire system. In some cases, differing measures are presented in various published document or formally adopted measures are never actually utilized. Generally, the measures that California systems include in their short range transit plans were considered 'real' and included, regardless of whether they have a basis in policy.

Table 4
Peer Review of Similar Transit Agencies

Measure	Community Transit	Sacramento	Fresno Area Express	SamTrans	Santa Clara (VTA)	AC Transit	Pierce Transit
Boardings per Revenue Hour	X		X	X	X	X	X
Boardings per Revenue/Total Service Mile		X	X	X			X
Boardings per Capita	X						
Customer Commendations per 100,000 Boardings	X						
Customer Complaints per 100,000 Boardings	X			X			X
Voluntary Employee Turnover	X						
Miles Between Roadcalls				X			
Average Operating Speed						X	
Cost per Passenger Mile	X		X				
On-Time Performance			X	X			
Cost per Passenger		X				X	
Cost per Revenue/Vehicle Service Mile/Hour	X	X	X	X		X	
Farebox Recovery	X	X	X	X		X	X
Revenue/Vehicle Service Hours per Employee	X	X					
Subsidy per Revenue Vehicle Hour						X	
Subsidy per Passenger		X	X	X		X	X

Table 5 summarizes and compares system performance and key operating ratios for each of the systems used in this comparison. It illustrates the effect that system design can have on operating performance and the identification of appropriate measures. While Community Transit has a relatively high cost per passenger, its cost per passenger mile is among the lowest of the peer systems. This is primarily due to the preponderance of long-distance express routes operated by Community Transit. The relatively small number of riders travels much longer distances than is common for other systems. The same trend is apparent with Sam Trans, another commuter-based system. As Community Transit moves towards a more corridor-based system, travel patterns will also likely shift. More people will take trips within the county, likely increasing performance relative to passengers per hour and cost per passenger.

This illustrates the importance of utilizing measures that accurately capture local values and priorities. Employed in a vacuum, passengers per hour could lead to misleading assessments of system performance if it is not balanced with measures that consider how long riders are on the vehicle.

Table 5
Operating Performance of Similar Transit Agencies (2007 Data)

	Community Transit	Sacramento	Fresno Area Express	SamTrans	Santa Clara (VTA)	AC Transit	Pierce Transit
Operating Expenses	$75,359,860	$82,267,568	$33,670,221	$91,844,003	$201,100,961	$268,963,984	$61,082,330
Fare Revenues	$16,929,567	$14,810,982	$7,819,099	$17,494,648	$26,561,146	$49,621,522	$12,906,182
Unlinked Trips	9,922,699	17,461,487	12,080,346	14,892,745	32,129,802	66,970,254	13,307,473
Passenger Miles	90,928,799	54,550,645	55,732,067	73,813,346	129,533,714	204,207,631	46,805,192
Vehicle Revenue Hours	495,297	702,797	366,378	660,579	1,282,243	1,822,247	570,819
Passengers per Revenue Hour	20.0	24.8	33.0	22.5	25.1	36.8	23.3
Operating Expense per Revenue Hour	$152	$117	$92	$139	$157	$148	$107
Farebox Recovery	22.5%	18.0%	23.2%	19.0%	13.2%	18.4%	21.1%
Operating Expense per Passenger	$7.59	$4.71	$2.79	$6.17	$6.26	$4.02	$4.59
Operating Expense per Pass. Mile	$0.83	$1.51	$0.60	$1.24	$1.55	$1.32	$1.31

Data is from the 2007 National Transit Database
Only bus services were included