

Appendix P

Streetcar and Enhanced Bus Peer Review Summary

Nicollet-Central Transit Alternatives

Streetcar and Enhanced Bus Peer Review Summary

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City of Minneapolis

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Introduction

This report includes a peer review of streetcar and enhanced bus systems in various cities across the U.S. The primary goal of the peer review is to provide additional context for the City of Minneapolis as it moves forward with its Alternative Analysis for the Nicollet-Central corridor. The experience of other cities with streetcars and enhanced bus systems provides valuable lessons learned for the planning, design, and construction phases of a new transit service in Minneapolis.

The peer review for both streetcar and enhanced bus systems are organized by the topics outlined below, which were evaluated for each of the peer cities.

- Project Purpose and Need
- Construction impacts
- Integration with existing bus service and other modes (e.g., bike facilities, streetscape)
- Ridership (projected vs. actual)
- Economic development and business partnerships
- Governance and funding
- Community support
- Land use planning process

1. Streetcar - Overview

The first portion of this report summarizes the findings of the streetcar peer review effort Nelson\Nygaard conducted for the Nicollet-Central Alternatives Analysis. These findings update a previous peer review Nelson\Nygaard conducted in 2011 as a precursor to the Alternatives Analysis. Streetcar systems included in this review range from existing lines to lines under construction:

- Portland, Oregon (two existing streetcar lines)
- Seattle, Washington (one existing streetcar line; one line under construction)
- Tucson, Arizona (new line under construction)
- Atlanta, Georgia (new line under construction)

2. Streetcar - Project Purpose and Need

The following section provides an overview of the project purpose and need for each of the four peer streetcar systems. Virtually all of the peer cities contacted said that connecting neighborhoods, fitting in with the existing environment, attracting new riders, promoting economic development, and reducing auto trips were important parts of the purpose for their project. Most of the lines are “starter” systems, with an initial segment designed to be part of a larger network in the future. The initial segments focus on the downtown area with connections to neighborhoods just beyond downtown.

2.1. Portland

The Portland Streetcar was the first modern streetcar to launch in the United States, and is currently the longest system, at over 9 miles in each direction. Its two lines, the North/South (NS) and the Central Loop (CL), connect to form an incomplete loop, with a third segment in the planning stages that would complete the loop via a new

crossing over the Willamette River. The lines are through-routed in downtown, and offer diverse connections to many bus and light rail lines.

Figure 1 Portland Streetcar System Map



Source: Portland Streetcar

The City of Portland's stated goals for the Portland Streetcar are to:

- Link neighborhoods with a convenient and attractive transportation alternative
- Fit the scale and traffic patterns of existing neighborhoods

- Provide quality service to attract new transit ridership
- Reduce short inner-city auto trips, parking demand, traffic congestion and air pollution
- Encourage development of more housing and businesses in the Central City¹

Figure 2 shows the route alignment of the current and proposed lines. The first line constructed, the NS line, opened in 2001 and runs on an 7.8-mile continuous loop (round-trip length) from downtown to major destinations such as the Pearl District, Portland State University, and the Legacy Good Samaritan Hospital. The second, the CL line, launched in September 2012 and runs on a 10.7-mile loop (5.35 miles in each direction) from downtown to the east side of the Willamette River. A third segment will eventually connect the two lines on the southern end as well, creating a full loop. These segments are relatively long compared with other cities that have implemented streetcars in segments of 3 miles or less.

2.2. Seattle

Seattle's streetcar network is currently comprised of one line, with a second under construction. The original South Lake Union (SLU) line runs from the South Lake Union neighborhood to downtown Seattle, with 11 stops along a 2.6-mile route (1.3 miles each direction). The First Hill line, which is scheduled to open next year, will serve 10 stations along a 2.5-mile alignment.

Figure 2 Existing South Lake Union Line (left) and First Hill Line Under Construction (right)



Source: Seattle Streetcar

¹ Source: <http://www.portlandstreetcar.org/node/11>

The SLU alignment was primarily chosen to connect development nodes near Lake Union to downtown Seattle. The primary goal for the First line is to offer better connections to regional transit. In general, the First Hill area is more urbanized than the SLU route, and offers additional infill potential.

Figure 3 South Lake Union Streetcar in Seattle



Source: Flickr/ kosmosxipo

2.3. Tucson

Tucson's first modern streetcar is scheduled to open in late 2013. The Sun Link Modern Streetcar will run 3.9 miles in each direction, connecting downtown Tucson, a major university and medical center, and several important business districts. Improving accessibility and spurring economic development in Tucson's central core are the City's primary goals for the streetcar, as well as addressing parking constraints and serving transit-dependent populations.

Figure 4 Tucson Streetcar Map



Source: Tucson Streetcar/City of Tucson

Figure 5 Rendering of Tucson Streetcar at University and Tyndall Station

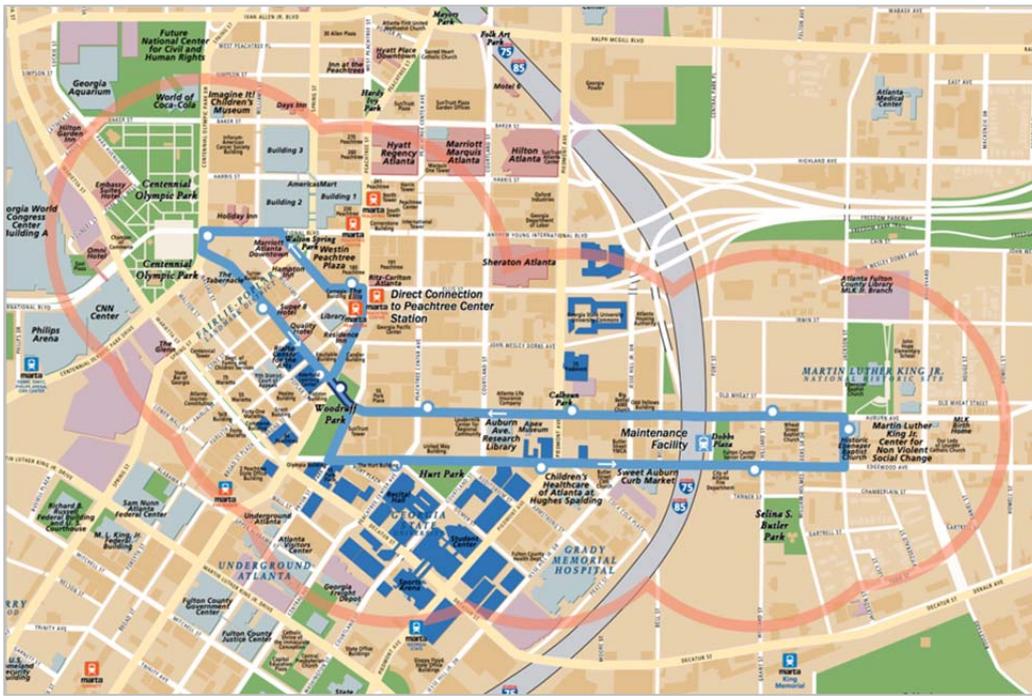


Source: Tucson Streetcar/City of Tucson

2.4. Atlanta

The Atlanta Streetcar is currently under construction and is projected to open in mid 2014, along a 2.7 mile loop (about 1.35 miles in each direction). The stated purpose of the Atlanta Streetcar is to link communities, improve mobility by enhancing transit access, support sustainable growth, and promote economic development and the development of livable communities. The streetcar line will connect major destinations, including downtown Atlanta, Georgia State University and the Martin Luther King National Historic Site, with MARTA, Atlanta's regional transit system.

Figure 6 Atlanta Streetcar Map



Source: City of Atlanta

3. Streetcar - Construction Impacts

There are several important findings about how each of the cities surveyed have mitigated construction impacts to businesses and residents:

- Streetcar construction often has less of an impact on businesses and residents than light rail projects, which often require more extensive street reconstruction, parking removal, and other impacts. Parking removal is relatively minimal for all of these projects, except for localized impacts near stations and to accommodate some certain travel and turning movements.
- The business community and developers are often the largest supporters of streetcar projects, and are often driving the project, and contributing to its financing.
- Most cities employ a phased approach to construction, limiting the impact to any one area at any given time.
- Construction updates on websites are also a common practice, as is close coordination and outreach to affected businesses.
- Streetcar projects can often be designed to minimize construction impacts, by avoiding major utilities and disrupting a smaller footprint during construction.

3.1. Portland

Portland's approach to mitigating streetcar construction impacts includes the following elements:

- Construction of the streetcar in several-block segments, with street and lane closures limited as much as possible
- Website with construction updates

- During design phase of streetcar project, city hosted "Streetcar Chats" to provide an opportunity for people who live, work or own businesses or property along or near line to talk directly with the project designers
- Provided "Open for Business" signage for all businesses near construction areas

For the most part, the Portland Streetcar did not require extensive parking removal, except to accommodate stations and turning movements. In these localized cases, parking removal was sometimes a contentious issue. On the whole, however, businesses strongly supported streetcar construction, especially for the second (CL) line, due to the increase in property values seen along the first line.

3.2. Seattle

In preparation for the First Hill Streetcar, Seattle's second streetcar line, project planners conducted extensive outreach with property owners and businesses to better coordinate with their operating schedules. Extensive planning focused on phasing the project's construction to minimize business impacts. During construction, the project planners have worked with businesses to provide signage and alternate routing information. In addition to business outreach, the project website provides construction updates.

Parking removal was necessary at stop locations along the SLU line, adding up to several dozen spaces over the entire route. Prior to construction, parking utilization rates along the line were relatively low, but higher demand is anticipated as a result of development. The First Hill line required much more extensive parking removal: about 50% of on-street parking on some sections. Most businesses and residences along the line have off-street parking, reducing the impact of on-street parking removal.

Despite localized construction impacts, both streetcar lines in Seattle are strongly supported by the business community and residents. In an interview, a project planner described developers and property owners as the driving force behind the project, with residents and businesses fighting to have the First Hill alignment in their neighborhood.

Locating the First Hill Streetcar maintenance facility was somewhat more contentious. Residents near the proposed location opposed the facility, based on concerns including lack of communication during the selection process, health and safety impacts, and the facility's lack of contribution to the desired mixed-use development pattern in the neighborhoods. A technical memo concluded that the City had followed industry standard processes during the selection process, however, and the proposed location was not changed.

3.3. Tucson

Tucson's approach to mitigating streetcar construction impacts includes the following components:

- Main Street Program
 - Provides \$10 million in small business assistance to businesses affected by road improvement projects (including the streetcar project)
 - Provides free consultant to businesses that need assistance before and during construction.
 - Main Street ombudsmen conveys business concerns related to construction to project team
 - To date, the Main Street Program has provided services to more than 700 businesses along streetcar route
 - According to project planners, local businesses report the Main Street Program is very helpful
- Building in phased segments to minimize impact
- Hosting weekly meetings with contractors
- Public relations team sending out alerts and updates

- During construction, flat rate parking special in two garages; free parking at a third.
- Detailed parking maps available on website during construction.

Once complete, parking will be removed in some locations, but overall the parking impacts along the route are expected to be limited.

Figure 7 Tucson Streetcar Construction Brochure Promoting Local Businesses

Gather this holiday season

Gather with friends & family to dine, play, & shop along the streetcar corridor during the holidays! Sidewalks are open and 15,000+ parking places make it convenient to explore during construction.

Be green this season – shop, play and do business along the streetcar corridor.

- 150+ shops
- 100+ eateries
- 30+ clubs & bars
- 20+ entertainment venues
- 30+ museums and galleries
- Hundreds of professional services
- Holiday events, fairs, parades & entertainment
- University of Arizona
- Fourth Avenue
- Main Gate Square
- Mercado District
- Downtown

LINK
Celebrate • Shop • Gather along the Sun Link Route
Check with merchants about holiday specials

Parking for the Holidays

15,000+ parking spaces on the streetcar route, steps away from shops, entertainment, food, culture, & holiday festivities.

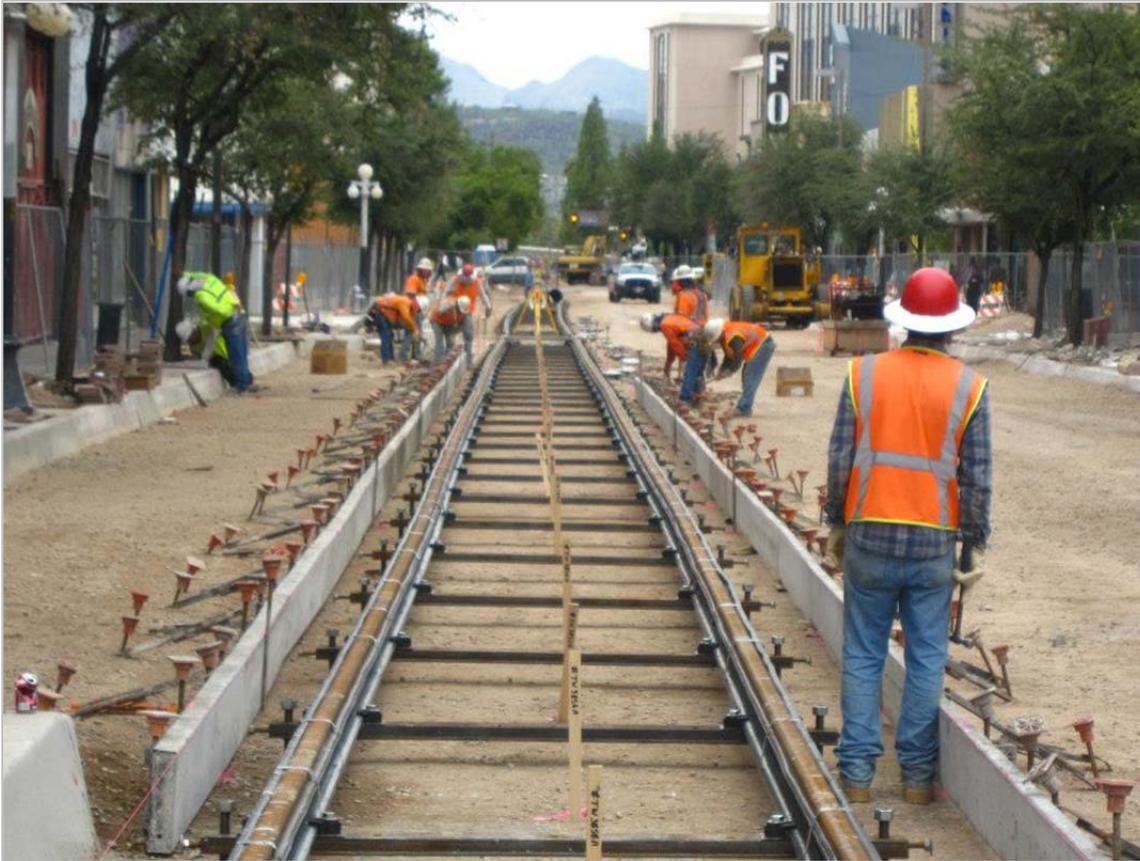
- Validated parking with many merchants
- 1100 on-street spaces – free after 5 pm & weekends
- Centro Garage - \$3 flat rate every day 'til 5 pm, \$3 flat rate after 5 pm Sun-Wed, \$5 after 5pm Thurs-Sat

ParkWise.Tucsonaz.gov • DowntownTucson.com • FourthAvenue.org
MainGateSquare.com • parking.arizona.edu

Source: Tucson Streetcar/City of Tucson.

After early wariness about the streetcar project, businesses are now supportive, and excited for service to begin. As part of its efforts to reach out to the business and retail community, the City paid for some business owners along the route to visit Portland and see the economic development impacts of its streetcar line. Major concerns that remain among businesses include preserving the historic character of the area, improving the streetscape, managing parking demand, and the operational details of the streetcar.

Figure 8 Construction on Tucson Streetcar



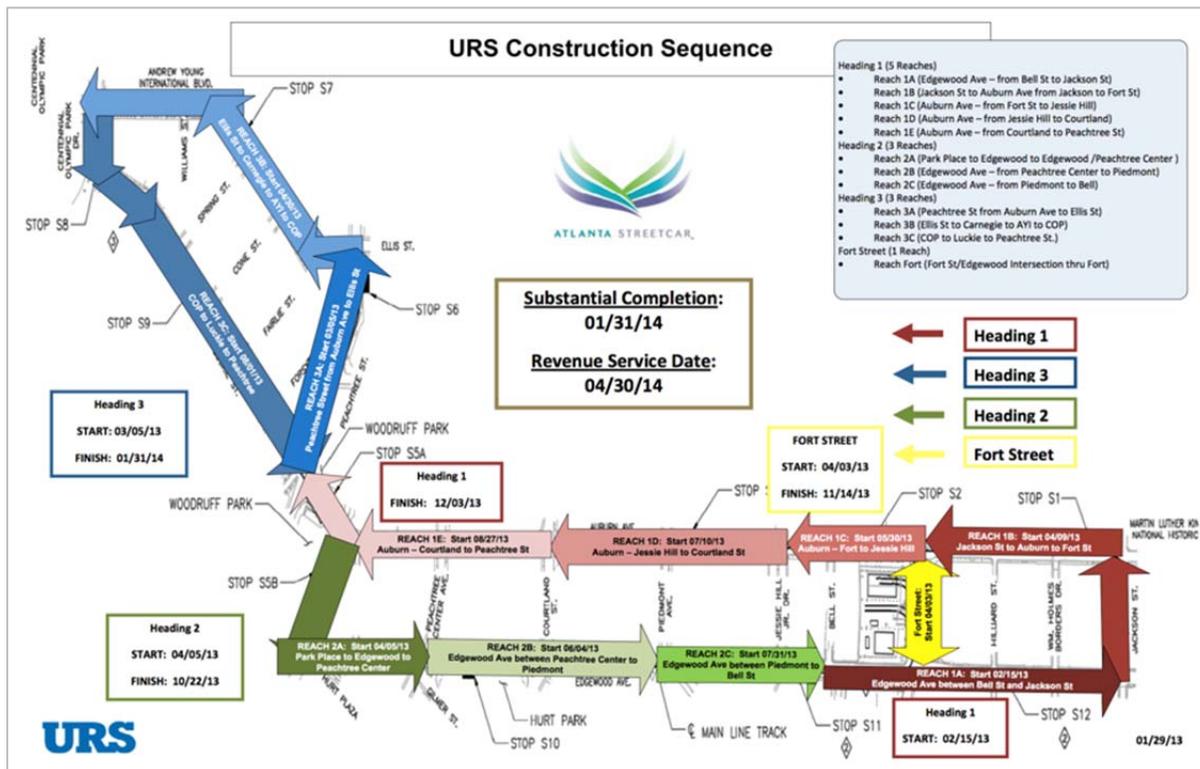
Source: Tucson Streetcar/City of Tucson

3.4. Atlanta

Atlanta's approach to mitigating streetcar construction impacts includes:

- Posting construction updates on the project website
- Conducting meetings in affected restaurants whenever possible
- Encouraging construction companies to advise workers to patronize shops along the line and keep the street fronts and sidewalks of shops as unobstructed as possible

Figure 9 Atlanta Streetcar Phased Construction Sequence



Source: Atlanta Downtown Improvement District/URS

The Atlanta business community has strongly supported the streetcar project. One illustration of this is the project's TIGER application, which included over 30 letters of support from businesses. Parking impacts are very limited: only 15 will be removed along the entire alignment. One of the project's goals is to actually reduce parking demand along the corridor by providing a quality alternative to driving, which could mitigate the parking loss.

Atlanta's streetcar will utilize a new storage and light maintenance facility located under a freeway overpass. In contrast to maintenance facilities located in mixed-use neighborhoods, the freeway underpass location has the benefit of not taking up prime real estate. The facility may also improve the actual and perceived safety of the underpass due to improved lighting and increased activity.

4. Streetcar - Integration with Existing Transit and Other Modes

Integration with existing transit service and non-motorized travel modes is a key challenge for each of the modern streetcar lines surveyed. In general, the modern streetcars surveyed do not directly replace parallel bus service. Many of the streetcar systems developed to date have been short lines or circulators serving the Downtown core. Existing bus service in the corridor, or along parallel corridors, typically provide service over a much greater length. Therefore, streetcars are often designed to serve different types of trips and market sectors. As a result, bus service is sometimes altered, but often is not. In the case of Portland, bus service was only modified many years after the launch of the streetcar. Most projects do not include overall streetscape overhauls, in order to keep costs down.

Integration of streetcars and bicycles was also examined as part of this section and managing conflicts with bicycles is also a recurring theme. While there have been a number of strategies employed, no city has fully solved

the problem of integrating streetcars and bikes, given the inherent safety challenges of bikes crossing streetcar tracks.

4.1. Portland

Portland's first streetcar line, the NS line, operates on a couplet that was previously devoid of bus service. The function of the streetcar is as a downtown circulator, and largely serves as supplemental service that does not compete with existing transit service. As a result, bus service was not changed when the NS line launched in 2001. Some bus service reductions were made near the NS line in September 2012, when the CL line was launched, but these were mostly a result of budget shortfalls that forced an overall service restructuring. Route 6 continues to operate in the same corridor as the new CL line.

Integrating streetcar service with Portland's bike network has been one of the biggest challenges for streetcar planners. A variety of measures are in place to manage conflicts, such as routing bike paths between stops and the sidewalk and striping bike paths to cross streetcar tracks at 90-degree angles, but this remains a major challenge. Conflicts with pedestrians have been limited, due to the slower speeds of streetcars compared to light rail.

4.2. Seattle

Seattle's existing and planned streetcar lines overlap bus service in some places, but do not replace it. Both streetcar lines are in corridors that have existing transit service, but are intended to serve as supplemental circulators. On South Jackson Street in downtown Seattle, the First Hill streetcar line will be center-running in order to avoid conflicts with existing transit service on the corridor. On Broadway, by contrast, the line will be side running because there is far less existing transit service.

The introduction of streetcar service to the Broadway portion of the First Hill line will be accompanied by a major redesign of the street that will include a 4-to-3 lane road diet, and the addition of a two-way cycle track. Dedicated bike traffic signals will be installed to separate bike traffic from other vehicle movements. The cycle track design will include "Copenhagen lefts" to accommodate turns across the streetcar tracks. No sidewalks or crosswalks will be removed as part of the First Hill construction, and some new crosswalks may be added.

4.3. Tucson

Streetcar service in Tucson will be accompanied by a streamlining of bus service to provide an integrated transit network. Tucson's streetcar alignment is designed to connect uses that are not linked by existing transit service, and will not directly replace a bus line, but existing transit service may be rerouted to better connect to the streetcar. Bus service will continue to operate on the same streets as the streetcar in many cases. Streetcars will operate in the center lanes, reducing the potential for conflict with buses, which will continue to run in side lanes and use separate stops.

Figure 10 Travel Time Benefits of Tucson Streetcar vs. Existing Transit Service (in Minutes)

Origin – Destination	Current Service	Modern Streetcar (Opening Year)	Modern Streetcar % Savings
West End Development – Downtown	22	13	41%
The University of Arizona – Downtown	31	18	42%
West End Development – UA	48	25	48%

Source: Tucson Streetcar TIGER Application

To minimize project costs, the Tucson Streetcar will not include an extensive street redesign or streetscape enhancements, except for the addition of basic amenities such as shelters and fare machines at some stops. The line passes through areas with high concentrations of bicyclists, such as the University of Arizona campus. To avoid conflicts with bicycles, streetcar stations have been situated in the center of the roadway in many locations. In downtown Tucson, the streetcar will operate on the left, inside lane to avoid conflicts with bicycles. Project planners report significant outreach with the bicycle community, but concerns remain about potential safety impacts due to conflicts with the streetcar tracks.

4.4. Atlanta

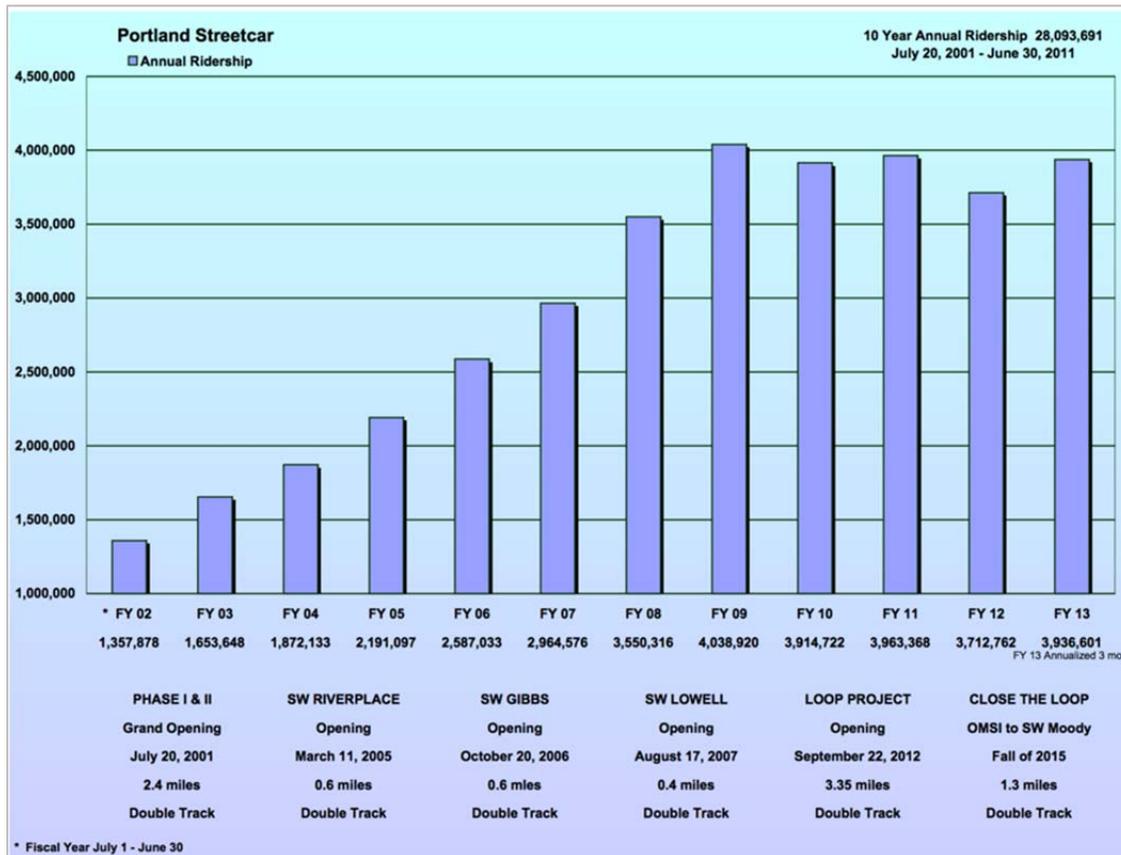
Streetcar service in Atlanta will not replace any existing bus routes. The line is designed to connect directly to MARTA, the regional rail system, and other existing bus lines. There are currently no plans to reorganize bus service when streetcar service begins operation.

The Atlanta Streetcar will interface directly with seven core and secondary city bicycle routes. In general, the route passes through some of the city's busiest biking and walking areas, including the Georgia State University campus. The streetcar route is also designated as a future bike route, but dedicated bike lanes will not be provided for most of the alignment due to space limitations. Where included, bike lanes will run in the opposite direction of the streetcar tracks to maximize the distance between bicyclists and the streetcar tracks.

5. Streetcar - Ridership Impacts

The following section summarizes projected and actual ridership for the four peer cities. Only two cities, Portland and Seattle, have existing streetcar systems to evaluate. In Portland, ridership on the North-South line has greatly exceeded projections. The initial weekday ridership target was 3,500, which the streetcar immediately exceeded. By 2005, weekday ridership had grown to 9,000, and now stands at about 11,000.

Figure 11 Portland Streetcar Ridership



Source: City of Portland Streetcar System Concept Plan

Ridership on Seattle's South Lake Union line has also exceeded projections. Ridership has also increased over time, from 1,000 in the first months of operation to 3,000 in fall 2012.

Portland's newest streetcar line, the Central Loop, has gotten off to a slow start, but the examples of original Portland streetcar line and Seattle's SLU line suggest that ridership may grow significantly over time.

The following table summarizes ridership figures for each of the four peer streetcar cities.

Figure 12 Ridership (Actual or Projected) Per Mile on Peer City Streetcar Lines

Streetcar Line	Average Weekday Ridership	Route Length in Track Miles (and Direction Miles)	Average Weekday Ridership Per Track Mile	Project Opening Year (Actual or Projected)
Portland: North-South	11,000 (FY12)	8 (4)	1,375	2001
Portland: Central Loop	3,200 (first week of service)	10.7 (5.35)	299	2012
Seattle: SLU	3,000 (Fall 2012)	2.6 (1.3)	1,154	2007
Seattle: First Hill	3,000-3,500* (2030)	5 (2.5)	600-700*	2014
Tucson	4,217*	7.2 (3.6)	586	Late 2013
Atlanta	2,600*	2.7	963	2014

Note: "*" indicates ridership figure is projected, not actual. Year of projection or actual ridership count is included in parenthesis if available.

6. Streetcar - Economic Development and Business Partnerships

Portland is the best-known example of the economic development impacts of streetcars, which is surveyed for each of the peer cities in the following section. Development along Portland’s first streetcar line has been impressive, but the degree to which this success can be attributed to the streetcar itself remains inconclusive. Cities have generally assumed significant economic growth will occur due to the introduction of a streetcar – in fact, this is often is a core reason for building a streetcar, including the cities selected for this peer review. As a result, business support for the streetcars is also strong in most of the cities profiled.

6.1. Portland

Portland's first streetcar line is the most widely cited example in the United States of the economic development benefits of modern streetcars. Over \$3.5 billion has been invested within two blocks of the streetcar alignment, yielding 10,212 new housings units and 5.4 million square feet of office, institutional, retail and hotel construction. The neighborhoods surrounding the line have undoubtedly been very successful in becoming denser and more popular destinations.

There is ongoing debate, however, about whether the neighborhoods surrounding the streetcar line, particularly the Pearl District, would have grown just as much even without the streetcar. This district was the target of extensive public and private investment aside from the streetcar, some of which almost certainly would have happened without the streetcar. There is a consensus that, at the very least, the streetcar catalyzed and organized this investment around the streetcar line, and may have helped to maximize private investment in the area.

The Central Loop, Portland's second streetcar line, is expected to spur economic development as well, in an area that is currently lacking in investment and economic growth.

6.2. Seattle

Seattle has also seen extensive economic development and growth near its first streetcar line, and many businesses and residents believe the success can be partially attributed to the streetcar. Consequently, neighborhoods and businesses near the second streetcar line have lobbied to have the alignment pass as close to

them as possible. The City and many businesses hope the permanent investment represented by a streetcar line will drive growth and bring people to the neighborhood.

One of several early signs of the streetcar's success in attracting development was the online retailer Amazon.com's decision to move its headquarters to South Lake Union in 2008. Amazon is now expanding its presence in the neighborhood again with new towers that straddle the streetcar line, and will pay the city to purchase an additional streetcar vehicle to increase service frequencies on the line and serve the additional employees working in the area.

6.3. Tucson

Tucson projects that its new streetcar line, once open, will lead to at least a 4% premium in the price of nearby properties, an average increase of \$9,200 per property by 2015 for each of the 3,800 properties within 1,500 feet of the streetcar alignment. This would lead to an aggregate increase of \$35 million along the alignment. The City also projects that the streetcar will lead to the creation of 1,480 long-term regional jobs.

6.4. Atlanta

Atlanta also anticipates positive economic impacts for the neighborhoods surrounding its planned streetcar line. The TIGER application for the project notes that there are 312 underutilized properties within a quarter-mile of the streetcar route, which the City and business community hope will benefit significantly from the streetcar's arrival.

Figure 13 Summary of Quantifiable Long-Term Benefits and Project Costs of Atlanta Streetcar

Long-Term Criteria	Benefits(s)/ Cost(s)	20-Year Sum
State of Good Repair	Residual Value of Streetcar Investment	\$1.36
Economic Competitiveness	Land Market Benefits	\$159.33
	Labor Market Productivity	\$2.65
Safety	Crash Reduction	\$0.34
Sustainability	Emissions Reductions	\$0.10
Livability	Travel Time Savings	\$2.60
	Vehicle Operating Cost Savings	\$1.36
Total Benefits		\$167.75
Capital Costs		\$53.64
Operating Costs		\$11.85
Total Costs		\$65.49
Benefit/Cost Ratio		2.56

** Millions of Dollars, discounted at 7%*

Source: Atlanta Streetcar TIGER Application



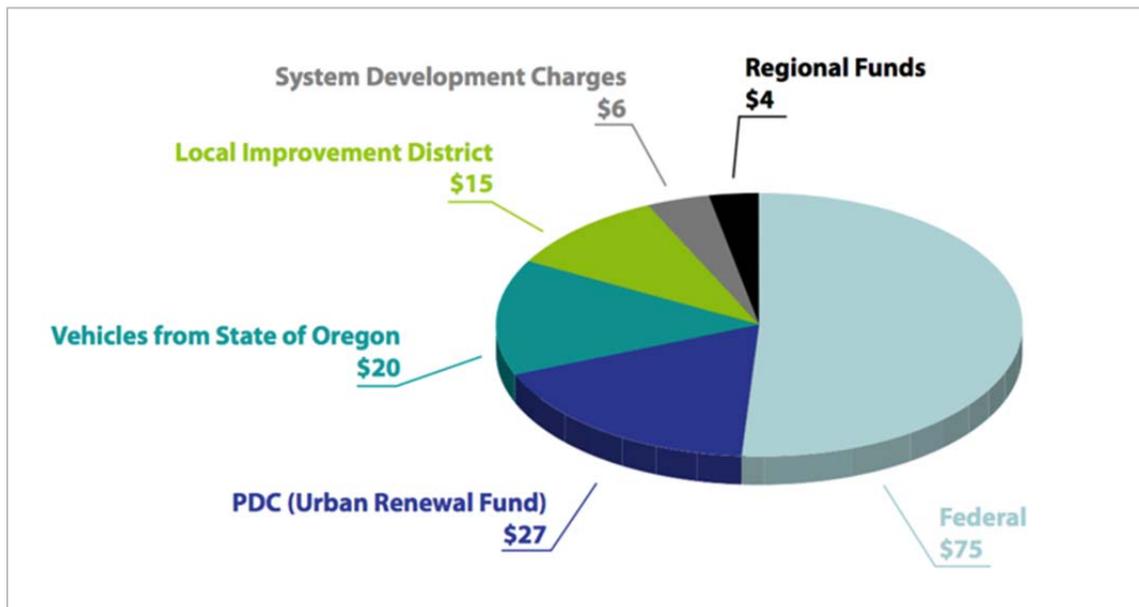
7. Streetcar - Governance and Funding

A review of the governance and funding structures in the five cities profiled turns up several key themes. First, streetcars systems are financed through a variety of local, regional, federal, public, and private sources. The federal government has heavily funded some systems, while other cities mostly go it alone. Second, most streetcar projects are led by the City, in partnership with the local transit agency. Several cities have separate non-profit entities that plan, operate and/or promote the streetcar, often with boards comprised of elected officials, business interests, and others. Finally, assessment districts are a common way to provide local funding.

7.1. Portland

The City of Portland has contracted with Portland Streetcar, Inc., a non-profit corporation formed to implement the Portland Streetcar, for design, construction and operation of the streetcar system. Its Board of Directors is comprised from both the public and private sectors. TriMet, the local transit operator, supplies streetcar operators and mechanics, and pays for just under half the operating costs for the streetcar system.

Figure 14 Funding Sources for Portland Central Loop Streetcar Project



Source: City of Portland Streetcar System Concept Plan

Construction of Portland's streetcar lines has been paid for through a wide variety of sources, including the FTA, parking bonds, tax increment funds, and many other sources. See Peer Review Matrix document for a full list of funds.

Figure 15 Typical Federal Funding Timeframe for Streetcar Corridor Project

Months	12	24	36	48-60
	Alternatives Analysis	Environmental and Preliminary Design	Engineering	Construction
Tasks	Analyze appropriate mode Transit modeling Ridership forecasting Concept design Federal funding application Public outreach Compare to other options	Environmental documentation Preliminary design Cost estimating Operations planning Local funding strategy Federal funding approvals Public outreach Compare to no-build	Final design Cost estimating Project cost controls Vehicle procurement Public outreach Final local funding approvals	Construction Quality assurance monitoring Project cost controls Vehicle delivery Public outreach

Source: City of Portland Streetcar System Concept Plan

Portland's business community has strongly supported the expansion of Portland's streetcar system, including a willingness to tax itself through tax increment financing districts to pay for the streetcar.

7.2. Seattle

Seattle's First Hill Streetcar, currently under construction, is projected to cost \$134 million to build, which will primarily be paid for by Sound Transit, the regional transit operator, which is currently the only operator of rail service in the region. Sound Transit also pays for the line's operating costs, and will contract with the local transit operator, King County Metro Transit to operate the line.

Seattle's existing SLU streetcar line receives funding from King County Metro Transit, which pays for 75% of the operating costs and operates the line, and the City of Seattle, which provides 25% of operating funds. The City relies on farebox recovery from pay stations, Federal Transit Administration grants, sponsorships, and donations to pay its share of the operating costs. It has not used money from its General Fund to pay for operating costs.

7.3. Tucson

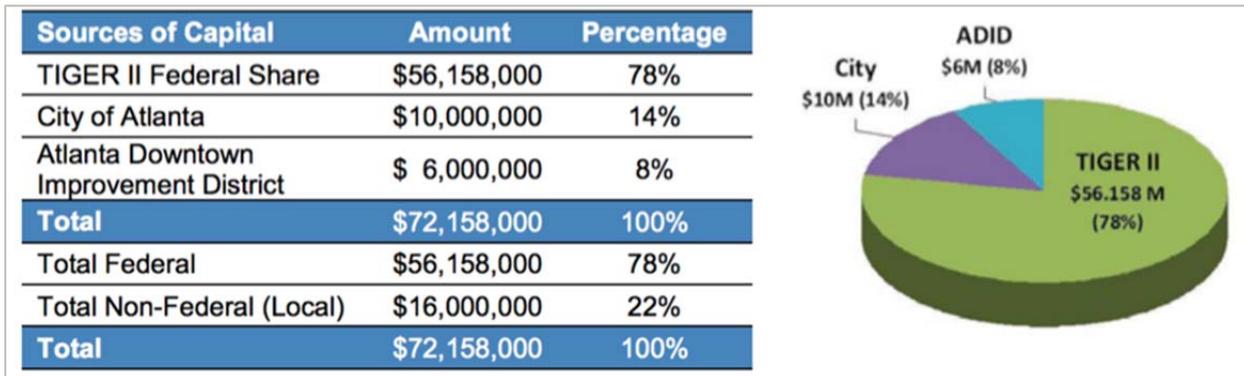
The Tucson Streetcar planning process is managed by the City of Tucson, with the city-owned transit operator Sun Tran, as a close partner. The City has also partnered closely with the University of Arizona's shuttle system, the regional transit operator (RTA), and the Arizona Department of Transportation. Sun Tran will operate the system.

Funding for the construction and operation of the streetcar came from RTA, local utilities, the City of Tucson, and other local sources, as well as FTA TIGER and New Starts grants. A notable political supporter of the project is former U.S. Representative Gabrielle Giffords, who advocated for federal funding for the project in 2008.

7.4. Atlanta

Construction of the Atlanta Streetcar will be paid for primarily through a \$47.6 million TIGER II grant, as well as \$15.6 million in matching contributions from the City of Atlanta, and \$6 million from the Atlanta Downtown Improvement District (ADID). As currently planned, operational costs will be covered by farebox revenue, advertising, ADID contributions, a car rental and hotel/motel tax, and federal funds. MARTA may operate the service, but there will be an RFP for potential operators.

Figure 16 Capital Funding Breakdown for Tucson Streetcar



Source: Atlanta Streetcar TIGER Application

ADID, a business group representing downtown, has been a key political champion and funding source for the project. Atlanta's current mayor has also been a major supporter.

8. Streetcar - Community Support

The following section provides an overview of the level of community involvement, outreach, and support for each of the peer streetcar systems. Three key themes from these cities emerged:

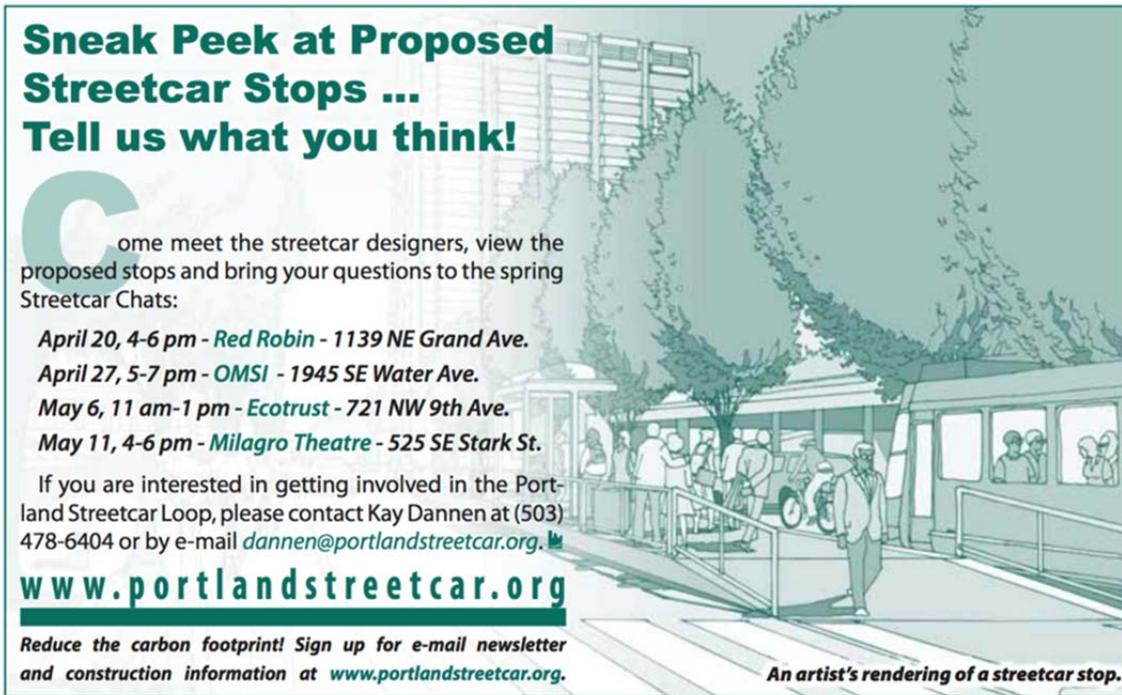
- Support of the local downtown businesses community is critical in most cases. They may even be the primary drivers of the project.
- Extensive outreach to businesses and property owners is important, especially if they will be part of a tax assessment district. Involvement with the local business association helps to do this.
- Residents and other interested members of the public should be involved early in the planning process. They often become key advocates for the project.

8.1. Portland

Streetcars have gained strong support from residents and businesses in Portland since their introduction in 2001. According to project planners, businesses that once opposed the project are now some of its biggest supporters. The depth of local support is demonstrated in part through businesses willingness to help pay for expansion of the system using a variety of fees and assessments. Balancing the economic development of the streetcar and the assessments on property owners is a key consideration, since assessments early in the project often outweigh the yet-to-be-realized benefits of increased economic activity for property owners.

The strong community support and economic impacts of the streetcar were also a key component in choosing streetcar over electric trolley bus service for the Central Loop line, since trolley buses were not expected to provide the economic development benefits associated with streetcars.

Figure 17 Community Meeting Flyer for Portland Streetcar Planning



Source: Portland Streetcar

8.2. Seattle

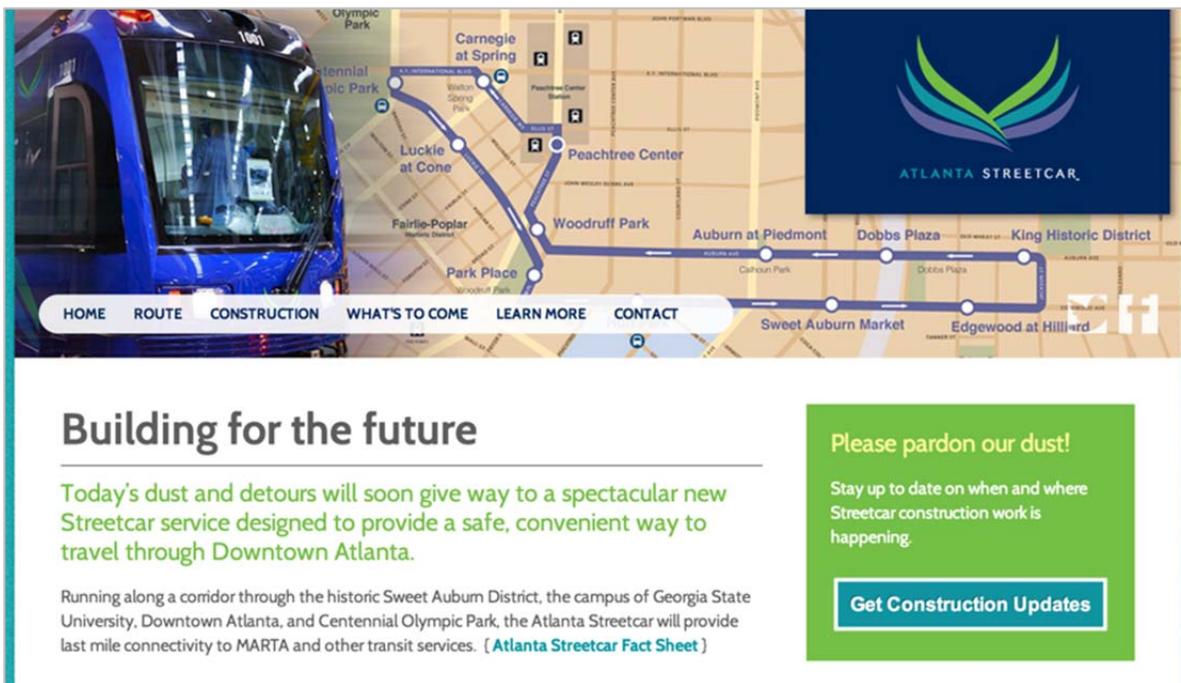
Both of Seattle's streetcar lines have received very strong support from the local business community, including an overwhelming willingness to enter into "Local Improvement District" tax assessment districts to pay for half the capital cost of the South Lake Union line (about \$25 million). During the planning phase for Seattle's second streetcar line, project planners report that neighborhoods argued over the alignment, with most residents wanting the line to come through their area rather than seeing streetcars operating on competing streets.

8.4. Atlanta

The Atlanta Downtown Improvement District (ADID) has been a major force in the development of a streetcar in Atlanta in large part. ADID is a public-private partnership governed by a board of directors of nine representatives from the private and public sectors, funded through a community improvement district. The business community has strongly supported the streetcar project due to its potential as a catalyst for economic development in downtown Atlanta.

In addition to ADID's active involvement, a project website and Facebook page are important components of the project's community education strategy.

Figure 19 Atlanta Streetcar Website



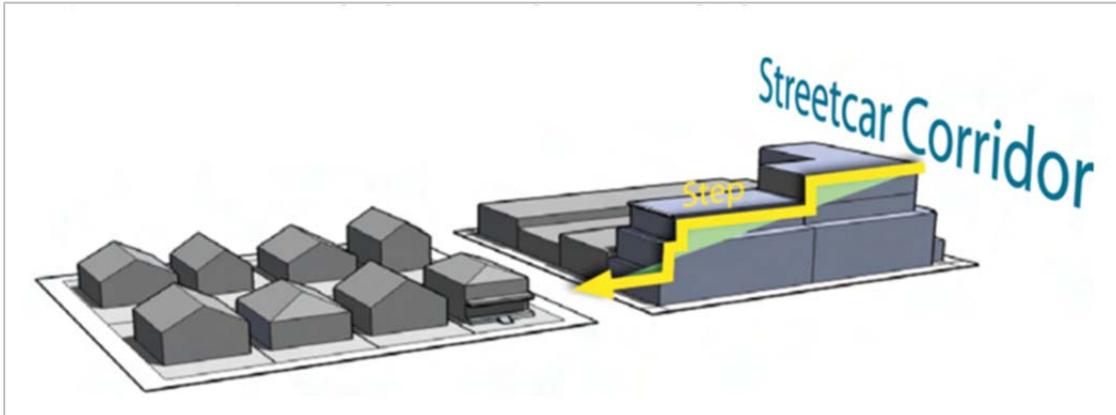
Source: Atlanta Streetcar

9. Streetcar - Land Use Planning Process

In each of the cities evaluated in this memo, streetcars are being implemented as a tool to spur development in some of the most central neighborhoods in each City. Most of these neighborhoods, whether in downtown or in redeveloping neighborhoods surrounding downtown, are already zoned for relatively dense development. In some cases, cities are also developing land use plans specifically tailored to complement the new streetcar lines and maximize development potential.

In Portland, the City is coordinating its streetcar network conceptual planning to make it an integral element of the City's updated comprehensive land use plan. In Tucson, the city has hired a consultant to develop a Land Use and Development Implementation Plan. So far, that effort has led to the design charrettes and public meetings, as well as the conclusion that the community is open to higher density along the streetcar corridor, if done right.

Figure 20 Portland Urban Design Concept Near Streetcar Corridors



Source: City of Portland Streetcar System Concept Plan

10. Streetcar - Conclusion

The case studies discussed in this report provide insight into the common themes that are likely to be relevant to Minneapolis as it continues with the planning of its own streetcar system. Support from the businesses community and residents, strong community outreach, support at the federal government level, and a strong economic development case are recurring components in all of the peer cities surveyed here. Most of these cases also suggest room for improvement as Minneapolis plans its own system. In addition to capturing economic development benefits similar to the cities surveyed here, Minneapolis is in a strong position to provide service improvements in a corridor with proven existing demand.

11. Enhanced Bus - Overview

The second portion of this report summarizes the findings of the enhanced bus peer review conducted for the Nicollet-Central Alternatives Analysis. Enhanced bus systems included in this review range from existing lines to lines still in the planning stages:

- Kansas City (two existing enhanced bus lines)
- New York City (existing enhanced bus line)
- Seattle (four existing enhanced bus lines and two lines in planning stage)

12. Enhanced Bus - Project Purpose and Need

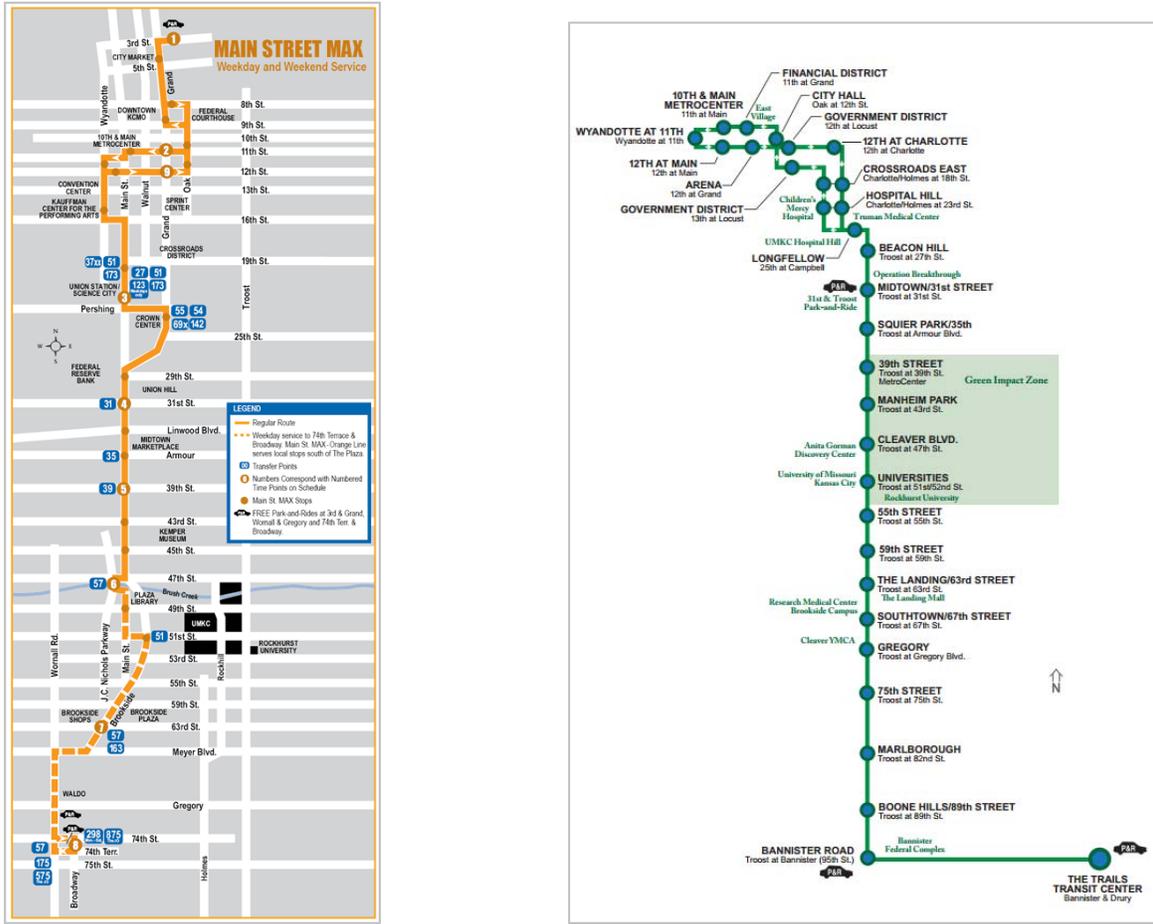
The following section provides an overview of the project purpose and need for each of the four peer systems. Several key factors emerged as the driving force for building enhanced bus lines, including:

- The ability to make improvements to important transit corridors quickly and affordably compared to building light rail (LRT) or a streetcar, thereby creating rail-like benefits at a fraction of cost.
- The ability to improve more corridors than LRT or streetcar would allow, due to the lower cost.
- Support for economic development goals, particularly in Kansas City

12.1. Kansas City

Kansas City has two enhanced bus lines in operation, including the Orange Line on Main Street and the Green Line on Troost Avenue. The Orange Line launched in 2005 and follows a six-mile route connecting the River Market, downtown, Union Station, Crown Center, and Plaza neighborhoods. The Green Line opened in 2011, and operates on a 13-mile route from downtown to the Bannister and Hillcrest area.

Figure 21 Kansas City MAX Route Maps (Main Street at left, Troost Avenue at right)



Source: KCATA

Figure 22 Kansas City Max Bus Service



Source: KCATA

The purpose of the Orange Line on Main Street was to attract new riders, provide some of the benefits of a dedicated rail corridor, build a unique identity for the line, reduce travel time, support economic development in the corridor, be quick to implement (3-4 years), and avoid the need for new taxes.

Following the opening of the MAX line on Main Street, a streetcar line was proposed for the Main Street corridor and is scheduled to begin construction shortly. The streetcar line is two miles in length, compared to the six-mile MAX route, and only partially overlaps with MAX, as their alignments vary in downtown. MAX service will continue to serve longer trips, given its wider stop spacing, and streetcar service will serve shorter trips, with a greater emphasis on spurring economic development.

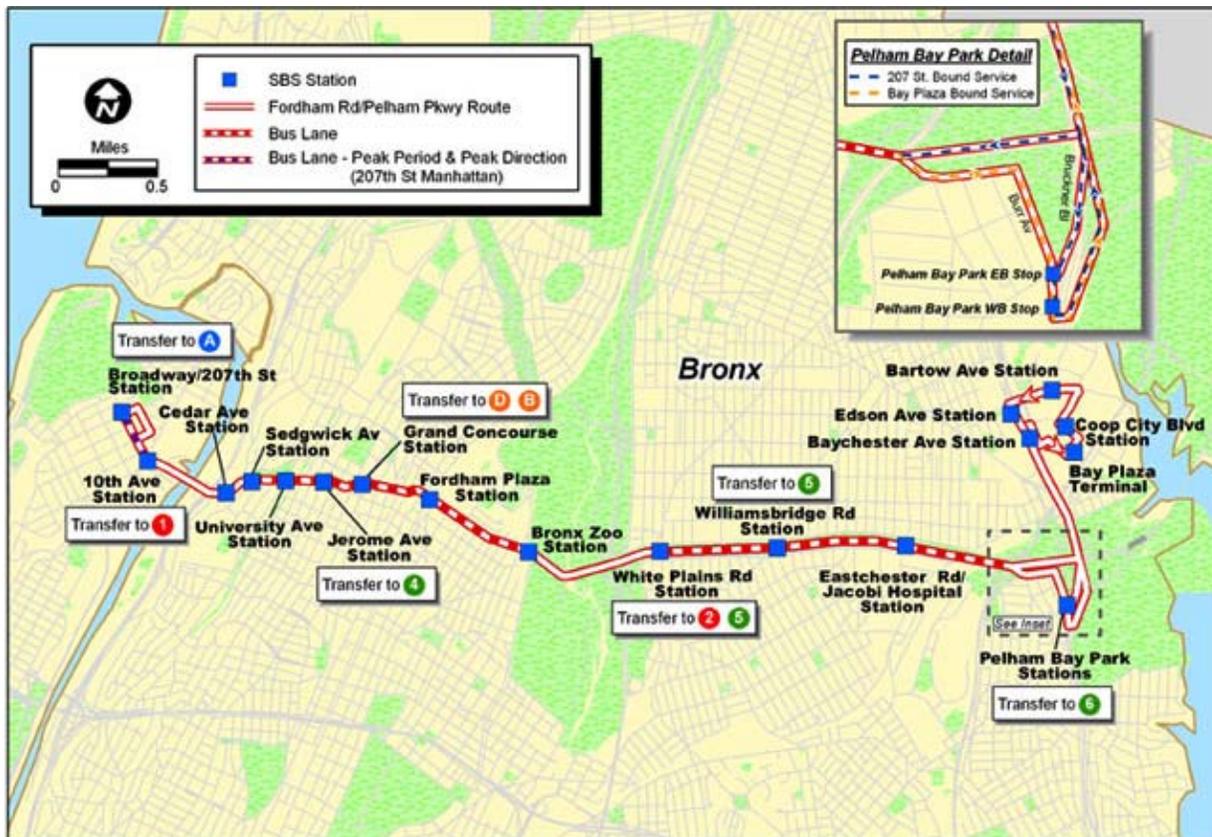
The Green Line on Troost Avenue had similar goals, though it was already a very strong transit corridor, so improving transit service for *existing* riders was also an important goal. Supporting reinvestment in the Troost Avenue corridor was especially central to the Green Line's development.

12.2. New York

New York City's Select Bus Service (SBS) is comprised of four existing enhanced bus lines, two under construction, and several additional projects in the planning stages. The first Select Bus line, the Fordham Road Bx12 SBS, launched in 2008, and is profiled in this chapter. The Fordham Road line operates over an 8.5-mile corridor from Broadway/207th Street in Manhattan to Coop City in the Bronx, with 18 stations in each direction.

The primary goal of Select Bus Service is to improve bus speed and reliability, as well as passenger comfort and convenience, at a lower cost than rail alternatives.

Figure 23 New York Fordham Road Select Bus Service Map



Source: New York MTA

Figure 24 New York Select Bus Service



Source: NYC DOT

12.3. Seattle

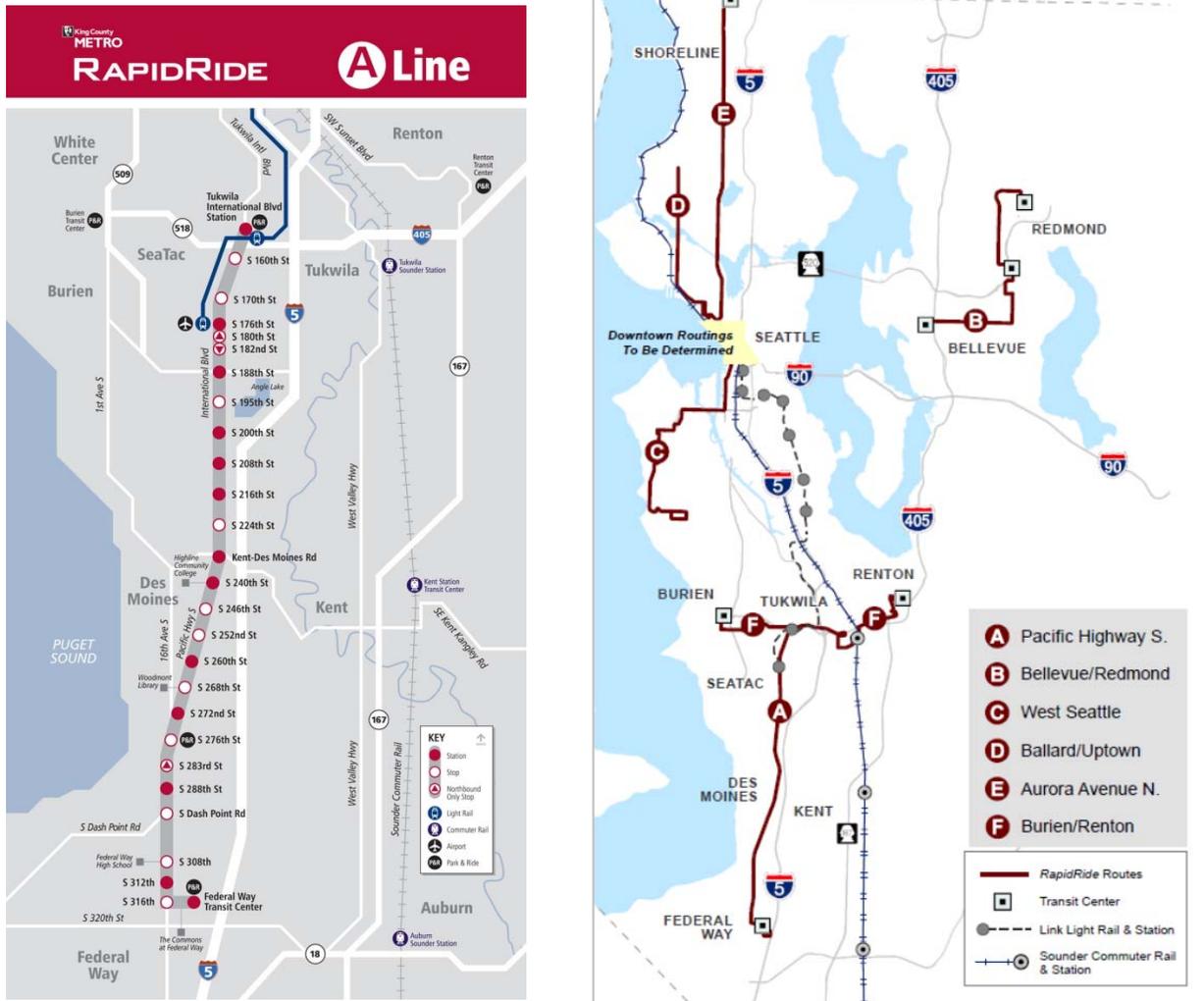
Seattle's RapidRide enhanced bus network opened its first line in 2010 and is continuing to expand, with 70 miles of rapid bus networked planned in total. RapidRide lines A, B, C, and D are now in operation, with lines E and F scheduled to open in 2014. RapidRide was designed to improve the speed and reliability of bus travel in a wide range of transit corridors, as well as the passenger experience on board and at stops and stations.

The first line to open, Line A, follows an 11-mile route with 50 stations and stops between the Federal Way Transit Center and the Tukwila International Boulevard Station, where many other transit connections are available.

Additional lines include:

- Line B: Bellevue Transit Center and the downtown Redmond Transit Center
- Line C: West Seattle to downtown Seattle using Fauntleroy Way SW and California Avenue SW (2012)
- Line D: Ballard to Uptown and downtown Seattle along 15th Avenue NW (2012)
- Line E: Aurora Avenue N (State Route 99) between Shoreline and downtown Seattle (planned opening 2014)
- Line F: Burien to Renton via Tukwila and Southcenter (planned opening 2014)

Figure 25 Seattle RapidRide Line A and System Maps



Source: King County Metro

Figure 26 Seattle RapidRide Line A



Source: FTA

13. Enhanced Bus - Construction Impacts

There are several important findings about how each of the cities surveyed have mitigated construction impacts to businesses and residents. Generally, the construction impacts associated with enhanced bus service are much more limited than LRT or streetcar, ranging from none for basic enhanced bus lines to full lane closures for more full-featured BRT lines. Likewise, enhanced bus systems often do not require new storage and maintenance facilities, minimizing overall construction impacts. Once operational, systems with dedicated transit lanes often involve removing on-street parking, which often requires strong support from local businesses and stakeholders.

13.1. Kansas City

Construction of Kansas City's two MAX lines involved relatively minimal impacts compared to rail construction. An emphasis was placed on not affecting existing business operations. The construction process consisted of bus shelter installation, limited repaving, and curb, gutter and sidewalk reconstruction. Temporary impacts were limited to some construction noise and lane closures. Access to businesses was maintained during construction.

The business community in Kansas City has been supportive of the MAX lines. Early in the planning process, LRT was the business community's preferred technology for Main Street, but a more cost-effective bus alternative was eventually adopted due to financial constraints. Although enhanced bus service is less known for its potential to spur development than light rail or streetcar, enhanced bus service fit more easily into the existing streetscape, and the long-term parking impacts of the MAX lines are minimal.

13.2. New York

While the construction impacts of New York's Fordham Road SBS line were relatively minimal, the project involved long-term trade-offs between the availability of curbside parking and transit reliability and speed. The City of New York hired a market research firm to study how people access Fordham Road businesses, and found that 90% arrive by a mode other than car. This finding helped to bolster support in the business community for removing on-street parking during the day to provide a transit-only lane for the SBS line.

Further reducing the Fordham Road SBS's construction impact is the ability of the buses to utilize an existing storage and maintenance facility.

Figure 27 Installing a Colored Bus Lane on the Fordham Road SBS Line



Source: NYCDOT

13.3. Seattle

Seattle's RapidRide lines have had very minimal construction impacts. Longer term changes to the street, such as removing some parking spaces near intersections to provide for transit priority treatments, have been met with opposition from some local businesses due to the perception that most customers will continue to arrive by car for the foreseeable future.

Figure 28 Construction of a RapidRide Line D Station



Source: King County Metro

14. Enhanced Bus - Integration with Existing Transit and Other Modes

The four enhanced bus systems profiled in this report vary in the degree to which they complement or replace existing bus service. They all serve corridors that had existing high-ridership service, providing a faster, more reliable alternative, with signal priority, high-quality stations, and other enhancements. The following section profiles the transition from existing service to the new enhanced bus service on each of the systems in more detail.

14.1. Kansas City

The Kansas City MAX bus service on Troost Avenue complements the corridor's existing bus route, serving as a limited-stop alternative to the existing local service. Route 25 on Troost Avenue was retained, though parts of the route alignment, hours of operation, and frequency were changed when MAX service began. The new MAX service on Troost Avenue offers a time savings of 10 minutes over the local route (40 minutes versus 50 minutes end-to-end). The two lines share many stops, and operate without creating major conflicts with each other.

Kansas City's MAX lines feature transit signal priority at intersections outside of the central business district (31 intersections on Main Street and 30 on Troost Avenue). Real-time information is provided at stations, as well as wayfinding information and maps. Improved lighting at stations is also an important feature of both MAX lines.

A streetcar line is about to begin construction in the Main Street corridor, which will partially overlap with the existing MAX Orange Line, stopping at much closer intervals. However, the lines overlap minimally in downtown, since the MAX Orange Line diverts from Main Street for most of its downtown route. The streetcar and bus may mutually benefit from existing and planned transit priority treatments in these shared corridors. There will be few shared stops, given MAX's wide stop spacing and different alignment downtown.

14.2. New York

Select Bus Service on Fordham Road replaced an existing limited stop service, and complements an existing local service that continues to operate. The new service completes a full run in 47 minutes on average, compared to the 58 minute travel time on the previous limited service. To avoid conflicts during passenger loading, local buses on Fordham Road have their own stops, separate from SBS stations.

SBS features signal priority at 20 intersections on the Fordham line, as well as high-amenity stops with off-board fare payment.

14.3. Seattle

Seattle RapidRide lines have generally replaced existing bus services where they have been implemented. For instance, RapidRide Line A replaced Route 174. The new service achieved 30% travel time reductions in some segments of the route. RapidRide Line A features signal priority at 20 intersections and real-time information and off-board payment at many stations.

15. Enhanced Bus - Ridership Impacts

The following section summarizes projected and actual ridership for the four peer cities. The four systems profiled in this report have all been successful in increasing ridership:

- Kansas City's Orange Line on Main Street experienced a 50% increase in ridership compared to the existing bus service. The line has also had success in attracting "choice riders" who could drive but now instead choose to ride the MAX.
- New York's Fordham Road corridor experienced a 7% increase in ridership in its first year (local bus and SBS compared to local bus and the previous limited service). While this is a smaller increase than other systems, it remains impressive given that Fordham Road is already a mature transit corridor with very high ridership. Thirty percent of customers surveyed said they were riding more frequently than before the SBS line was implemented.
- In its first six months of operation, Seattle RapidRide Line A experienced a 25% increase in ridership compared to previous bus service.

Figure 29 Ridership (Actual or Projected) Per Mile on Peer City Enhanced Bus Lines

Enhanced Bus Line	Average Weekday Ridership	Route Length in Miles	Average Weekday Ridership Per Mile	Project Opening Year
Kansas City MAX: Orange Line (Main Street)	6,000	6	1,000	2005
Kansas City MAX: Green Line (Troost Avenue)	8,500	13	654	2011
New York SBS (Fordham Road)	31,079	8.5	3,656	2008
Seattle RapidRide Line A	7,500	11	682	2010

The ridership increases in these four systems demonstrate the ability of enhanced bus lines to attract new riders in large numbers. The travel time, reliability, comfort, and branding elements featured in each of these systems seem to partially offset the traditional bias towards rail among "choice riders."

16. Enhanced Bus - Economic Development and Business Partnerships

Enhanced bus services are often built with economic development in mind, though the expectations for growth are more modest than those for light rail or streetcar systems.

A study of the Select Bus Service on Fordham Road in New York found that retail sales at locally-based businesses in the corridor had increased 71% since the line was introduced, compared to 23% borough-wide. Though other factors could be at play, the increase is impressive, and suggests that the loss of parking on the street was not detrimental to businesses.

17. Enhanced Bus - Governance, Costs, and Funding

A review of the governance and funding structures in the three cities profiled reveals several key themes:

- Transit agencies tend to plan and operate the enhanced bus lines, though they must coordinate with cities to implement signal priority and stripe the streets where necessary.

- New York City's Department of Transportation may have played the most active role of the cities involved, whereas transit agencies generally took the lead in other cities.
- The split between federal and local funding varied greatly between the systems, ranging from 20% local funding to 100% local funding.

Figure 37 summarizes the capital costs for each enhanced bus line, as well as for the streetcar lines profiled in the Streetcar Peer Review.

Figure 30 Capital Costs for Enhanced Bus Lines and Streetcar Lines

Line	Length (Route Miles)	Capital Cost (Millions)	Capital Cost/Mile (Millions)
Enhanced Bus Systems			
Kansas City MAX Orange Line	6	\$20.90	\$3.5
Kansas City MAX Green Line	13	\$30.70	\$2.4
NYC SBS Fordham Line	8.5	\$10.50	\$1.2
Seattle RapidRide A Line	11	\$25.40	\$2.3
Seattle RapidRide E Line	11	\$48.09	\$4.4
Streetcar Systems			
Portland Streetcar System	7.35	251.42	\$34.2
Tucson	3.6	\$196	\$54.4
Seattle SLU	1.3	\$52.10	\$40.1
Seattle 1st Hill	2.5	\$134	\$53.6
Atlanta	1.35	\$69.20	\$51.3

As Figure 30 illustrates, per mile capital costs are generally much higher for streetcar systems than enhanced bus systems. The enhanced bus alternatives cost significantly less per mile than the lowest-cost streetcar systems on a per mile basis.

Comparing operations and maintenance costs, enhanced bus services are also generally more cost-effective. Data was not available for all systems profiled in this peer review, but a trend towards lower costs among the enhanced bus systems was evident. Seattle's South Lake Union streetcar linecosts \$5 million annually to operate and maintain, or \$1.5 million per route mile.

Portland's streetcar system costs \$8 million annually to operate, or \$1.1 million per route mile, but maintenance costs are not available. The operating costs alone for Kansas City's MAX Orange Line, Green Line, and Seattle's E Line, respectively, were \$0.7 million, \$0.4 million, and \$0.5 million per route mile.

These operations and maintenance costs should be viewed with caution, since they are presented per route mile instead of per service hour or service mile. Nonetheless, both the operations and maintenance costs and costs for each of the peer systems underscore the relative affordability of enhanced bus service compared to streetcars.

17.1. Kansas City

Kansas City received federal grants for both of its MAX lines, covering 80% of the costs, through Small Starts and Very Small Starts grants. A local sales tax paid for the remaining 20% of the Troost Avenue line. A combination of city bonds and transit agency funding covered the local match of the Main Street line. KCATA, the local transit provider, operates and manages the lines.

Given the large federal contribution and small overall project cost, the MAX system encountered less opposition from local groups opposed to tax increases than an earlier proposed for a light rail system in the corridor.

17.2. New York

The Fordham Road SBS line cost approximately \$10.5 million to build and was funded without federal assistance. Planning of the line involved collaboration between MTA (the transit agency) and the New York City Department of Transportation, which manages streets and signals. MTA operates and manages the line.

17.3. Seattle

Funding sources for Seattle's RapidRide system has varied by line, but an important source for each line has been the Transit Now sales tax in King County. Additional funds have come from cities, employers, and other organizations that benefit from the service. For lines built later, RapidRide has received some federal funding. The E line, for instance, received almost half its funding from the FTA, including Small Starts grants. A metro sales tax and property tax paid for the bulk of the remaining cost. Metro Transit operates the RapidRide system, but must coordinate with local jurisdictions that control streets and traffic signals.

An important political champion for the RapidRide system was King County Executive Ron Sims, who advocated for the Transit Now initiative that helped fund RapidRide. Other Transit Now supporters included labor union, environmental groups, and several suburban cities.

18. Enhanced Bus - Community Support

The following section provides an overview of the level of community involvement, outreach, and support for each of the four peer cities. Cities arrived at building enhanced bus systems through different paths. One cities turned to enhanced bus after LRT proved too expensive in a specific corridor, while the other two focused on enhanced bus from the start and studied many potential corridors.

Public enthusiasm for fixed rail's benefits is often high, but enthusiasm for paying for the high costs remains a major obstacle to implementation. In several of the systems profiled here, strong branding increased public enthusiasm for more affordable enhanced bus service in lieu of rail, emphasizing the features of the enhanced bus systems that closely resemble rail.

18.1. Kansas City

Early in the planning process for Kansas City's Main Street transit corridor, community members expressed a preference for LRT over other transit technologies. Despite this local preference among stakeholders, voters did not pass a sales tax that would have paid for the line. Consequently, planners and stakeholders had to rethink their approach to the corridor. KCATA, the regional transit agency, continued to hold public meetings with neighbors and businesses, and eventually settled on an enhanced bus system for Main Street, which would not require a tax increase.

When service began on Troost Avenue, the second MAX line, KCATA conducted education and outreach to the community along the alignment, as well as current riders, to explain the differences between the previous bus service and the new MAX line, emphasizing the benefits of the enhanced bus service.

18.2. New York

New York City focused on enhanced bus service from the beginning of the planning process that led to SBS on Fordham Road. Fordham Road was the first of many corridors it hoped to add enhanced bus service to. Customer Ambassadors helped to explain the service to new riders upon its launch.

Figure 31 Badge Worn By Customer Ambassadors on New York's SBS



Source: NYCDOT

18.3. Seattle

Similar to New York, Seattle was focused from the start on building an enhanced bus network in a wide range of corridors, with Line A being the first to open. The Transit Now sales tax initiative successfully passed at the ballot in 2007, and has helped to fund the system's development over the years.

The RapidRide website provides a clear explanation of how the service works, as well as providing information about planned expansions to the system.

Figure 32 Seattle Transit Now Campaign Website



Source: peoplefortransitnow.com

19. Enhanced Bus - Land Use Planning Process

In the cities profiled for this report, enhanced bus service was not generally implemented in coordination with updates to local land use plans, though the lines often were implemented in areas that are already zoned for more dense development.

20. Enhanced Bus - Conclusion

The case studies discussed in this memo provide insight into the common themes that are likely to be relevant to Minneapolis as it evaluates enhanced bus and streetcar service. Enhanced bus service generally brought less documented economic development than the systems profiled in the streetcar peer review, though they were able to deliver significant transit improvements at a much lower cost than streetcars or light rail. In New York and Seattle, enhanced bus service was able to cost-effectively fill the gaps between rail lines, complementing them and completing the regional transit network.

Strong branding and high-quality design were instrumental to maximizing the appeal of enhanced bus systems. While enhanced bus lines lack the stylistic appeal of streetcars, their cost effectiveness makes it possible to build complete networks much faster than is possible with streetcars.