PATRONAGE ESTIMATES

Factors Influencing Ridership

There are a number of known factors that contribute to streetcar ridership. These include:

- Intensity of land use within walking distance of the line – including both residential and employment density
- Mix of land use – residential, employment, retail, recreational
- Travel time (Speed of service)
- Frequency of service
- Fares
- Connectivity to a broader public transportation network
- Legibility and information
- Comfort

Each of these factors, and how it is influenced by streetcar development, is described below. It is important to note that while there is no direct mathematical relationship between all of these factors and ridership, they have collectively proven to be key factors in attracting ridership to all types of transit routes. Figure 15 summarizes these factors and compares the ability of bus routes and streetcar lines to capitalize on each factor. The cumulative advantages of streetcar service explains the ridership increase transit operators have noted when replacing a bus route with an equivalent streetcar line.

Intensity of land use – There is a direct correlation between the intensity of land use along a transit corridor and the number of transit riders in the corridor. In fact, intensity of land use has proven to be the most important factor in determining transit ridership, and has a far more direct relationship than any demographic factor studied such as income or age.

Each of the three alignment alternatives were designed to serve the most intense land uses in downtown Salem. It

should be noted that existing development in the downtown is primarily focused on employment (especially public sector employment) and retail opportunities, with relatively few housing units in the downtown area. A mix of uses, including housing and jobs creates the best opportunity for high transit ridership.

Mix of land use (residential, employment, retail, recreational) – While overall density is the single most important factor in estimating transit ridership, the mix of land uses is also a contributing factor. Areas that are dominated by a single land use type may generate high ridership, but the ridership will be very directional and very peaked. For example, ridership from a residential neighborhood will generate a high number of commute trips leaving the area in the morning and returning at night, but relatively little ridership midday. A mixed-use area will attract commute trips in and out of the neighborhood as well as retail, recreational and other types of trips within the immediate neighborhood.

Both bus and streetcar lines have been proven able to attract routine trips such as commute travel, both for residents and employees. Where streetcars have an advantage over buses is in attracting occasional trips, especially for recreational purposes. The opening of the new conference center in downtown Salem offers a new type of trip that could be well served by the streetcar.

Based on the existing land uses, the streetcar would be most useful for shuttle trips within the downtown, including trips to and from the transit center and trips within downtown for lunches, meetings, etc. Conference center users and other tourists may also be interested in the streetcar as a form of transportation and entertainment.

Both existing and future land uses should be considered in developing ridership projections. Assuming the areas adjacent to the proposed streetcar alternatives achieve their full build-out potential, Alternative 2 has a slight advantage, both in intensity of use and in the mix of uses, especially for ad-

ditional residential units along the routes. Alternative 1 and Alternative 3 with the proposed extension perform similarly using this criterion.

Figure 15 Factors Influencing Ridership for Buses and Streetcar

Factor	How it Influences Ridership	Ridership Advantage – Bus vs. Streetcar
Intensity of Land Use	Density is the most direct influence on transit ridership – the greater the intensity of land use, the greater the ridership.	Slight advantage to streetcar, which tends to have higher carrying capacity than bus on a one for one basis.
Mix of land uses	Different land uses have different demand patterns. Mixing land uses ensures steady ridership through the day, rather than directional peaking.	Streetcar has a proven track record of attracting some types of trips that generally do not use bus transit – especially visitor- and tourist-oriented travel and weekend trips.
Travel Time	Riders are attracted to transit services that more closely match auto travel times.	Both bus and streetcar can be designed for fast service. The flexibility of bus service may give it slight advantage as buses can swerve around obstacles.
Frequency and Span of Service	Frequent service reduces wait times and allows riders to make trips without planning. Services with a longer service span are attractive to more types of trips. Longer evening service ensures riders who work late, or attend events in the evening will be able to get home.	No advantage – both bus and streetcar can be designed to run frequently.
Fares	High fares discourage ridership. Lower fares encourage ridership.	No advantage – fares can be the same for both.
Connectivity to a Broader Network	Connecting to regional services provides greatly enhanced mobility and enhances the ridership of the overall system	Slight advantage to streetcar which provides a highly visible connection to other routes.
Legibility and Information	The easier it is to understand a transit system, the more likely it is that occasional riders will use it. Real time information has been proven to increase ridership by as much as 5%.	Both bus and streetcar can be designed for quality real time information. However, streetcar has a slight advantage in that the tracks provide instant legibility.
Comfort	Roomier seats, ample room for standees, and a less “rocky ride” contribute to rider comfort and to increase ridership.	Slight advantage to streetcar, which operates on rails and therefore has less lateral movement than a bus. Riders often report they can read on streetcars but not on buses.

Travel Time (Speed of Service) – Travel times that are more competitive with auto travel will generate more riders. Travel times are based on the distance between stops along an alignment and the dwell times at stops, as well as the average speed between stops. Routes with more stops tend to be slower, as the transit vehicle tends to attain lower maximum speeds and lower average speed between stops.
Travel time or speed of service is directly related to conflicts from traffic. Buses or streetcars operating in their own right-of-way, similar to light rail service have the fewest intrusions from auto conflicts and operate with the fastest travel times.

There is no significant difference in travel time between bus and streetcar. While streetcars can have a higher design speed than the urban transit bus, close stop spacing and mixed traffic operations will result in similar operating speeds. Both bus and streetcars can be designed to operate with all modern protections such as signal preemption, queue jump lanes, etc. to increase speed. Similarly, both modern buses and streetcars can be low floor and have a number of wide doors to speed boarding thereby reducing dwell time at each stop and increasing travel speed. Buses may have a slight advantage over streetcar in that they can easily change lanes to get around conflicts in the primary transit lane, where streetcars can get "stuck" behind an incident or double-parked car.

Frequency – The more frequent a transit line operates, the less time spent waiting. In addition, very frequent service, with service at least every 15 minutes, allows riders to make trips without planning in advance. This is a very important factor in estimating transit ridership, particularly for generating trips that are not routine or made at the same time every day. For shuttle trips, which will make up the bulk of ridership on any proposed streetcar line in central Salem, the route should be no less frequent than every 15 minutes. Given wait times, and relatively short trip lengths, frequencies of less than every 15 minutes will lose significant rider-

ship to walking or due to people simply choosing not to take trips during the day. All alternatives are designed to be able to operate more frequently, with a goal of service every 10 minutes as demand increases.

Fares – Low or no fare systems encourage ridership by eliminating the need to put money in the farebox and by encouraging "short hop" trips that might otherwise be made on foot. In Portland and Tacoma, for example, the streetcar route is within the "free fare zone" for the transit operator, and no fare is charged. Currently, Salem does not have a free fare policy. For the purposes of estimating ridership standard transit fares were assumed. Ridership could be expected to increase by between 5 and 15 percent if fares are eliminated on the line.

Connectivity to a Broader Network – Connectivity to the high capacity regional network is clearly a key factor in influencing transit use. All three alternatives are designed to make good quality connections with the existing transit center in downtown Salem, and to provide connections with the Amtrak station. These connections are very important to maintaining ridership especially for "short hop" connections between a commute line and final destination or employment site.

Legibility and Information – Attracting riders is clearly easier when the line route is easy to understand, and when the customer feels comfortable knowing when the next transit vehicle will arrive and where it will be going. Recent studies show as much as a five percent ridership increase based on the availability of real time information alone. Both bus and streetcar systems can be designed with a high degree of real time information. However, only streetcars can provide the legibility of tracks in the street that defines the line. This is especially true in urban areas where there are many bus routes, but clearly only one streetcar track. Legibility and information have the greatest influence on attracting occasional or visitor trips, where riders do not have the time or experience to become fully familiar with a line route.

Comfort – There are many factors affecting passenger comfort, and they create an intangible factor that influences riders who have other travel mode options for their trip. Comfort may come in the form of more spacious or padded seats, bigger windows, ample standing room, and reduced motion. Any transit vehicle can be designed to maximize comfort, but here the advantage goes to streetcars, which operate on tracks, rather than buses, which experience significantly more lateral motion. Many riders describe the difference of "being able to read on the streetcar but not on the bus."

Ridership Experience in Other Cities

To estimate ridership for the lines on the proposed Salem streetcar network, we have reviewed examples from other cities where streetcars are serving similar land uses, as well as reviewing existing bus and streetcar ridership in Salem. Figure 16 shows the range of ridership and productivity, as measured in passengers per hour, from each of the peer cities included in this analysis, as well as a brief description of the unique factors that may contribute to each city's ridership statistics.

Figure 16 Peer Streetcar System Ridership

City	Annual Ridership	Ridership (Riders/Rev. Hour)	Factors Contributing to Ridership
Memphis	1,000,000	7.8	• Does not currently connect to a regional node • Short line serving shuttle and circulator trips
Tampa	420,023	24.3	• Similar land use intensity to Salem • Serves tourist and local trips.
Charlotte	40,000	27.6	• Very short line carrying mostly short circulator trips • Not connected to major regional service
Tacoma	738,536	49.2	• Free service and plentiful parking • Good connections to regional system • More intense land use than Salem • More integral to overall transit system than Salem proposals
Astoria	30,000	11.0	• Low density development, primarily a tourist service • Not seen as part of overall transit system.
Tucson	40,0000	35.0	• Operated primarily by volunteers • Not seen as part of overall transit system. • Densities slightly higher than Salem
	Average Salem Peers:	**22.1**	

Estimated Ridership for Three Potential Alignments

Ridership estimates for three potential streetcar alignments in Central Salem are presented below. Ridership estimates are based on known productivities from peer systems, adjusted for operating conditions in Salem. As a further validation, ridership estimates were compared with existing bus routes operating in relatively similar operating environments.

Given the advantages offered by streetcar operations, streetcar ridership is expected to be at least 15 percent higher than equivalent bus service. This is a conservative assumption based on the experience identified by peer cities. Figure 17 summarizes initial and build-out ridership estimates for the three streetcar alignments. Build out estimates assume full build out along the alignments as described in Figure 13.

Figure 17 Streetcar Ridership Estimates

	Alignment 1	Alignment 2	Alignment 3
Initial Ridership/Hour	20	23	25
Initial Annual Ridership	205,300	236,100	256,700
Full Build Out Ridership/Hour	25	32	30
Full Build Out Annual Ridership	256,700	330,600	308,000

Alignment 1 – Amtrak Station to North Downtown via Salem Hospital, Willamette University and Downtown

This alternative has the advantage of providing of providing very good access to a number of key generators within the existing downtown area including the new Conference Center, retail core, Tokyo and Willamette Universities and the Amtrak Station, as well as Salem Hospital. However, this alignment provides inferior service to the Capitol Mall area, to City Hall and the Library, all of which are likely to generate substantial streetcar ridership.

Initial productivity on this route is expected to reach approximately 20 boardings per revenue service hour, or just over 200,000 annual riders. This alignment offers significant redevelopment potential, particularly in the north downtown area. This alignment has the second highest potential for new dwelling units, increasing the mix of uses as well as the overall development potential. With such an increase in density and the mix of uses, ridership can be expected to increase by 25 percent, even if overall service levels remain

constant. Build out ridership of 256,700 translates to a line productivity of 25 riders per hour.

Alignment 2 – Amtrak Station to North Downtown Via Willamette University, Capitol Mall and Downtown

Alignment 2 offers a number of advantages over Alignment 1 including better service to the Capitol Mall area and better penetration of the commercial core. The trade-off for this improved service is relatively poor service to Salem Hospital, City Hall and the Library, all of which could generate substantial ridership. The improved service to the commercial core, and better access to more State workers in the most employment intense area of downtown will result in slightly higher initial ridership compared with Alternative 1, based primarily on access to jobs. Initial productivity of 23 riders per hour is predicted, resulting in initial annual ridership of just over 236,000.

Alignment 2 also has the advantage of having the highest development potential of any of the alternatives considered. Current zoning would allow for over 2,000 dwelling units along the line, and nearly 29 million square feet of retail and commercial space. Even with a four-story height limit, the alignment serves the greatest development potential of any of the alternatives considered. At full build out of existing zoning potential, ridership would be expected to be 40 percent higher than on opening day, resulting in an annual ridership of over 330,000 and an annual productivity of just over 32 passengers per hour.

Alignment 3 – Civic Center to Capitol Mall Via Downtown

This alignment provides the best service between the City Hall/Library/Civic Center area and the downtown business district. It also provides a very good connection to the Capitol Mall, providing service that is closest to the most jobs. The trade-off with this alignment is that it does not provide reasonable service to the Amtrak Station, the Universities, the Hospital or the north downtown neighborhood with its redevelopment potential.

Initial ridership on this line is expected to be slightly higher than Alternative 2, because it provides the closest service to the most current jobs. However, build out potential is much lower on this line because it misses the development potential of the North downtown. The build out potential along this route is based primarily on infill opportunities. Without the proposed extension, the development potential of this alignment is approximately 25 percent less in zoned developable commercial space and nearly 75 percent less potential for residential development along the line. The build out potential ridership on the line is expected to be 20 percent higher than opening ridership, or about 308,000 annual riders. Build out ridership on this line would still be higher than Alternative 1 based on higher initial ridership and better proximity to the jobs in the Capitol area.