

5 PEER REVIEW



Transit Lanes on Marquette Street and Second Avenue
in Minneapolis

Image from Nelson\Nygaard



This section examines transit services and performance in five U.S. cities and two Canadian cities that are North American leaders in transit service delivery and system development. The evaluation is intended to provide insight into challenges and opportunities Seattle will face as the regional rail system is expanded, RapidRide begins in Seattle, and the city continues to grow.

5 PEER REVIEW

OBJECTIVES AND PEER DESCRIPTION

This peer review explores how transit performs and is structured and how Seattle compares to other North American cities that are leaders in delivering high-quality transit services. Although each city and transit agency is unique, the similarities and differences in these five U.S. cities and two Canadian cities provide useful insight into how transit works in Seattle and opportunities for improvement. Key points of review include downtown circulation, capacity of major bus corridors, and implementation of light rail and bus rapid transit. While size was a consideration in selecting peers, greater weight was placed on choosing peers that are industry leaders and are implementing projects or initiatives that will be instructive as Seattle makes decisions about investments in transit.

The peer review is organized into the following major sections:

- **Peer Description**, including modes operated and level of transit use
- **Peer Overview**, a profile of transit service in each city
- **Bus and Rail Transit Operations**, analyzing transit performance measures
- **Fare Structures**, including fares and related policies
- **Governance**, discussing policies for allocating transit service and use of transit infrastructure
- **Downtown Circulation and Service Configuration**, focusing on how to serve downtown

FIGURE 5-1 BASIC PEER CHARACTERISTICS

City	Agency	Type of Provider	City Population	Service Area Population
Seattle	King County Metro / Sound Transit	County / Region	582,490	1,884,200 / 2,715,000 (County / Region)
San Francisco	Muni	City	808,976	824,525
Vancouver	TransLink	Regional	578,041	2,271,224
Portland	Tri-Met	Regional	560,194	1,466,540
Denver	RTD	Regional	598,707	2,619,000
Minneapolis	Metro Transit	Regional	360,914	1,761,308
Pittsburgh	Allegheny County Transit Authority	County	297,187	1,415,244
Ottawa	OC Transpo	City	900,000	784,725

Notes: National Transit Database, Canadian Urban Transit Association, and American Community Survey, 2008; Canadian Census, 2006.

- **System Branding and Legibility**, including transit information and marketing
- **Conclusions**, summarizing issues/models for Seattle to consider

The data used in the review is primarily from 2008, drawn from the National Transit Database (NTD) and Canadian Urban Transit Association (CUTA) as well as from each transit agency. In the case of light rail service provided by Sound Transit, partial-year data from 2009 and 2010 is used to evaluate performance for Central Link light rail, which was opened in mid-2009 and extended to Sea-Tac Airport in December 2009. Data for the King County Metro West Subarea (which includes Shoreline, Lake Forest Park, and Seattle) was used to assess bus operations within

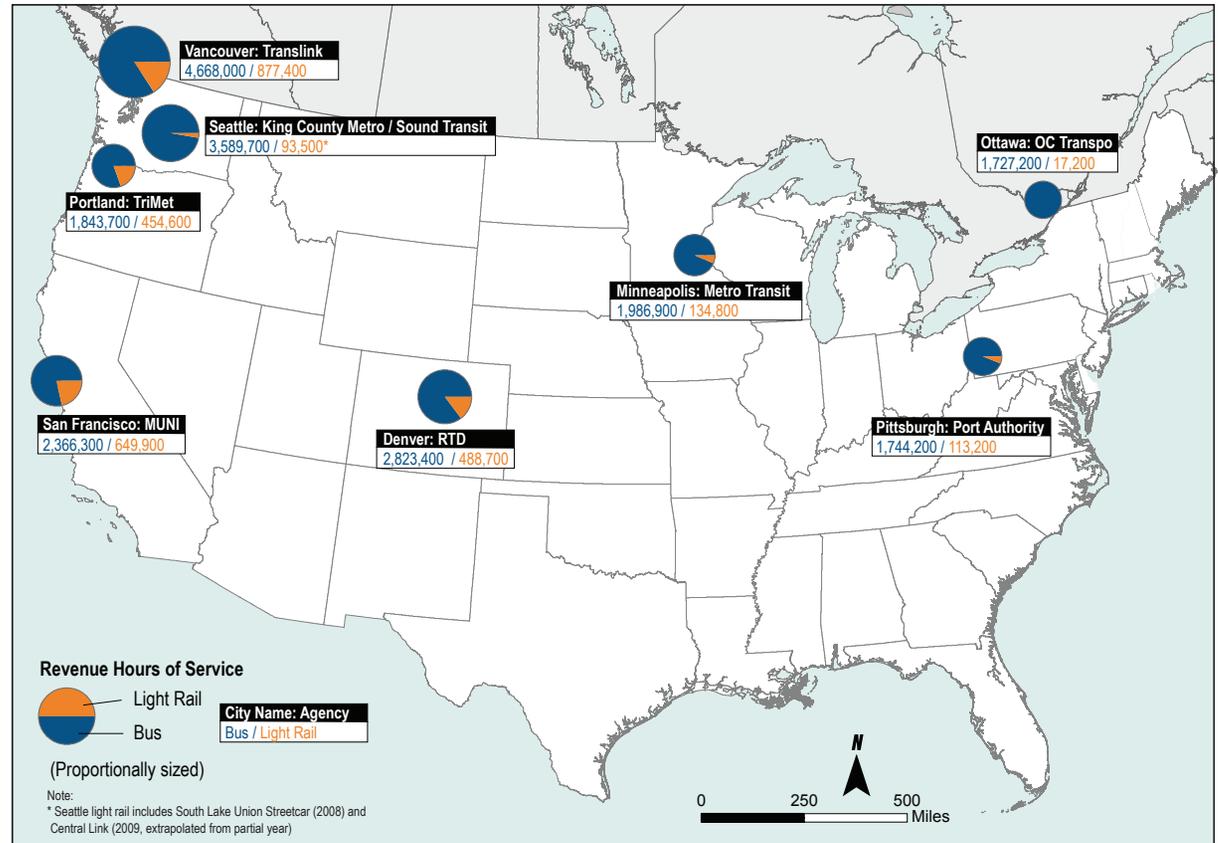
Seattle. Although streetcar is distinct from Link light rail service in Seattle and shown separately where possible, the NTD combines light rail and streetcar data into a single category.

Figure 5-1 identifies the primary transit agency in each peer city and provides basic information about each city, including the type of provider. San Francisco and Ottawa are both city agencies with approximately equal service area and city populations; in San Francisco, Muni serves a slightly larger population than the city, while in Ottawa, OC Transpo does not serve the entire city population. The others are county or regional agencies that serve populations several times larger than the city's population, as is the case in Seattle.

Figure 5-2 identifies the peer cities and shows their geographic distribution along with the proportion of transit revenue vehicle hours fulfilled by bus and light rail transit. (Revenue hours include time when a transit vehicle is available to carry passengers and layovers, but exclude “deadhead” time, such as when a bus travels between a garage and the start or end of a route.)

As in Minneapolis, Ottawa, and Pittsburgh, light rail makes up only a small share of public transit service in Seattle. Almost all the peer cities are actively planning, building, or have recently completed expansions to their rail systems. Ottawa and Pittsburgh have bus-based systems, including significant dedicated busway facilities.

FIGURE 5-2 PEER TRANSIT SYSTEM CITIES: REVENUE HOURS BY MODE

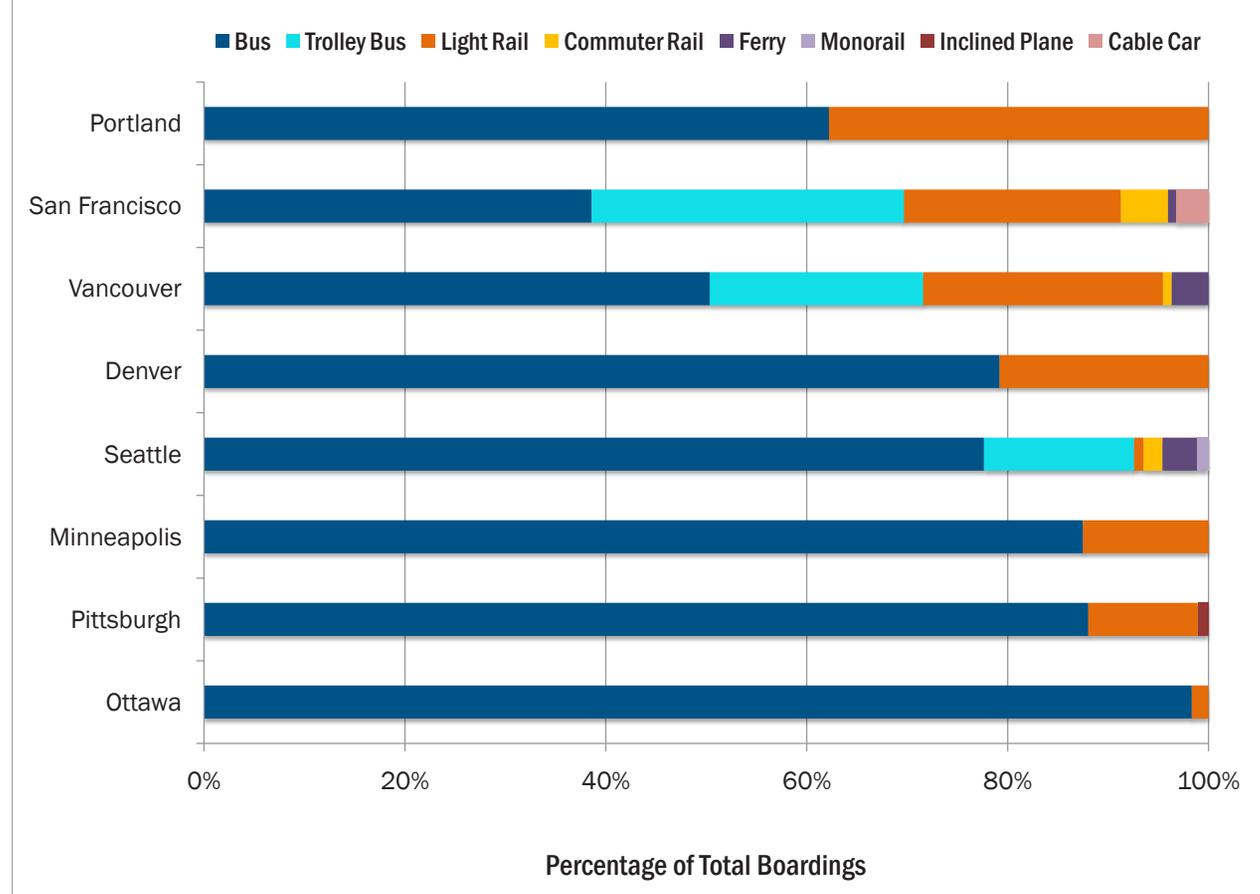


TRIPS BY MODE OPERATED

Although this review focuses on bus and light rail/streetcar service, Figure 5-3 illustrates that transit trips in Seattle and in the peer cities are provided on a variety of other forms of transit service or modes. The chart shows the share of transit boardings for each mode in 2008, in order of the combined share of bus and electric trolley bus service. Seattle falls in the middle of the peer group, with over 80% of transit boardings served by bus transit. Trolley buses also provide a significant share of bus service in San Francisco and Vancouver. Light rail (South Lake Union Streetcar and Link) serves a small but growing share of trips in Seattle; this is comparable to Ottawa, which is undertaking a significant reconstruction of its central Transitway (busway) to accommodate light rail. Washington State Ferries provides the second largest share of trips in the Seattle region after combined bus/trolley bus service, while Sounder commuter rail and the monorail serve small shares of total transit trips. In Denver and Minneapolis, transit was almost completely bus-based less than a decade ago, but rail expansions have sparked rapid transitions toward increased rail ridership.

Several unique transit modes provide both a transportation function and serve as a tourist attraction: the Seattle Center Monorail, San Francisco's cable cars, and Pittsburgh's Duquesne and Monongahela inclined plane railways (or funiculars), which use a cable to pull a pair of railway cars up steep slopes.

FIGURE 5-3 PERCENT OF TRANSIT TRIPS BY MODE, 2008



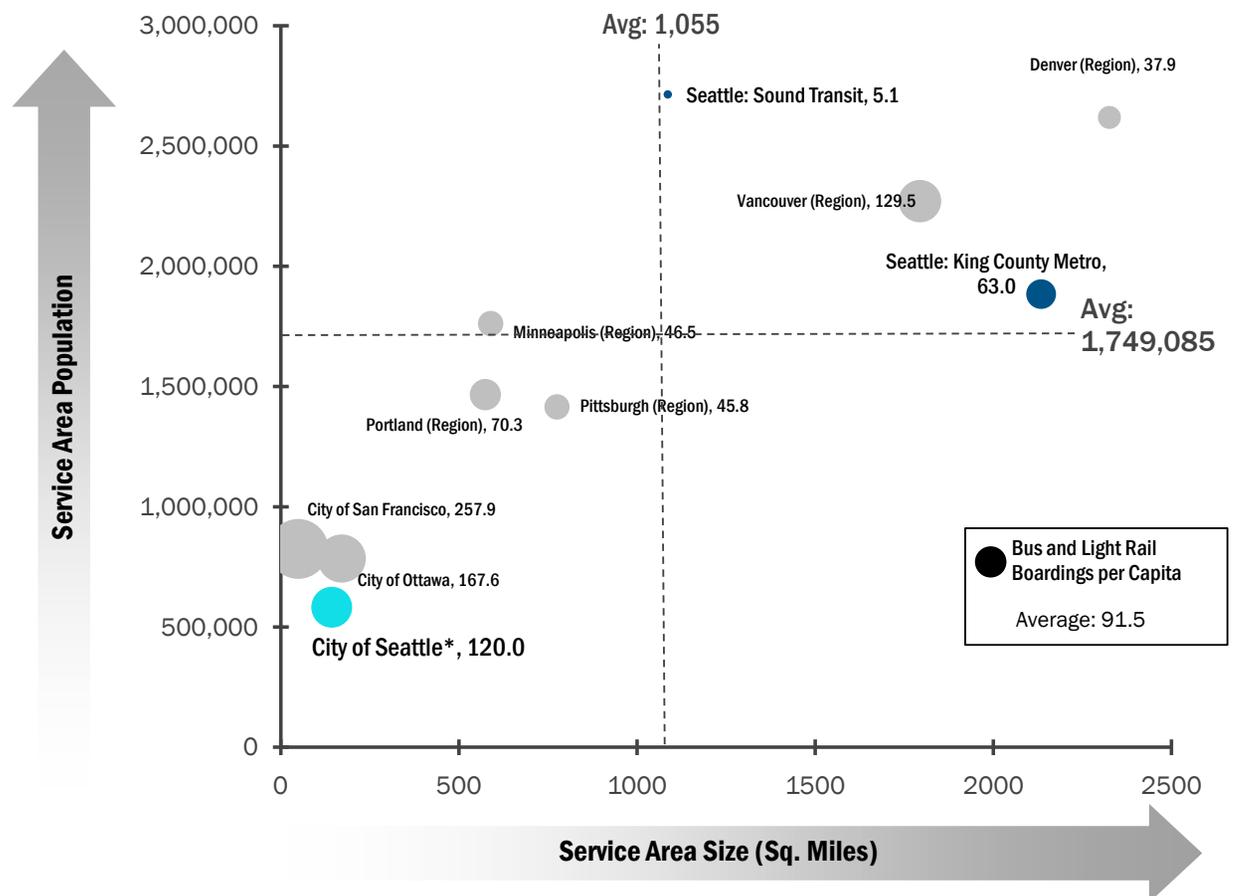
Notes: Central Link light rail, opened in mid-2009, is not included, but is estimated to increase Seattle light rail share of trips by about 2 percentage points. The National Transit Database, which is the source of this data, includes streetcar in the light rail category. Ferry trips include only foot passengers. Although often considered as a single mode, buses and electric trolley buses are shown separately. Inclined plane railways are also known funiculars (see sidebar at left).

SERVICE AREA CHARACTERISTICS AND TRANSIT USE

Figure 5-4 compares transit service use, in terms of bus and light rail boardings per capita, to service area size (horizontal axis) and population (vertical axis). King County Metro operates in one of the largest geographic service areas, second only to Denver. Metro has 63 annual bus and light rail boardings per service area resident and approximately 120 annual boardings per Seattle resident. Transit use within Seattle is most comparable to the Vancouver metro area and Ottawa.

Annual per capita boardings for Sound Transit (ST) are low since ST provides primarily long-haul regional bus service over a large service area. Because ST's service is designed for the regional transit market, boardings per capita is not a good metric by which to measure Sound Transit performance.

FIGURE 5-4 ANNUAL BUS AND LIGHT RAIL BOARDINGS PER CAPITA, BY SERVICE AREA SIZE AND POPULATION, 2008



Notes: King County Metro and Sound Transit are shown separately since they differ in service area size and population.

* Boardings for the city of Seattle were estimated based on bus boardings in the King County Metro Transit West Subarea, which includes Shoreline and West Forest Park, and Seattle South Lake Union Streetcar boardings. Per capita boardings were calculated by dividing combined bus and streetcar ridership by the estimated population for Seattle, Shoreline, and West Forest Park from the most recent available American Community Survey or U.S. Census data for each jurisdiction. The overall King County Metro service area population is from the National Transit Database. With the exception of Ottawa and San Francisco, all other data is regional.

PEER OVERVIEWS

San Francisco, CA

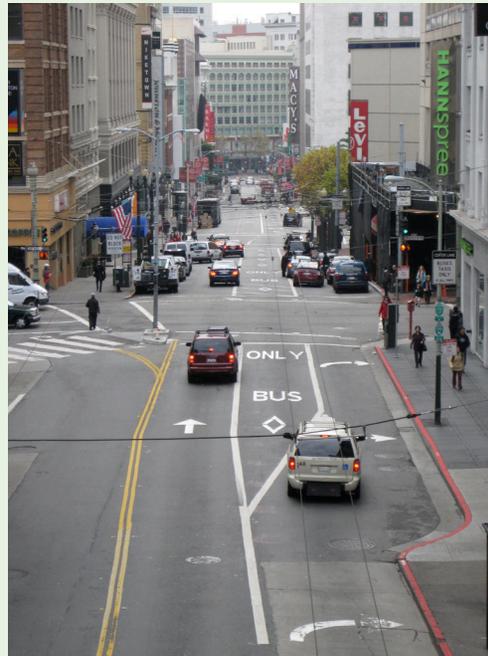
The Municipal Transportation Agency (SFMTA) runs the San Francisco Municipal Railway (Muni) and all surface transportation infrastructure. Muni serves over 200 million annual trips in a 49-square mile area with distinct topography and water on three sides, using motor/electric trolley buses, light rail, historic streetcars, and cable cars. The city is also served by regional rapid transit (BART), commuter rail (CalTrain), ferries, and express bus service operated by neighboring transit providers.

Key Facts

- All six Muni Metro light rail lines and about 20% of bus routes converge onto Market Street—the central multimodal artery through downtown—which carries 25% of Muni ridership with 7,000 passengers per hour and over 160 buses per hour during peak periods. Muni Metro trains and BART run in a subway, while historic streetcars and motor/trolley buses run on the surface.
- A recent study identified passenger boarding and traffic signal timing as the primary sources of transit delay on Market Street.
- The regional Clipper transit smart card stores monthly passes and allows transfers from the BART system.
- Muni’s modern trolley buses can travel several blocks “off-wire” to allow detours from their normal routes, and Muni is considering expanding the trolley system beyond the current 16 routes.

Major Initiatives / Corridor Investments

- Muni opened the 5.1-mile T-Line light rail service on the Third Street corridor in 2007 and is planning a 1.7-mile “Central Subway” extension of the T-Line across Market Street to Chinatown (see Figure 5-5).
- Design of the first BRT projects in San Francisco is nearing completion for Geary Boulevard and Van Ness Avenue, two heavily used transit corridors.
- The multimodal Transbay Transit Center is redeveloping as a mixed use neighborhood and as the extended terminus of existing commuter rail and future high speed rail into downtown. (See sidebar on page 5-26.)
- The Transit Effectiveness Project or TEP, described in Section 7: Best Practices (Transit-Supportive Policies and Programs), included a comprehensive program of stop consolidation, although San Francisco has struggled to implement it. Only 17% of Muni’s bus stops are within its guideline of 800-1,000 feet between stops (less on steep hills).



San Francisco’s Transit First policy, described in Section 7: Best Practices (Transit-Supportive Policies and Programs), makes explicit the city’s commitment to sustainable modes as evidenced by these transit-only lanes near Union Square in the city’s downtown.

Image from Nelson\Nygaard

FIGURE 5-5 SAN FRANCISCO CENTRAL SUBWAY PROJECT



The Central Subway project (red) will provide high-speed north-south access through downtown, where buses are heavily loaded and slowed by congested surface streets. It will extend existing Muni Metro service from the CalTrain commuter rail station, crossing under Market Street, to serve San Francisco’s densely populated Chinatown neighborhood.

Source: SFMTA

Vancouver, BC

TransLink, short for the South Coast British Columbia Transportation Authority, is the regional transportation authority in Vancouver and is responsible for transit, multi-modal transportation infrastructure, and regional commute options. It provides nearly 300 million trips and has several subsidiaries that operate bus and trolley bus service and community shuttles, SkyTrain automated (driverless) light rail, ferries, commuter bus service, and commuter rail.

Key Facts

- TransLink operates three SkyTrain lines covering 42 miles, including the Canada Line to Vancouver International Airport, which opened in 2009.
- Bus rapid transit, branded as the B-Line, includes two routes operating in future light rail corridors. TransLink allows three-door boarding at all stops on the 99 B-Line, served by 60-foot articulated buses. The Canada line replaced the 98 B-Line.

Major Initiatives / Corridor Investments

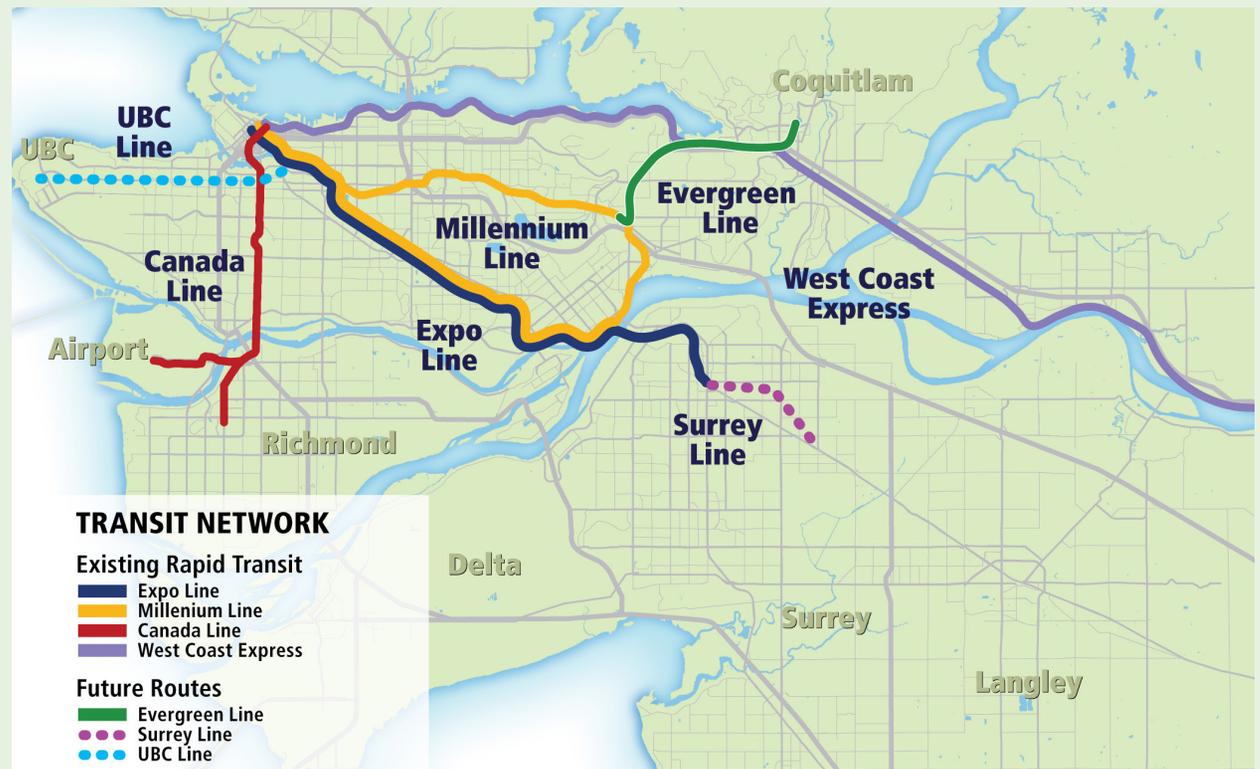
- The Evergreen Line SkyTrain extension to Coquitlam is under construction.
- TransLink is evaluating mode options for replacement of the 99 B-Line between downtown and University of British Columbia (UBC).



The 10-mile Canada Line SkyTrain includes 16 stations and replaced a B-Line rapid bus route.

Image from Flickr user Atomic Taco

FIGURE 5-6 VANCOUVER, BC EXISTING AND FUTURE TRANSIT NETWORK



The Evergreen Line SkyTrain extension is projected to save passengers 45 minutes per day compared to driving.

Source: BC Ministry of Transportation and Infrastructure

Portland, OR

The Tri-County Metropolitan Transportation District (TriMet) is the regional transit provider for the Portland metro area. TriMet provides over 100 million trips using buses, light rail, streetcar, and commuter rail. The City of Portland owns the streetcar and also operates an aerial tram. The city and region are hilly west of the Willamette River and generally flat with a well-connected street grid in downtown Portland and east of the river.

Key Facts

- Portland's transit mall (redesigned in 2009) provides high-frequency north-south light rail service through downtown, complementing east-west light rail service. TriMet increased bus stop spacing for faster downtown travel times and created a secondary east-west bus corridor to improve circulation through downtown. Buses use a skip-stop pattern and travel in groups along the mall.
- TriMet has a well-developed light rail system (52 miles with 84 stations) and a core bus network of 12 "Frequent Service" routes that operate every 15 minutes or better (see System Branding on page 5-27).
- TriMet recently eliminated free bus service within a downtown "Fareless Square," now a "Free Rail Zone."

Major Initiatives / Corridor Investments

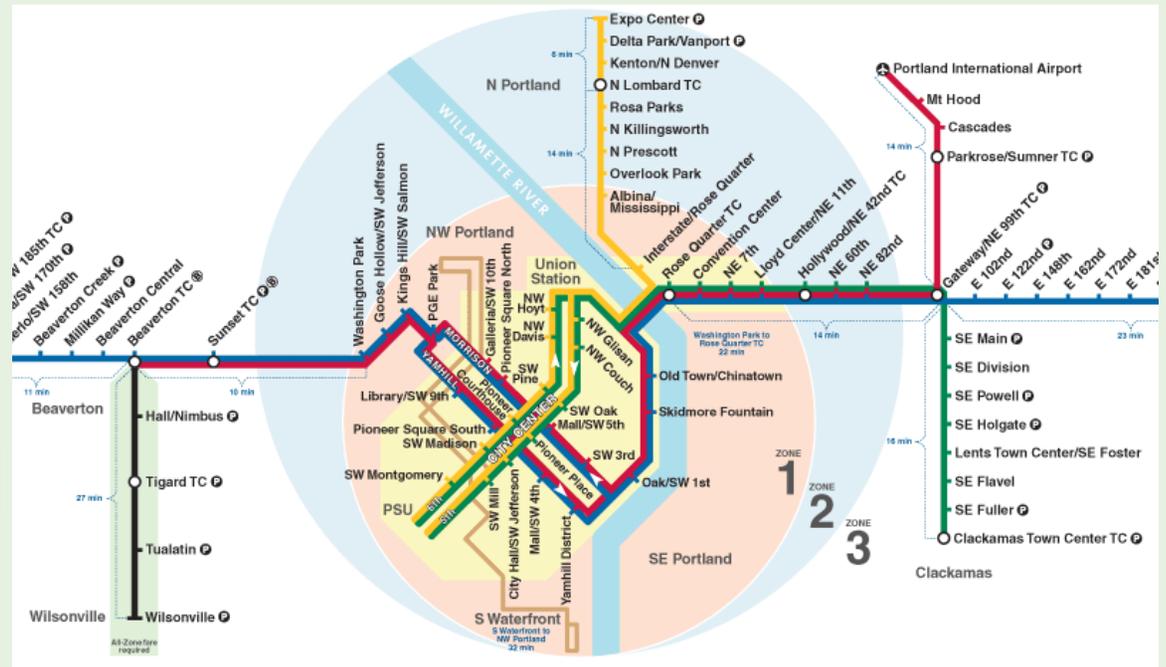
- A 3.3-mile eastside streetcar loop is under construction, extending the existing 6-mile westside loop.
- TriMet is in the final planning stages of a 7.3-mile light rail extension to the southeast of downtown, including a new transit (bus/light rail/streetcar) and bicycle/pedestrian bridge across the Willamette River.
- TriMet is considering an additional 5.6-mile streetcar extension to the southern suburb of Lake Oswego and light rail on a new I-5 bridge over the Columbia River to Vancouver, WA.
- Following adoption of a high-capacity transit plan in 2009, BRT (and light rail) evaluations are underway on at least one corridor, and enhanced bus (similar to Seattle's RapidRide) will be considered in the most productive "Frequent Bus" corridors.



Portland's redesigned transit mall includes two dedicated transit lanes for buses and MAX light rail and a continuous lane for cars and bicycles.

Image from Nelson\Nygaard

FIGURE 5-7 PORTLAND (TRIMET) LIGHT RAIL SYSTEM



Portland's most recent light rail project includes the 8.3-mile Green Line light rail extension to the southeast and an intermodal connection between light rail and intercity rail and bus service at Union Station on the northern end of the downtown transit mall.

Source: TriMet

Denver, CO

The Regional Transit District (RTD) provides public transportation service in the Denver metropolitan area, serving nearly 100 million trips over 2,300 square miles—the largest service area of the peer group—and all or part of eight counties. Denver’s topography is generally flat.

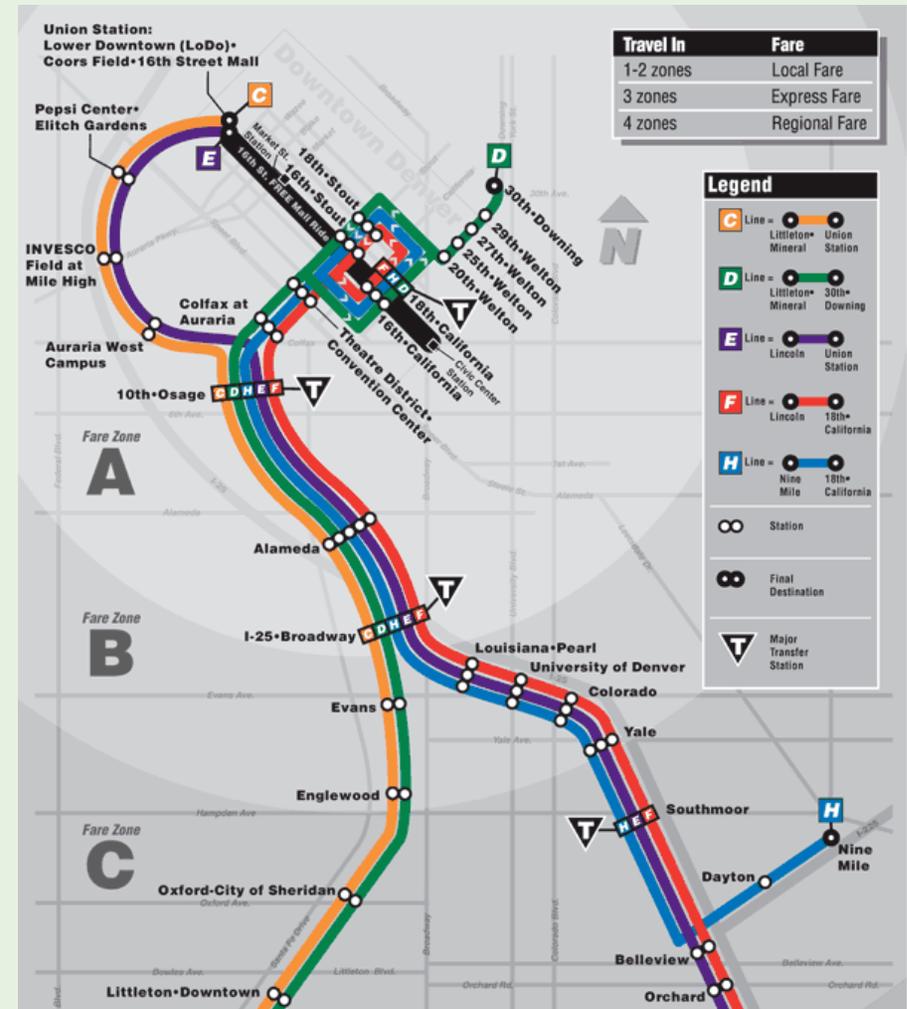
Key Facts

- Downtown transit service is oriented around Union Station, Market Street Station, and Civic Center Station and is connected by the 16th Avenue Mall (a pedestrian/transit-only corridor designed as an outdoor plaza for dining, special events, and open seating). A free shuttle operates every 75 seconds during peak hours and has an average weekday ridership of 48,000, served with four-door ultra-low emission hybrid vehicles.
- RTD operates six light rail lines to southern suburbs with 34.8 miles of track and 37 stations.
- RTD’s bus system includes 67 local routes, 37 express routes, 20 regional inter-city routes, and two local urban systems that have 15 routes in Boulder and 8 routes in Longmont.

Major Initiatives / Corridor Investments

- “Fastracks,” a 12-year plan for 122 miles of light/commuter rail and 18 miles of BRT, is being implemented with funding from a sales tax increase of 0.4% approved by voters in 2004.
- Denver’s planned redevelopment of Union Station (described in a sidebar on page 5-26) exemplifies use of a major transit infrastructure investment as an integral part of a downtown redevelopment plan.

FIGURE 5-8 DENVER LIGHT RAIL SYSTEM AND TRANSIT MALL



Two light rail lines from southern suburbs serve INVESCO Field, Pepsi Center, and Union Station and terminate at the northwest end of the 16th Street Mall. Four lines connect southern suburbs with the convention center on the outskirts of downtown and then make a loop across the 16th Street Mall.

Source: RTD

Minneapolis, MN

Metro Transit, a division of the Metropolitan Council, provides transit service for the Minneapolis-St. Paul Twin Cities region. Metro Transit provides over 80 million trips, primarily using buses, but opened its first light rail line in 2008 and is planning aggressive rail expansion. Much of the public transportation in Minneapolis is focused around bringing people to and between downtown business districts, the Mall of America, and the University of Minnesota.

Key Facts

- In downtown Minneapolis, bus service is concentrated on a handful of bus corridors, including the transit and pedestrian Nicollet Mall. Metro Transit recently reconfigured downtown Minneapolis bus service to concentrate regional express bus service on two corridors (Marquette Street and Second Avenue) and protect service levels with side-by-side bus-only lanes and traffic priority (see page 5-24 for more detail).
- Fares are \$0.50 per trip in Minneapolis and St. Paul downtown transit zones. Non-downtown fares vary by time of day, with a premium for peak-hour service.
- HOV lanes utilized by express buses on I-394 were converted to High-Occupancy Toll (HOT) lanes, using the region's MnPass transponder system. By state law, half of net revenues (after operating expenses) are used to fund expansion and improvement of bus service in the corridor.

Major Initiatives/Corridor Investments

- The 12-mile Hiawatha light rail line opened in 2008, connecting downtown Minneapolis, Minneapolis/St. Paul Airport, and the Mall of America. With average weekday ridership of 30,500, the line has exceeded pre-construction estimates for the year 2020.
- Metro Transit is building the 11-mile Central Corridor light rail line connecting Minneapolis and St. Paul, with 18 new stations and 5 shared with the Hiawatha line.
- The region has identified a network of “transitway” corridors, which may be selected for either BRT or rail technology.
- The region recently evaluated potential corridors for expansion of HOT lanes, known as the MnPass Phase 2 study.
- Building two-level transit stations in the median of I-35W will allow express buses and future BRT to stop without leaving the freeway. These stations will allow regional passengers to connect with local transit routes and enable use of the express buses for fast, local trips within the city. (See photo at top right.)
- Metro Transit will soon launch an alternatives analysis for its first streetcar line running north-south through downtown.



A new transit station at 46th Street in the median of I-35W in Minneapolis, opened in December 2010, allows passengers to board express buses on the freeway level or transfer to local buses on the 46th Street bridge.

Image from Metro Transit



The Nicollet Mall is a pedestrian and transit mall through the commercial and cultural center of downtown Minneapolis. New transit priority corridors on a pair of parallel one-way streets (Marquette Street and Second Avenue) have reduced bus volumes on the mall.

Image from Nelson\Nygaard

Pittsburgh, PA

The Port Authority of Allegheny County provides transit service in Pittsburgh. Some routes serve neighboring counties, which also operate several routes to downtown Pittsburgh. The Port Authority serves about 65 million trips using buses, light rail, and two inclined planes or funiculars that pull railway cars up the short, steep slope of Mt. Washington from downtown Pittsburgh. Pittsburgh has a compact downtown at the confluence of two rivers that form the Ohio River, extending across bridges to the north and south shores. Service is generally hub-and-spoke, centered on downtown Pittsburgh, with corridors defined by river valleys extending from downtown.

Key Facts

- The “T” light rail system has five routes over three lines (22.8 miles of track) and 89 stops/stations, including four downtown subway stations.
- Three dedicated busways (18.4 miles) provide access to downtown: South Busway (14 routes), Martin Luther King, Jr. East Busway (21 routes), and West Busway (8 routes). The color designating each busway (e.g., G for Green) prefaces route numbers for bus routes that operate on the busway.
- Due to Pittsburgh’s free bus/rail downtown, passengers leaving downtown pay when they exit and passengers traveling to downtown pay when they board.

Major Initiatives/Corridor Investments

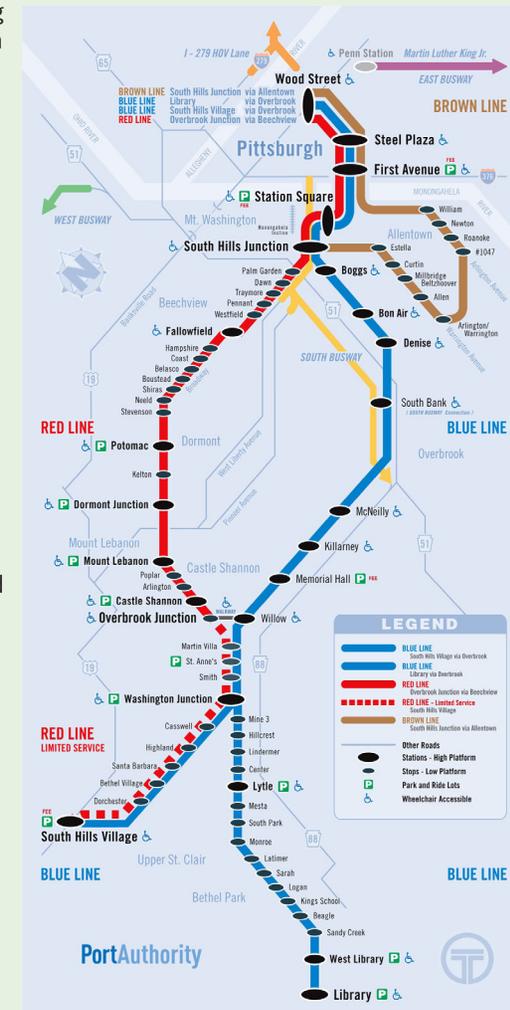
- The “North Shore Connector,” a 1.2-mile light rail extension north of downtown which will use a tunnel under the Allegheny River, is currently under construction and is due to open in 2012.
- The Port Authority is undertaking a full restructuring of bus routes and is planning to implement on-street rapid bus service on nine existing routes with a common alignment that would provide two-minute peak and four-minute off-peak frequency between downtown Pittsburgh and the Oakland neighborhood (a major academic, cultural, and healthcare center about three miles east of downtown).



As part of Pittsburgh’s recent bus service restructuring, the two core routes on the West Busway (Green Line), including route 100, were renamed G1 West Busway and G2 West Busway-Oakland.

Image from Flickr user Derek Dukas

FIGURE 5-9 PITTSBURGH LIGHT RAIL SYSTEM AND BUSWAYS



Pittsburgh’s “T” light rail system serves downtown from the south, along with Pittsburgh’s original South Busway (yellow line).

Source: Port Authority of Allegheny County

Ottawa, ON

OC Transpo is a division of the City of Ottawa and provides transit service in Ottawa and downtown Gatineau, across the Ottawa River. It serves over 80 million trips, primarily using buses. It is known for its bus rapid transit (BRT) system, the Ottawa Transitway. Ottawa is pursuing a significant service restructuring around light rail.

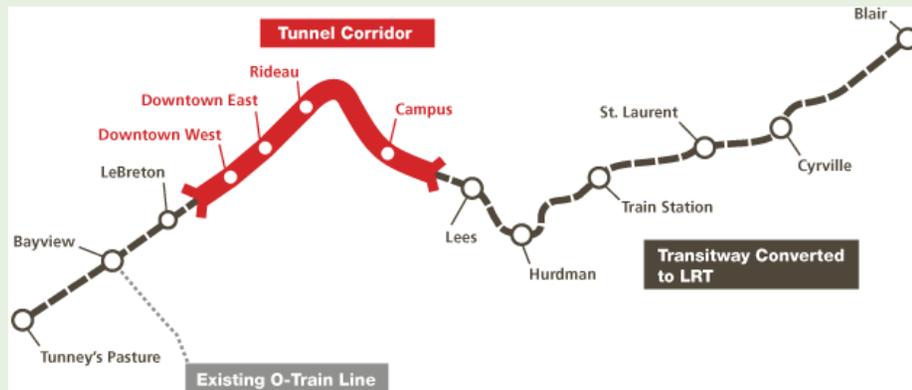
Key Facts

- The east-west oriented Ottawa Transitway carries up to 180 buses per hour through central Ottawa, with eight major routes that run every one to two minutes during peak hours. The transitway is near capacity in downtown, where buses share the street with other vehicular traffic.
- OC Transpo opened the O-Train light rail line in 2001 with five stations along a five-mile route, served by self-powered diesel trains.

Major Initiatives / Corridor Investments

- A major service restructuring that will develop light rail along a core segment of the Transitway bracketing central Ottawa (between Tunney's Pasture and Blair stations) is in preliminary engineering. The project includes a two-mile, twin-bored Downtown Ottawa Transit Tunnel with four center-platform light rail stations that can accommodate up to six-car trains. The project is expected to reduce bus volumes by more than half, due to the shift to light rail vehicles running in the tunnel and feeder buses serving the light rail stations.
- Ottawa's long-term transit vision includes 25 miles of light rail and expanded BRT service to outlying areas.

FIGURE 5-10 OTTAWA TRANSITWAY AND PLANNED LIGHT RAIL



Light rail is planned between Tunney's Pasture and Blair Stations, running in a transit tunnel through downtown Ottawa.

Source: OC Transpo



Capacity issues on Ottawa's Transitway spurred implementation of light rail and a downtown transit tunnel.

Image from Wikimedia Commons, Reaperexpress

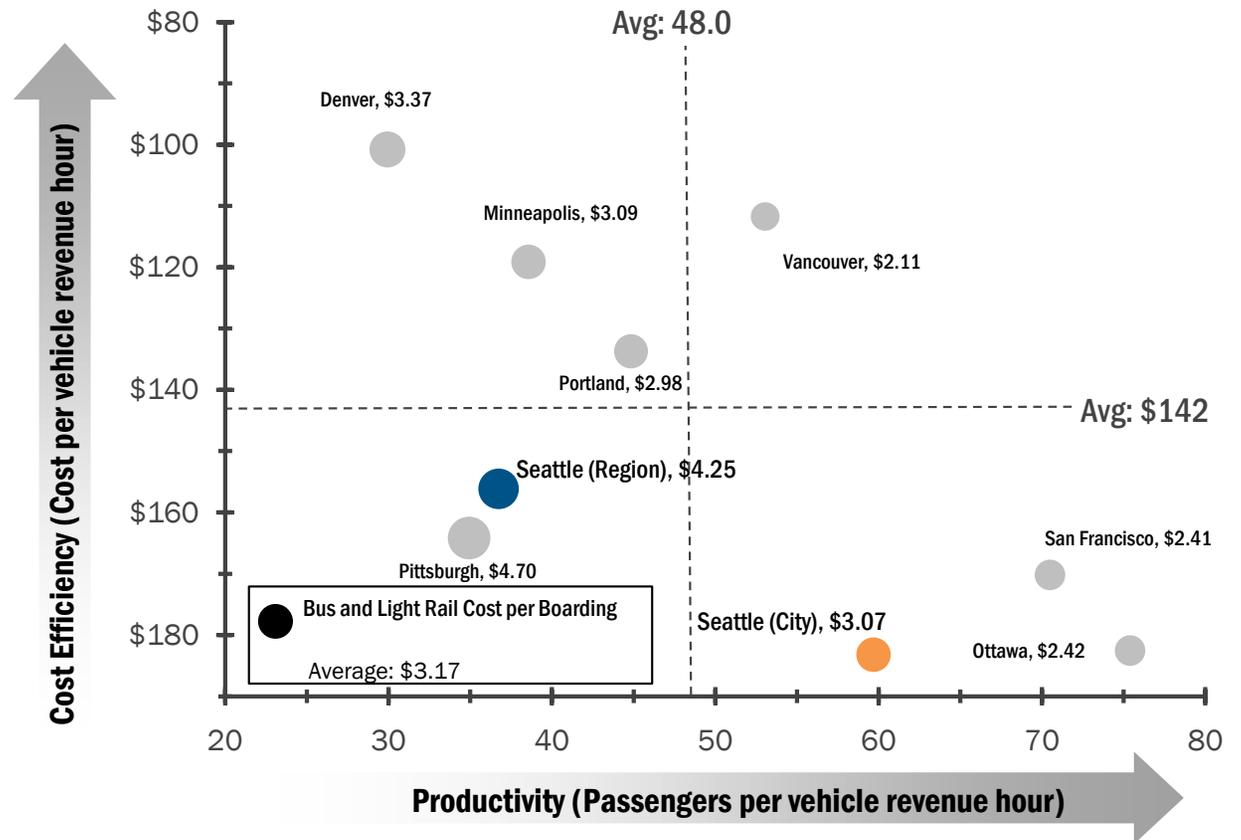
BUS AND RAIL TRANSIT OPERATIONS

The figures on this and the following two pages illustrate the productivity (passenger boardings per vehicle revenue hour) and cost efficiency (operating cost per vehicle revenue hour) for bus and light rail transit operations in Seattle relative to the peer cities. The size of the bubbles on the charts illustrates cost effectiveness, measured in operating cost per boarding; therefore, smaller bubbles indicate lower cost per passenger boarding and greater cost effectiveness. The label for each data point lists the cost per boarding.

Figure 5-11 shows that combined bus and light rail service in the Seattle region has both productivity and cost efficiency that is below average compared to all but one of the peers. Service in just the city of Seattle is significantly more productive, and therefore more cost effective. Service in the city of Seattle falls into the same range as Portland, Minneapolis, and Denver, from just under \$3.00 to \$3.50 per boarding. Vancouver, San Francisco, and Ottawa have most cost effective service, with a cost of less than \$2.50 per boarding.

The figures on the next two pages present bus and light rail cost effectiveness separately.

FIGURE 5-11 BUS AND LIGHT RAIL COST EFFECTIVENESS (COST PER BOARDING), 2008 *



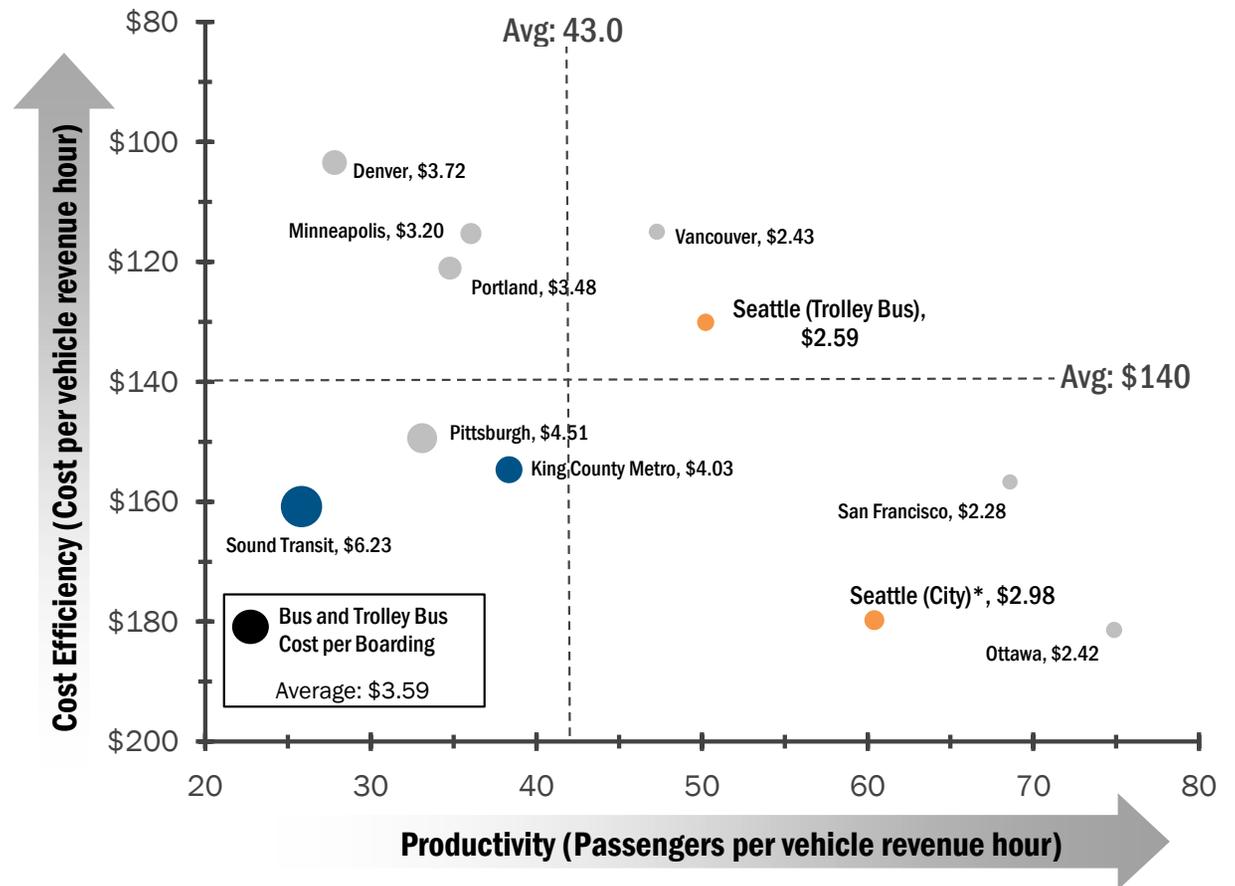
Notes: Seattle (Region) bus and light rail service includes all King County Metro and Sound Transit bus and light rail. Seattle (City) includes King County Metro service in the West Subarea, the South Lake Union Streetcar, and Central Link.

* Central Link service, which began in mid-2009, is included in the data point for the city of Seattle, based on data from the first quarter of 2010.

Bus routes serving the city of Seattle are highly productive and are comparable to the two peer city agencies (Ottawa and San Francisco). The cost per boarding for Seattle routes (\$2.98) is well below the peer average (\$3.59) and overall cost of bus service in the region. The cost per boarding for trolley buses (\$2.59) is lower than the overall bus cost per boarding for Seattle or King County Metro, reflecting its lower hourly operating cost.

Bus service in the Seattle region, indicated in the data points for King County Metro and Sound Transit, is below the peer average in terms of both productivity and cost efficiency, resulting in one of the highest costs per trip within the peer group. Unlike other regional providers that operate both local and express service, Sound Transit bus service is exclusively regional; therefore, its cost effectiveness is not directly comparable to this peer group.

FIGURE 5-12 BUS COST EFFECTIVENESS (COST PER BOARDING), 2008

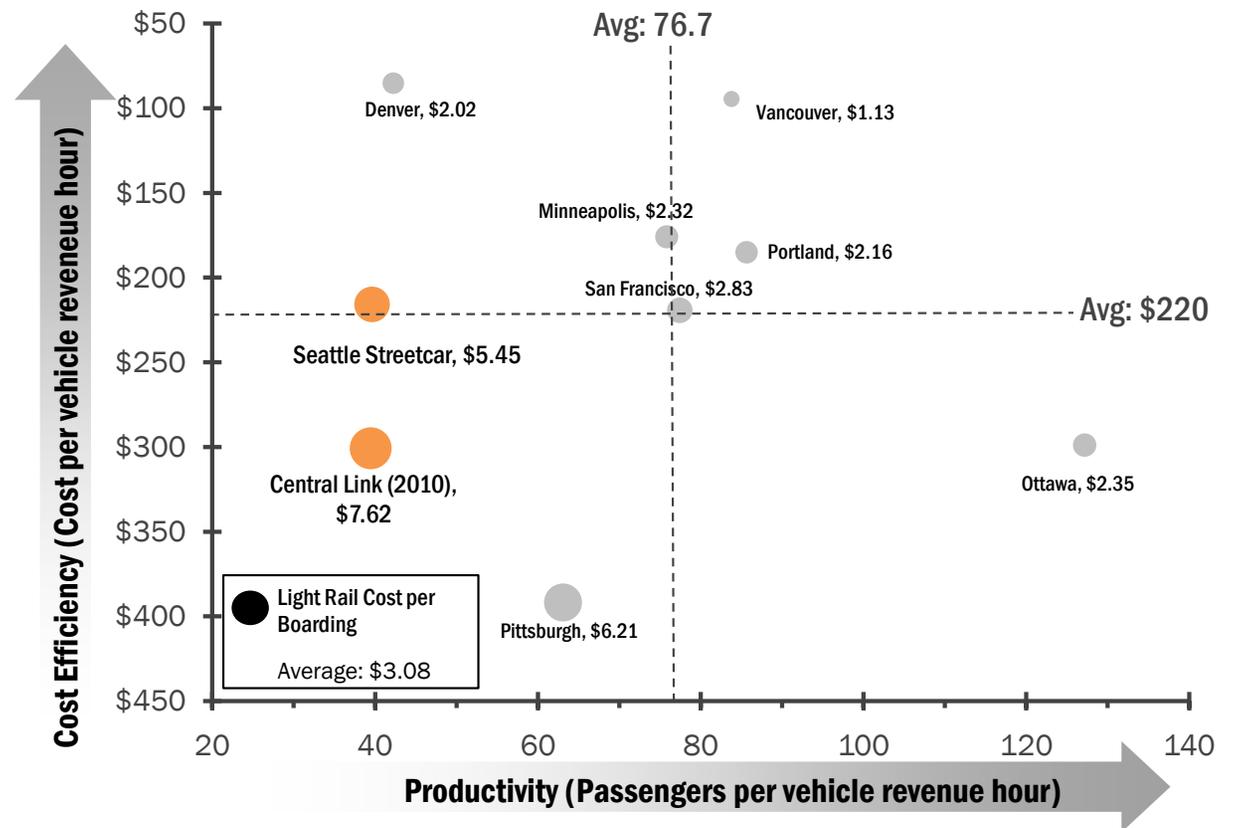


Note: City of Seattle routes are within the King County Metro West Subarea, which includes Shoreline and West Forest Park.

The figure at right illustrates the cost effectiveness of peer light rail systems; Vancouver, BC's automated (driverless) SkyTrain is the most cost effective among the peers. In general, efficient regional light rail operations (such as in Denver, Minneapolis and Portland) are more cost effective than bus operations in those cities.

The limited streetcar and light rail transit currently operating in Seattle is not directly comparable to the peers. The South Lake Union Streetcar performs a local access function not directly comparable with the longer-haul light rail services reflected in most of the peer light rail systems. Central Link is small relative to the more extensive systems of the peers and is shown based on data from the first quarter of 2010 (the first phase opened in July 2009 and service to Sea-Tac Airport started in December 2009). Its cost effectiveness and cost efficiency have improved over the short period it has been in operation, with a decline in cost per boarding (from \$8.56 in 2009 to \$7.62 in the first quarter of 2010) and in cost per revenue hour (from nearly \$400 to about \$300). The cost per hour is comparable to Ottawa, which also has only a single light rail segment in operation. Cost effectiveness of Link should improve as the system expands.

FIGURE 5-13 LIGHT RAIL COST EFFECTIVENESS (COST PER BOARDING), 2008 *



Notes: South Lake Union Streetcar boarding data is from the City of Seattle.

* Central Link data from the first quarter of 2010. All other data is from 2008.

Operating Speed

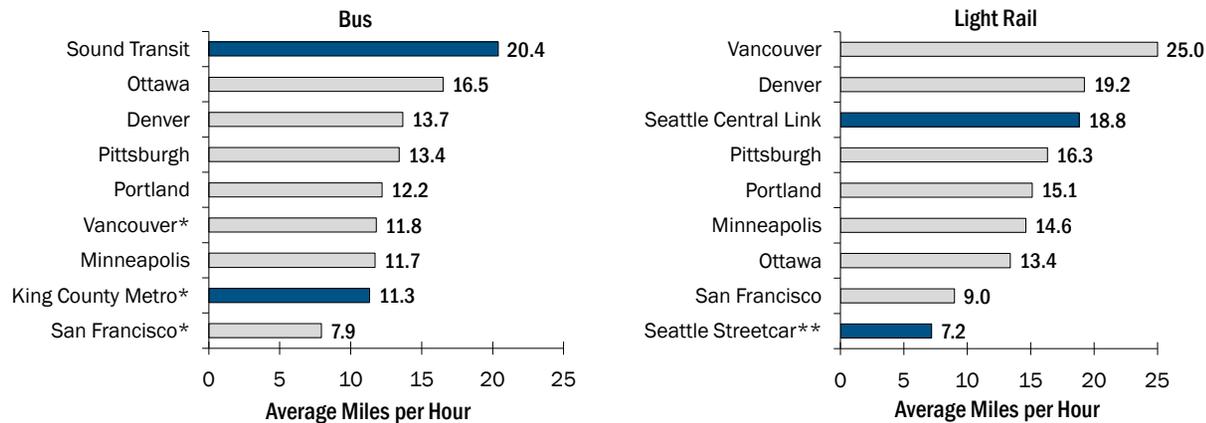
The average speed of King County Metro bus service is among the lowest of the peer agencies. Sound Transit's high operating speeds are due to its long-haul express bus service. Among the peer cities, bus operating speeds are slowest in San Francisco owing to factors such as frequent stops and hilly topography in a dense urban environment and relatively little exclusive right-of-way or express service. Ottawa and Pittsburgh owe high bus operating speeds to exclusive rights-of-way on their busways.

High operating speeds for Central Link light rail are attained by running in an elevated right-of-way or a subway for half of the line. Slower operating speeds

in Pittsburgh are due to frequent stops (nearly three per mile) and lack of a proof-of-payment system. Similarly, Portland's light rail lines have short stop spacing and run at grade in downtown.

Operating speed for the South Lake Union Streetcar, though lower than the other light rail systems, is slightly higher than the average speed for the Portland Streetcar (6.8 mph; included in overall Portland light rail data) which also operates in mixed traffic and performs a local circulation function. Operating speed for San Francisco's light rail system is also slow due to significant operations in mixed traffic with short stop spacing.

FIGURE 5-14 OPERATING SPEED: BUS VS. LIGHT RAIL, 2008



Although not directly comparable to this data, average operating speed on routes in the city of Seattle (King County Metro West Subarea) is lower than other parts of the King County Metro system.

Source/Notes: All data from National Transit Database, 2008, except for: Central Link, from Sound Transit 2010 1st Quarter report; Seattle Streetcar and Portland Streetcar determined from scheduled travel times.

* Vancouver, King County Metro, and San Francisco bus average speed includes trolley buses.

** Seattle South Lake Union Streetcar operates in mixed traffic.

Why Cities Choose to Invest in High Speed Modes

High speed transit modes integrated with pedestrian and bicycle networks provide fast, reliable, and convenient transportation options and alternatives to driving. High speed transit in its own right-of-way provides competitive travel times and helps ease congestion. High speed modes allow transit providers to maximize efficiency in several ways:

- **Labor costs.** High capacity vehicles used in light rail and BRT systems maximize labor efficiency—one of the largest contributors to transit operating costs.
- **Operating speed.** Exclusive right-of-way and transit priority features ensure efficient operating speeds along a route. Slower operating speeds due to traffic congestion can increase costs as additional vehicles and operators are needed. Operating speed is also a function of stop and station spacing: stop spacing that is too small can adversely impact operating speed.
- **Travel time and reliability.** Competitive and consistent travel times attract riders to transit, particularly “choice” riders who have access to other travel options.

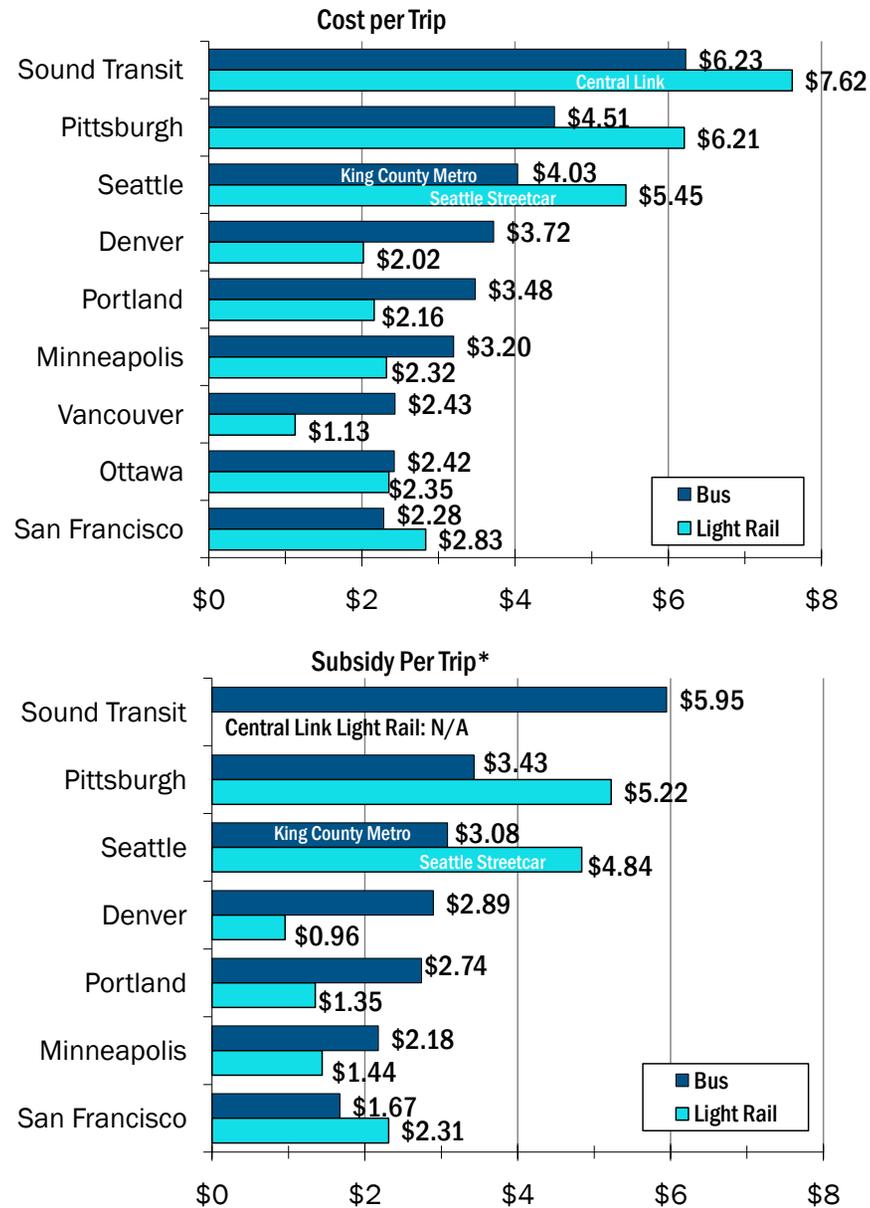
Cost and Subsidy per Trip

The performance of the transit system as a whole is paramount, and mode-to-mode comparisons within a single city or region should be made with caution. Although light rail is more expensive to operate than bus service, agencies with highly productive light rail systems can reduce cost and subsidy per trip due to light rail's ability to carry more passengers with a single operator. As highlighted in the adjacent figure, light rail achieves this efficiency in Denver, Portland, Minneapolis, and Vancouver.

In contrast, relatively extensive light rail systems in Pittsburgh and San Francisco are more expensive to operate on a per trip basis than their bus systems. In Pittsburgh's case, this may reflect the lowest ratio of revenue service hours to total hours (see Figure 5-16 on the next page), operating restrictions such as a maximum of two-car trains, and a high ratio of peak to off-peak service. For San Francisco, contributing factors are low operating speeds and several light rail lines that operate in lower-density corridors.

It is difficult to compare the efficiency of light rail transit and bus systems in Seattle, with only the South Lake Union Streetcar and Central Link currently in operation. Such an assessment will be more relevant as these systems are expanded.

FIGURE 5-15 COST AND SUBSIDY PER TRIP: BUS VS. LIGHT RAIL, 2008



Source/Notes: All data from National Transit Database, 2008, except for: Central Link, from Sound Transit 2010 1st Quarter report; Seattle Streetcar boardings from City of Seattle. King County Metro and Sound Transit data is systemwide, except as noted.

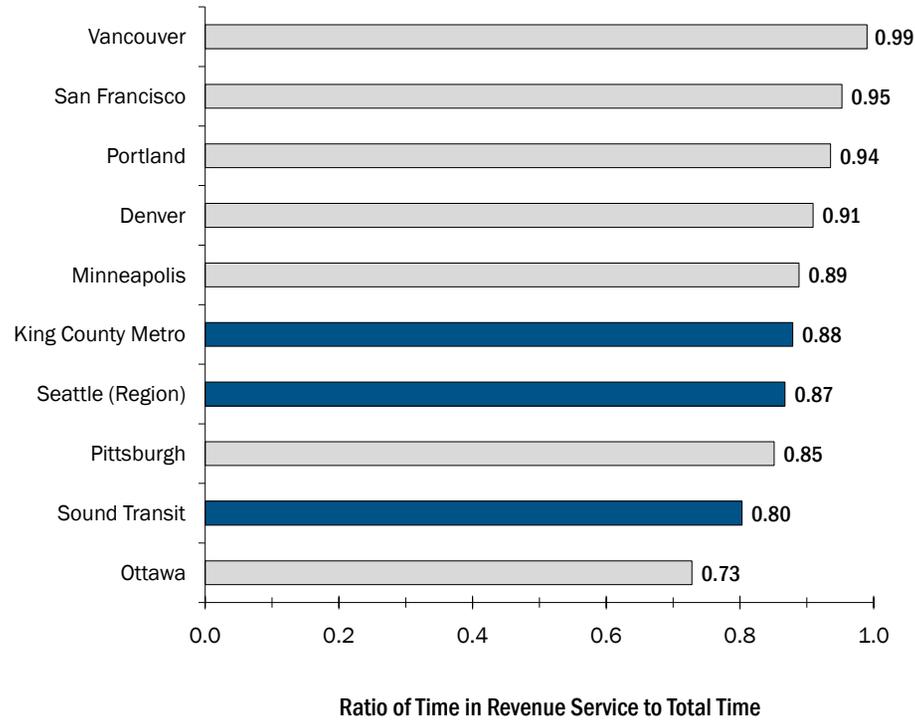
* Subsidy per trip not available by mode for Canadian agencies or for Central Link.

Service Efficiency

Service efficiency, calculated as vehicle revenue hours divided by total vehicle hours, illustrates the amount of time transit vehicles are available to transport passengers relative to total time in operation. This measure highlights how much time transit vehicles spend traveling out-of-service to or from a maintenance base or the start of a route. Transit agencies would like to be near the top of this chart, minimizing non-revenue travel. Shown systemwide, the measure primarily reflects bus operations. However all peer light rail systems have a relatively high service efficiency ratio.

Service efficiency of Seattle region bus operations may reflect deadheading on one-way express routes (not carrying passengers on the return trip) and/or efficiency of layover locations. It is not surprising that Sound Transit has a low ratio of time in revenue service compared to vehicle hours as it operates extensive commuter service over a large region, requiring more deadhead travel than an urban agency.

FIGURE 5-16 SYSTEMWIDE SERVICE EFFICIENCY, 2008

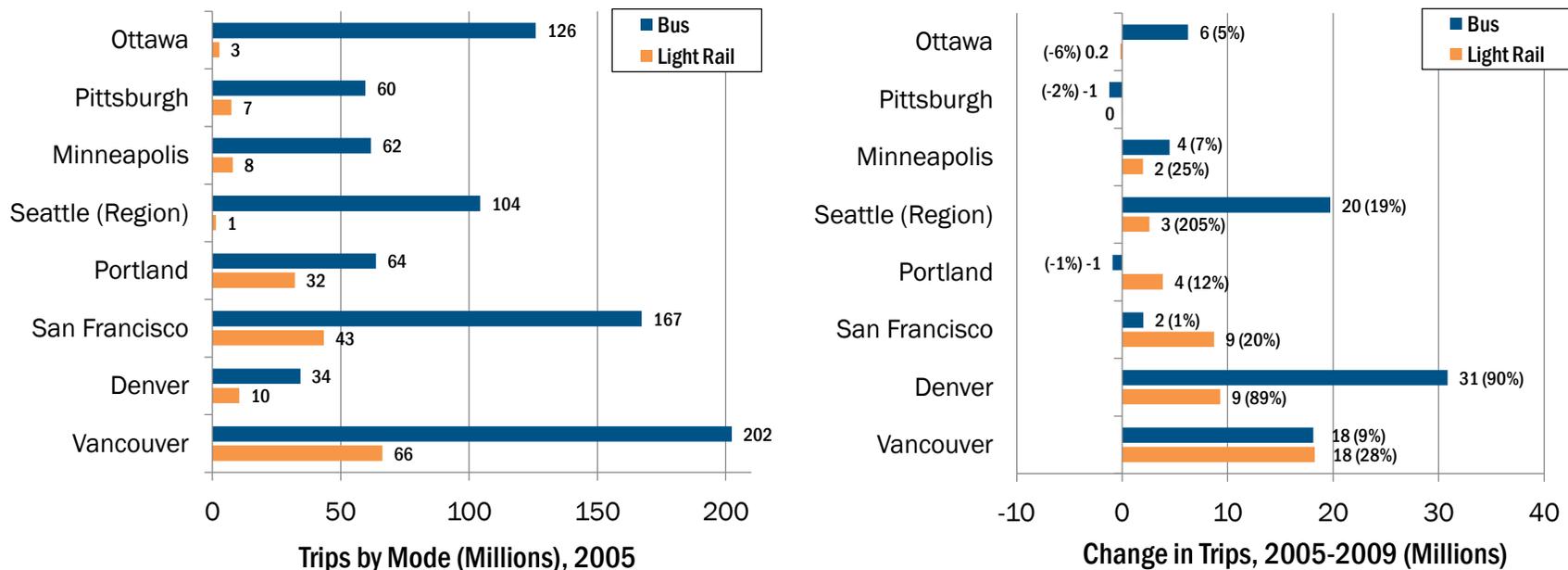


Changes in Bus and Light Rail Ridership

The graphics below illustrate the number of trips provided by bus and light rail in each city/region in 2005, and the change from 2005 to 2009. There was growth of nearly 20 million bus trips in the Seattle region between 2005 and 2009, which was second highest among the peer group in both numbers and as a percentage. Light rail trips in Seattle increased by over 200%, including only a partial year of Central Link light rail operation in 2009; however, it is important to understand that this increase is starting from a minimal level.

Denver increased bus trips by the largest number, nearly doubling both bus and light rail trips. Vancouver increased light rail trips by the largest number and increased bus ridership by nearly the same number of trips. Portland and San Francisco were the only cities with larger increases in light rail ridership than bus ridership, although most cities increased light rail trips by a greater percentage over the baseline than bus trips.

FIGURE 5-17 CHANGE IN RIDERSHIP BY MODE (2005-2009)



Source: American Public Transit Association

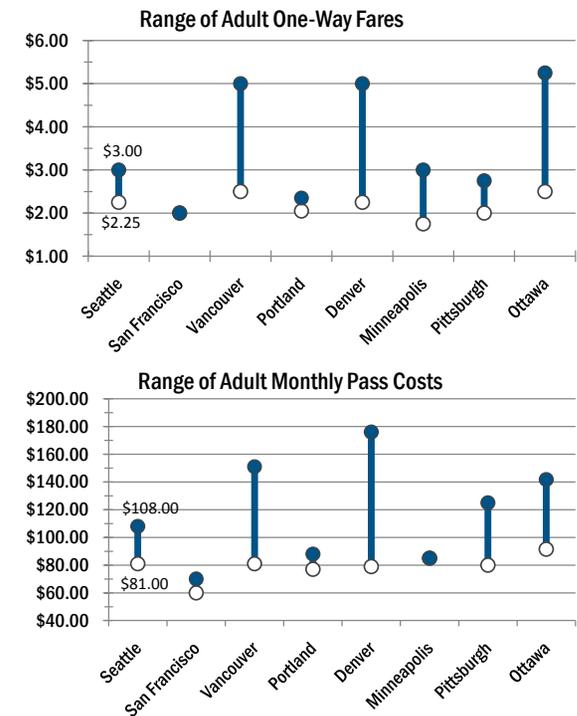
FARE STRUCTURES

The bullets below summarize the fare structures and policies listed in Figure 5-19 on the following page.

- Fare Structure:** Similar to most peers, fares in the Seattle region are based on zones, with the exception of Central Link light rail's distance-based fares. Figure 5-18 shows the cost of both single-trip and monthly passes in Seattle relative to the peers. It includes a 25-cent fare increase for King County Metro as of January 1, 2011, bringing the cost of a single-zone bus fare to \$2.25 and the cost of a single-zone monthly bus pass to \$81. The single-zone monthly pass cost is typical of the peers. A single-zone peak period fare is \$2.50 (\$90 monthly pass). Outside of peak periods, the \$3.00 two-zone fare (\$108 monthly pass) is the same as a single-zone fare. The fare increase places Seattle's fares at approximately the median of the peers. Monthly passes in San Francisco are by far the lowest cost among the peers, with a cost of \$60 (or \$70 including use of the BART rapid rail system within the city). Fares on Central Link, based on distance traveled, are the lowest in Seattle (e.g., \$1.75 for a trip between Westlake and Beacon Hill or \$63 for a monthly pass covering this one-way fare amount).
- Fareless Zones:** Four of the seven peers have a downtown fareless area or zone. Portland recently limited its zone to rail transit due to enforcement issues. Pittsburgh's fareless zone, limited to buses, ends at 7:00 pm, similar to Seattle. In Pittsburgh, bus riders who board in the downtown zone pay their fare when getting off the bus. Minneapolis charges a reduced \$0.50 fare within downtown.

- Transfers:** All of the peers allow some form of free transfer except Pittsburgh, which charges \$0.75. King County Metro paper transfers are not valid with other agencies; however an ORCA card can be used to transfer up to the dollar value of a single-ride or monthly pass within a two-hour window.
- Proof-of-Payment:** Most peers allow proof-of-payment boarding on their light rail systems. Vancouver allows all-door boarding on B-Line BRT vehicles, and Ottawa uses proof-of-payment on articulated and double-decker buses.
- Pay-on-Exit:** In Pittsburgh, the only peer that (like Seattle) has a downtown free zone for buses, passengers pay their fare when they exit buses on trips out of downtown to speed boarding.
- Electronic Payment Technology:** The Clipper card in the San Francisco region (formerly TransLink) is an effort similar to the ORCA card in Seattle to coordinate fare payments and transfers across multiple providers.

Figure 5-18 Fare Cost Comparison, 2010 *



The figure illustrates the cost range of both single-ride fares (top) and monthly passes (bottom), including both bus and light rail fares (if different), with the low end of each range typically representing single-zone travel and the upper-end regional trips covering multiple zones. The figure does not include Central Link's distance-based fares, as low as \$1.75 per trip or a \$63 monthly pass.

* Reflects fare increases for both King County Metro and RTD in Denver as of January 1, 2011.

FIGURE 5-19 COMPARISON OF FARE STRUCTURES

City	Fare Structure (# of Zones)	Free Zones	Transfer Policy	Proof-of-Payment and Pay-on-Exit Policies	Time-Based Surcharge/Discount	Electronic Payment Technology
SEATTLE: King County Metro Buses	Zonal (2 zones), City of Seattle is one zone	Ride Free Area, 6 am - 7 pm	King County Metro: Free - 2 hours; paper transfers valid only on Metro buses/streetcar All providers: Transfers valid for up to two hours using ORCA card.	Proof-of-payment under evaluation on RapidRide A Line; pay-on-exit on out-bound trips from downtown	Surcharge of \$0.25 for single-zone fare during peak hours (6-9 am and 3-6 pm weekdays). Two-zone fare is the same as a single-zone fare outside of peak hours.	ORCA card
Seattle Streetcar	Single Zone	Does not operate within Ride Free Area		Proof-of-payment	None	ORCA card valid for transfers or proof-of-payment; fare collection is planned
Sound Transit Buses	Zonal (2 zones + intercounty)	Ride Free Area, 6 am - 7 pm		None	None	ORCA card
Sound Transit Central Link	Distance-based	None		None	None	ORCA card
SAN FRANCISCO	Flat	None	Free - 90 minutes; from BART to Muni only with electronic payment card	Light rail proof-of-payment	None	Clipper card
VANCOUVER	Zonal (3 zones)	None	Free - 90 minutes	Bus and light rail proof-of-payment	Single zone fare after 6:30 pm weekdays and on weekends	Planned
PORTLAND	Zonal (3 zones)	Free Rail Zone in downtown and Lloyd Center district	Free - 2 hours	Light rail proof-of-payment	None	None
DENVER	Zonal (4 zones)	Free 16th Ave. MallRide shuttle	Free - 1 hour	Light rail proof-of-payment	None	Planned
MINNEAPOLIS	Flat except downtown; based on local vs. express service	Reduced fare zone in downtown and for select buses on Nicollet Mall	Free - 2.5 hours, except with downtown zone fare	Light rail proof-of-payment; pay-on-exit on some express trips leaving downtown or University of Minnesota	Peak surcharge of \$0.50 bus/light rail; \$0.75 express	Go-To card
PITTSBURGH	Zonal (2 zones)	Free Fare Zone in downtown; for bus, only until 7 pm	Single-zone transfer, valid for 3 hours: \$0.75	No proof-of-payment on light rail. Pay-on-exit for outbound trips	\$0.75 peak surcharge for T light rail	Planned but on hold
OTTAWA	Flat; based on local, express, and rural express service	None	Free - 90 minutes	Light rail; articulated buses and double-decker buses	None	Planned, 2011 (Presto card)

GOVERNANCE

This section explores several issues related to transit governance in the peer cities.

Local and Regional Tradeoffs

In Portland and Minneapolis, where service is oriented around downtown and there is one major regional provider, smaller suburban jurisdictions on the fringe have withdrawn from the TriMet and Metro Transit regional service districts. This is primarily due to concerns about the amount of local service provided relative to tax revenue produced in those districts. In Denver, RTD provides extensive local service outside of Denver, notably the HOP, SKIP, JUMP circulators in Boulder. In both Minneapolis and San Francisco, where multiple providers provide regional service into downtown, coordination and communication are needed to make the transit system easy to use.

Service Allocation Policies

As discussed in previous sections, King County Metro is currently required to allocate 40% of new service hours to the South and the East Subareas, and 20% of new service hours to the West Subarea, which covers the city of Seattle. There is no similar policy at peer agencies. RTD in Denver, Metro Transit in Minneapolis, and TriMet in Portland focus on productivity (boardings per hour) and cost effectiveness (subsidy per trip or cost per trip) standards for allocating (and reducing) service. For these agencies, serving transit-dependent populations is also an important factor.¹

¹ Metropolitan Council 2030 Transportation Policy Plan (see Appendix M, Service Standards). RTD Service Standards, 2002. TriMet 2011 TIP (see Frequent Service and Frequent Service Criteria Appendix). TriMet applies seven major criteria in prioritizing its Frequent Service (see sidebar), and has invested in very limited new service outside its core network of Frequent Service bus routes and rail system for the last decade. Metro Transit in Minneapolis determines transit market areas based on a quantitative index and defines appropriate operating characteristics and service levels for each area.

FIGURE 5-20 TRIMET FREQUENT SERVICE CRITERIA

Criterion	Description	Weight
Ridership productivity	Projected short-term ridership productivity, population/employment density, major attractions	40
Transit/pedestrian friendly streets	Sidewalk coverage, signalized crosswalks, planned improvement	20
Density of transit-dependent population and activities	Areas with high proportion of low income residents, seniors, or persons with disabilities	10
Regional Transportation Plan (RTP) Designation	Frequent or rapid bus designation in Regional Transportation Plan	10
Relationship to major transportation developments	Connection to existing or proposed high-capacity transit	10
Land use connectivity	Number of 2040 Centers served *	10
Transportation demand management	Number of ECO compliant companies **	5
Total possible score		105

Notes: * 2040 Centers refer to regional land use designations for urban centers across the Portland region.

** ECO compliance refers to companies subject to and compliant with requirements for transportation demand management programs under Employee Commute Ordinances.

Source: TriMet, 2011 TIP. See Priority 3 of the TIP (page 5-57) and the Frequent Service Appendix (page 5-101).

TriMet applies seven major criteria in prioritizing its Frequent Service (see sidebar), and has invested in very limited new service outside its core network of Frequent Service bus routes and rail system for the last decade. Metro Transit in Minneapolis determines transit market areas based on a quantitative index and defines appropriate operating characteristics and service levels for each area.

TriMet Frequent Service Criteria

In Portland, TriMet has criteria in place to guide expansion of its Frequent Service routes, which run at least every 15 minutes from 6:00 am to 10:30 pm seven days a week (starting at 8:00 am on weekends). The seven criteria, listed in the table above, were developed with a technical advisory committee representing local jurisdictions. Frequent Service expansion is prioritized in tiers in TriMet's annual Transit Investment Plan. From about 2001 to 2005 TriMet reallocated resources from underperforming routes to improve service on these 12 routes, which serve 58% of bus ridership while comprising only 48% of service.

Restrictions on Other Public Providers

Local transit agencies sometimes place restrictions on regional or neighboring providers to minimize competition for passengers or roadway space.

For example:

- In San Francisco, regional buses providing express or local service are not allowed to make local stops outside of the downtown corridor to prevent competition with Muni service.
- In Portland, C-TRAN service from neighboring Vancouver, WA, is allowed to operate on the downtown transit mall; however, C-TRAN operates only on I-5 outside of downtown and does not directly compete with TriMet service.
- In Minneapolis, Metro Transit is studying the bus staging requirements for regional providers, where peak period express bus service, often operated in one direction only, places extensive demand on constrained downtown curb and bus garage space.

Private Use of Curb Space

Shuttles provided by private companies and institutions are common in Seattle as well as in several other peer cities. In Seattle, Microsoft provides its employees with direct commuter service, carrying about 3,000 employees per day to its Redmond campus. The City of Seattle has established an annual \$300 per-vehicle fee for use of exclusive shuttle zones throughout the city and about 50 permits are issued each year.

A number of private employers in the San Francisco Bay Area operate private shuttles from San Francisco to workplaces in Silicon Valley and elsewhere in the region. Existing regulatory tools for the San Francisco Municipal Transportation Authority (SFMTA) include restrictions on weight and idling time (maximum of 5 minutes), and the explicit authority over use of transit stops by non-Muni vehicles. The City also allows shuttle zones to be created for a one-time fee to cover striping costs; these are mostly in the downtown area. However, private shuttles have been using bus zones informally without the required permission. In June 2009, providers implemented a voluntary “Muni First” pilot to reduce conflicts with public transit vehicles by minimizing loading time in stop zones. This approach also aims to reduce neighborhood impacts from staging/idling.

While San Francisco’s own regulations can require or allow shuttles as a condition of development approval or as part of a commuter benefits program, shuttle activity in the city is also affected by ordinances of other jurisdictions in the region. The SFMTA is considering options that would help fund a dedicated staff position to focus on the shuttles and lead development of operating guidelines and coordination efforts, including possible shuttle consolidation between employers. This voluntary “Muni Partners” program could have basic and enhanced tiers with different fees for different levels of operation. Providers would receive Muni Partner stickers to identify vehicles and assist with increased enforcement of restrictions for vehicles not participating in the program.²

² San Francisco County Transportation Authority, Strategic Analysis Report: The Role of Shuttle Services in San Francisco’s Transportation System, June 2010



Microsoft Connector employee shuttles use two leased bus bays at Overlake Transit Center near the Microsoft Campus, which is also served by Metro and Sound Transit buses. Connector buses use 3-minute passenger loading zones to pick up and drop off passengers in Seattle but by city ordinance are not allowed to share Metro stops.

Images from Nelson\Nygaard

DOWNTOWN CIRCULATION AND SERVICE CONFIGURATION

Transit circulation in downtown Seattle is constrained by water to the west, steep grades and the I-5 freeway to the east, and changes in orientation of the street grid. Most buses use either the Third Avenue Busway or the downtown transit tunnel, where Central Link light rail has operated since 2009. Trolley buses provide most of the east-west service in downtown, which operates on several sets of streets that intersect with the transit tunnel.

Most of the peer cities use one or more circulation models that could be applied to enhance downtown transit circulation in Seattle. The future of downtown transit circulation and throughput is a critical element of this plan. Downtown transit demand will continue to grow as the city grows, straining downtown streets, particularly since transit tunnel capacity for bus throughput will decrease and eventually be eliminated as Link light rail expands. Furthermore, a transparent and highly usable downtown system will be essential for the city to meet its livability and carbon neutrality goals.

The peer cities use a range of service configurations and policies to enhance downtown transit:

- **Service oriented around a linear downtown transit facility.** This model is used in Seattle as well as Denver, Ottawa, Portland, and San Francisco.
- **Concentrated transit service on a few streets, providing dedicated transit lanes and/or traffic signal priority.** This is the primary approach used by Metro Transit in Minneapolis-St. Paul

and is complementary with downtown transit facilities.

- **Concentrated transit service at hubs on the perimeter of downtown.** Denver takes this approach in conjunction with its transit mall, and San Francisco's Transbay Terminal, now being redeveloped, (see page 5-26) also performs this function. Minneapolis had planned a similar approach for regional bus service on the Nicollet Mall, although it was not implemented.
- **Light rail lines (or other high capacity/high speed transit services) intersecting each other or concentrated bus corridors, such as transit malls through downtown.** Portland, Denver, Minneapolis, and Vancouver have employed this strategy. Vancouver's planned UBC line and San Francisco's planned Central Subway also take this approach.
- **Free downtown circulation.** Seattle as well as Denver, Minneapolis, Pittsburgh, and Portland have some form of free transit service in downtown. To address fare evasion and security concerns related to this policy, Seattle's and Pittsburgh's zones only operate until 7:00 pm and Portland recently converted its fareless zone to a rail-only free zone.

These service characteristics are discussed below for several of the peer cities:

- Denver's downtown transit service is organized around the 16th Street Transit/Pedestrian Mall (Figure 5-8), where a free bus shuttle runs as often as every two minutes during peak hours, connecting underground bus stations at each end of the mall (Union and Civic Center Stations). A light rail loop and additional bus service (at Market Street Station) intersect the mall

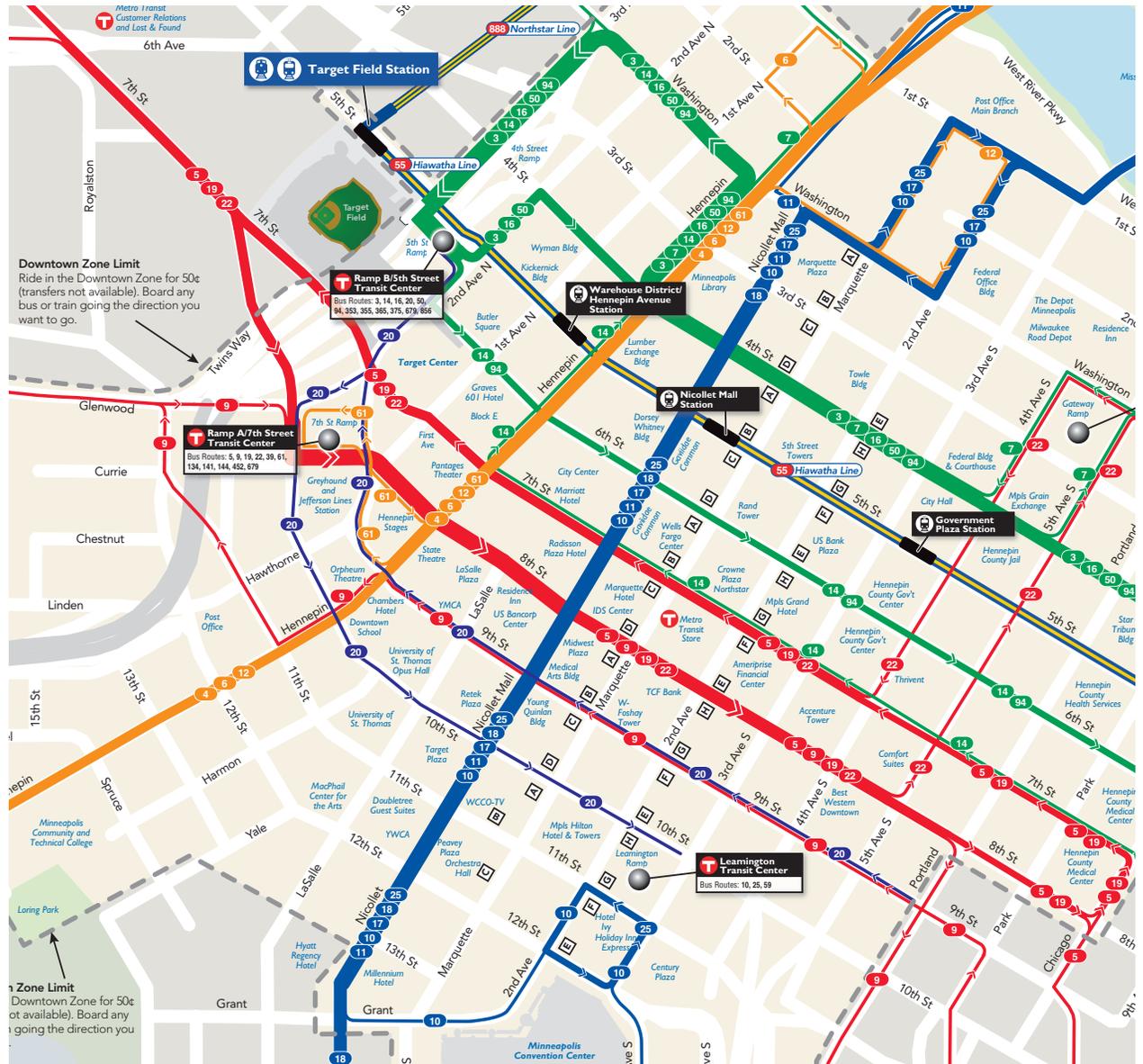
between the two bookend stations. As described on page 5-26, Denver's historic Union Station is being redeveloped into a multimodal transit hub that will improve connections between the Mall Shuttle and include a new downtown circulator service.

- Portland's Transit Mall (Figure 5-7) runs along Fifth and Sixth Avenues in downtown. It was reconstructed to include a north-south light rail line, intersecting with east-west light rail service. Buses and light rail share two lanes on the mall, which has one lane for cars and bicycles, with skip-stop operations and four sets of stops. In conjunction with the redesigned mall and north-south light rail, TriMet reduced bus volumes to minimize their impact on street life. It also increased bus stop spacing and eliminated free bus service in downtown to improve bus operating speeds. East-west frequent bus corridors intersect with the transit mall but do not turn onto it, decreasing bus volumes on the mall and improving east-west circulation. Traffic and bicycles are also allowed on the Transit Mall, providing activity throughout the day.
- San Francisco's Market Street (Figure 5-5) is the focus of downtown transit service. It is a trunk for Muni motor and trolley buses on the surface and light rail in a subway, as well as BART regional rail also running in a subway. Transit vehicles run in transit priority lanes on Market Street and adjacent Mission Street. However, violations frequently prevent buses and streetcars from loading and off-loading passengers on boarding islands in coordination with signal timing. This is a major source of transit delay. San Francisco recently conducted a

pilot in which it forced cars to turn off of Market Street at two locations, resulting in significant declines in private vehicles and a 5% increase in transit speeds. San Francisco is also building a north-south Central Subway under Market Street and redeveloping the regional Transbay Transit Center (see page 5-26).

- In downtown Minneapolis, local buses are concentrated on the Nicollet Transit/Pedestrian Mall through downtown. Regional express services were recently shifted off of Nicollet Mall onto adjacent Marquette and Second Avenues, which were each expanded from single to dual transit-only lanes. The Hiawatha light rail line intersects these facilities, and select buses are free along the Nicollet Mall in addition to a broader discounted fare zone. A map of Minneapolis's downtown service is included as Figure 5-21.
- In Vancouver, BC, the Canada line provides a north-south service through downtown, while the planned UBC high-capacity transit line (mode to be determined) will provide a high-capacity east-west link connecting to the Expo and Millenium light rail lines (see Figure 5-6).

FIGURE 5-21 MINNEAPOLIS DOWNTOWN TRANSIT SERVICE



Source: Metro Transit

Downtown Minneapolis Express/Limited-Stop Routes

Route	Arrives via	Leaves via
691	2nd Ave S [F]	— [D]
697	2nd Ave S [F]	Marquette [D]
698	2nd Ave S [F]	Marquette [D]
699	2nd Ave S [F]	Marquette [D]
721	6th St	7th St
724	6th St	7th St
742	2nd Ave S [F]	Marquette [A]
747	2nd Ave S [F]	Marquette [A]
755	8th St	7th St
756	2nd Ave S [H]	Marquette [B]
758	6th St	7th St

Partial listing of express routes and stop locations on 2nd and Marquette Avenues, from Minneapolis Downtown Transit Map, with letters corresponding to locations on the map.

Transit and Non-Motorized Commute Mode Shares and Downtown Parking Rates

Seattle has the fifth highest share of public transit commute trips among the peer cities and the third highest share among the U.S. peers. As shown in Figure 5-22, only a few cities, including Seattle, achieved an increase in public transit mode share for commute trips between 2000 and 2006-2008. One factor in Seattle's transit mode share may be high daily parking rates, equivalent to San Francisco, as shown in Figure 5-23.

The transit commute share is likely higher within downtown employment districts. For example, a survey of Denver downtown employees found that 48% used transit to get to work "most days," while 44% used transit on the day of the survey.

Most cities also increased non-motorized transportation (walk/bike) mode share, with the third largest increase occurring in Seattle.

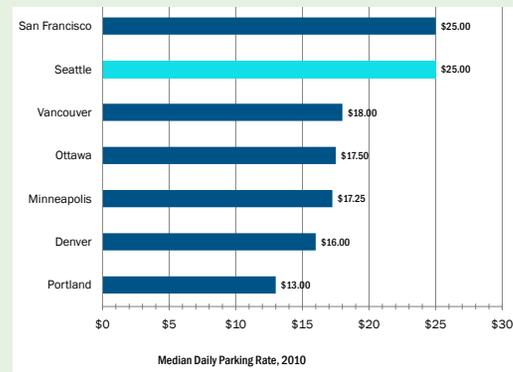
FIGURE 5-22 COMMUTE MODE SHARE FOR PEER CITIES

	Seattle	San Francisco	Vancouver	Ottawa	Pittsburgh	Minneapolis	Portland	Denver
Public Transit								
2000 ¹	17.6%	31.1%	17.0%	21.0%	20.5%	14.6%	12.3%	8.4%
2006-2008 (Average) ²	18.1%	31.9%	25%	22%	20.1%	13.5%	12.2%	8.2%
% Change	0.5%	0.7%	8.0%	1.0%	-0.4%	-1.1%	-0.1%	-0.2%
# Change	3,200	7,400	26,900	8,100	-2,100	-3,900	1,000	300
Walk/Bike								
2000 ¹	9.2%	11.3%	17.0%	10.0%	10.2%	8.5%	7.0%	5.3%
2006-2008 (Average) ²	11.1%	12.0%	16%	10%	12.6%	10.1%	9.6%	6.0%
% Change	1.9%	0.7%	-1.0%	0.0%	2.4%	1.6%	2.6%	0.7%
# Change	6,800	4,500	1,900	3,300	2,400	2,000	8,300	2,600

Data for each city includes working residents age 16 and over and reflects the principal mode used over the course of a week. Data from the 2006-2008 American Community Survey (ACS) provides a broader sample size than more recent annual ACS samples and offers the best comparison with Canadian Census data. A 4-month transit strike affected 2001 mode share data for Vancouver and is a key factor in the high rate of increase between 2001 and 2006.

Sources: (1) U.S. Census, 2000. Canadian Census, 2001. (2) American Community Survey, 2006-2008 3-Year Average. Canadian Census, 2006.

FIGURE 5-23 SEATTLE DOWNTOWN PARKING RATES, 2010



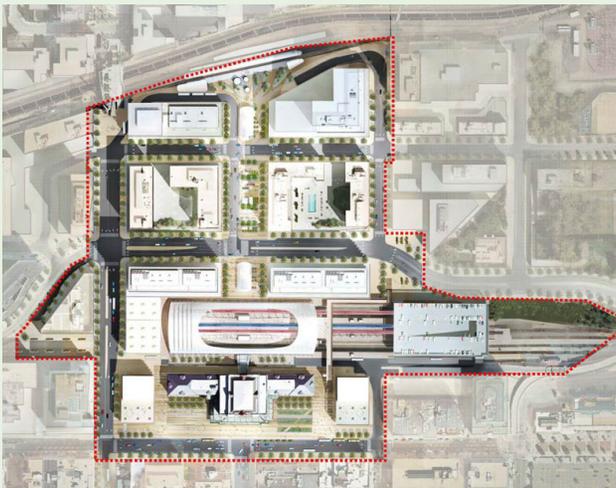
Source: Colliers International, CBD Global Parking Rate Survey, 2010. Data for Minneapolis is from 2009 survey; data for Pittsburgh is not available.

Integrating Transit Infrastructure Investments with Downtown Redevelopment: Denver Union Station and San Francisco Transbay Transit Center

Denver and San Francisco are undertaking ambitious transformations of key downtown transit facilities as part of integrated development plans, managed by special-purpose authorities that oversee funding and construction.

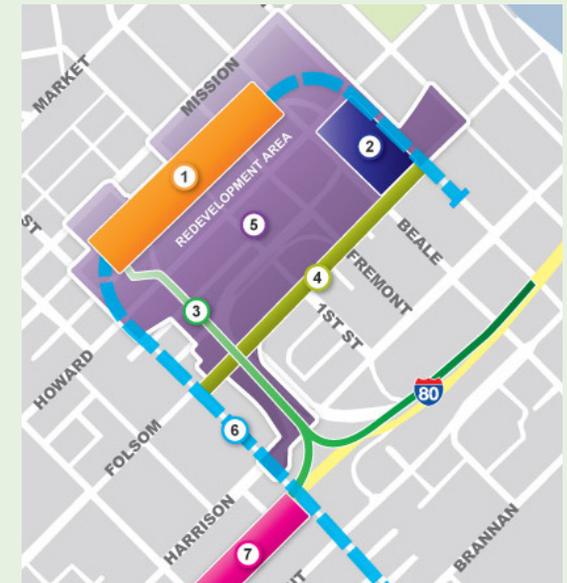
- Denver Union Station:** Denver is redeveloping its historic Union Station into a multimodal transportation hub as part of its \$6.7 billion FasTracks program. The redevelopment will create transit infrastructure that supports the dense urban center Denver envisions around the station. The project includes mixed-use redevelopment around the station, a below-grade bus station that will allow vertical transfers between modes, and several public spaces that will connect each part of the development. Transit elements of the project include the underground bus station with 22 bays, replacing the existing Market Street Station; relocated light rail platforms adjacent to new stops for the 16th Street Mall Shuttle; a new downtown circulator service that uses the underground bus station; and a commuter rail hall and eight at-grade rail tracks to accommodate RTD commuter rail, Amtrak, and Ski Train services.
- San Francisco Transbay Transit Center:** The 1939 Transbay Terminal was built to handle a peak rate of 17,000 commuters per 20 minutes arriving on trains over the San Francisco-Oakland Bay Bridge. It served only regional bus connections after 1959 and was demolished in April 2010. Shown in Figure 5-25, the first phase of the redevelopment project is a five-story transit center with one above-grade bus level, a ground-floor concourse, and two below-grade rail levels serving Caltrain commuter rail and future California High Speed Rail. A five acre park is planned on top of the facility, on the site of the temporary terminal. Additional transit infrastructure includes bus ramps connecting to the Bay Bridge and bus storage facilities to house regional express buses during off-peak hours. The project is envisioned as the centerpiece of a mixed-use neighborhood oriented to Folsom Street in San Francisco's South of Market district. The total cost of the project is \$4.2 billion, including the 1.3-mile rail extension from the existing CalTrain terminal.

FIGURE 5-24 DENVER UNION STATION REDEVELOPMENT PLAN



Source: <http://www.denverunionstation.org>

FIGURE 5-25 SAN FRANCISCO TRANSBAY TRANSIT CENTER REDEVELOPMENT PLAN



The Transbay Center will include: (1) Transit Center, (2) Temporary Terminal, (3) Bus Ramps to Bay Bridge, (4) Folsom Street, (5) Redevelopment Area, (6) CalTrain Extension/High-Speed Rail, (7) Bus Storage Facilities.

Source: <http://transbaycenter.org>

SYSTEM BRANDING AND LEGIBILITY

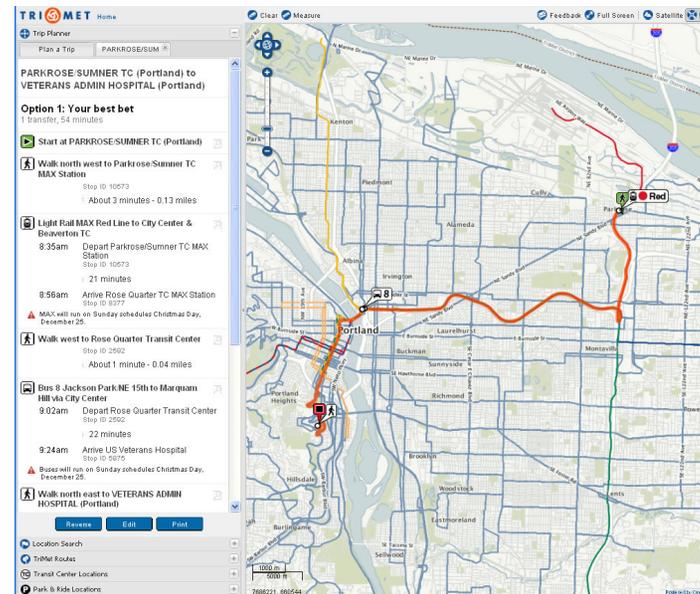
System information provided by transit agencies is transit's public face. It helps residents and visitors understand transit routes and modes across a city or region as a coherent system for getting around. Agencies are deploying increasingly interactive trip planning tools and maps and visually branding their systems to make them more legible and easy to use. One of the biggest barriers to providing and marketing transit in a region with multiple providers is that information is often organized by agency and/or mode instead of from a passenger-centric point of view.

Trip Planning Tools

Trip planners are one of the primary tools that passengers can use to learn how to reach a destination on transit. Nearly all the agencies in this review feature trip planning tools prominently on their website home pages, and all the agencies make route information available to tools such as Google Maps for easy comparison of trips by transit, driving, walking, and, in several cases, biking. In Seattle, King County Metro's regional trip planner provides text-based directions and trip planning for transit providers in the region; however, interactive system maps would enhance the existing trip planner and would be easier to use than the current large format system map. Features from other agencies' trip planners as well as Google and Bing Maps that could enhance trip planning in Seattle include:

- Integrating interactive maps into trip planners, to show overall trips and walking routes at origins/destinations. TriMet in Portland allows trip plans to be created by clicking on a location on its interactive system map (Figure 5-26).
- Integrating interactive maps with searches for routes, stops, landmarks, park and rides, and other information. Metro Transit in Minneapolis markets searches as a "Services Finder" directly on its home page.
- Providing the capability to look up popular destinations from within the Metro trip planner, as for most of the other peers (e.g. Denver, Minneapolis, Ottawa, San Francisco, and Vancouver). Currently these are listed on the Destinations tab of the Metro website and can be used to initiate a trip plan.
- Improving visual presentation of trip plans with graphical symbols that identify each transit or other travel mode segment in a trip.

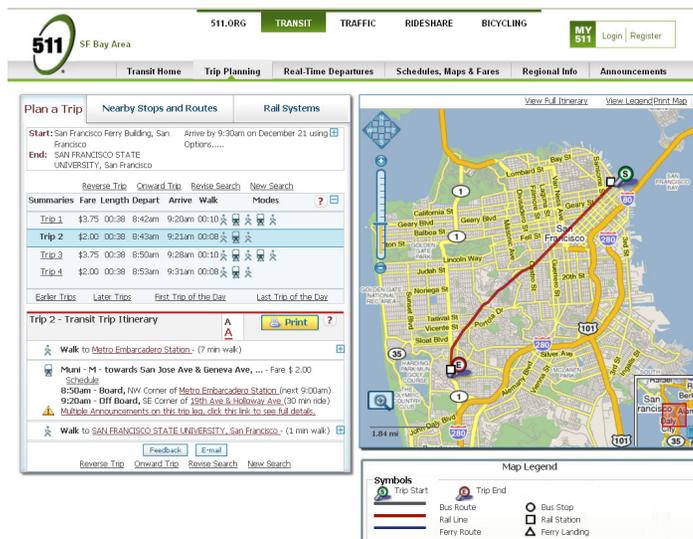
FIGURE 5-26 PORTLAND (TRIMET) INTERACTIVE SYSTEM MAP



In Portland, TriMet's interactive system map integrates trip planning, searches, and route information.

Source: <http://ride.trimet.org/>

FIGURE 5-27 SAN FRANCISCO BAY AREA 511.ORG REGIONAL TRANSIT WEBSITE



The peer region most comparable to Seattle in terms of the number of separate transit agencies is the San Francisco Bay Area. There, the regional 511.org transit information website, operated by its regional transportation planning agency (MTC), provides a regional trip planner with interactive maps and a comprehensive transit information portal.

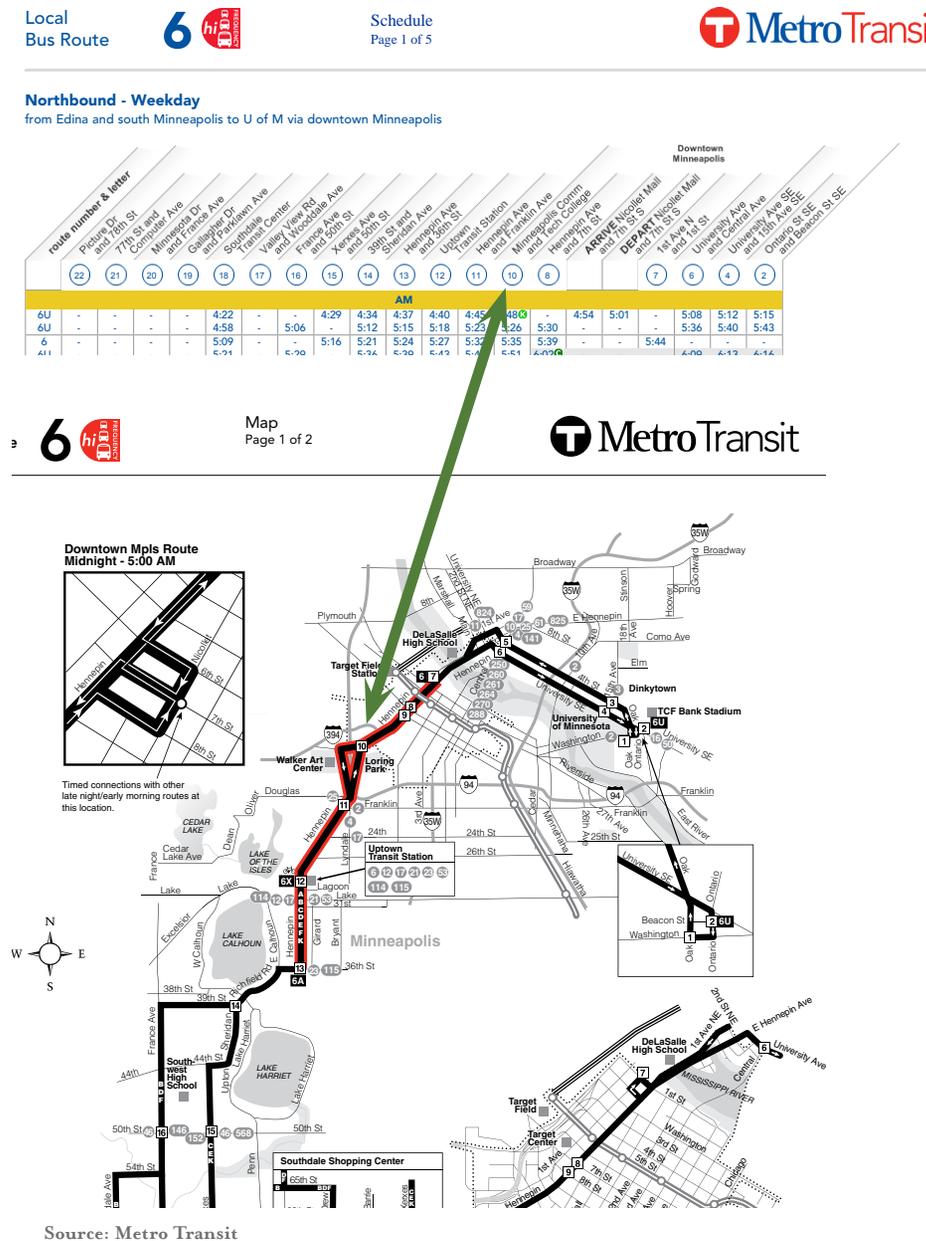
Source: <http://transit.511.org>

Schedule and Route Information

Clarity and organization of schedules and maps for individual routes is also important for more detailed trip planning and transit usability. Potential models for improving this information in Seattle include:

- Improving organization of the King County Metro Transit website. For example, searching for routes, stops, or schedules by location is accessed under the “Ride Metro” tab or directly from the trip planner. The “Destinations” tab lists routes by neighborhood as well as popular destinations that could be used in trip planning. Schedules and route maps can only be accessed by route number on the Metro home page.
- Interactive schedules that, as in Denver, allow users to easily create and print a subset of stops and departure/arrival time frames. Denver’s route numbering scheme is clearly explained, and the available information about each route is listed in an easy-to-read format.
- Route maps with numbered timepoints that match schedule listings improve their usability, such as in Minneapolis (Figure 5-28). Showing cross-streets and connecting routes makes the maps more useful for orientation.

FIGURE 5-28 MINNEAPOLIS SAMPLE TRANSIT ROUTE MAP AND SCHEDULE



Branding of Frequent Service Routes

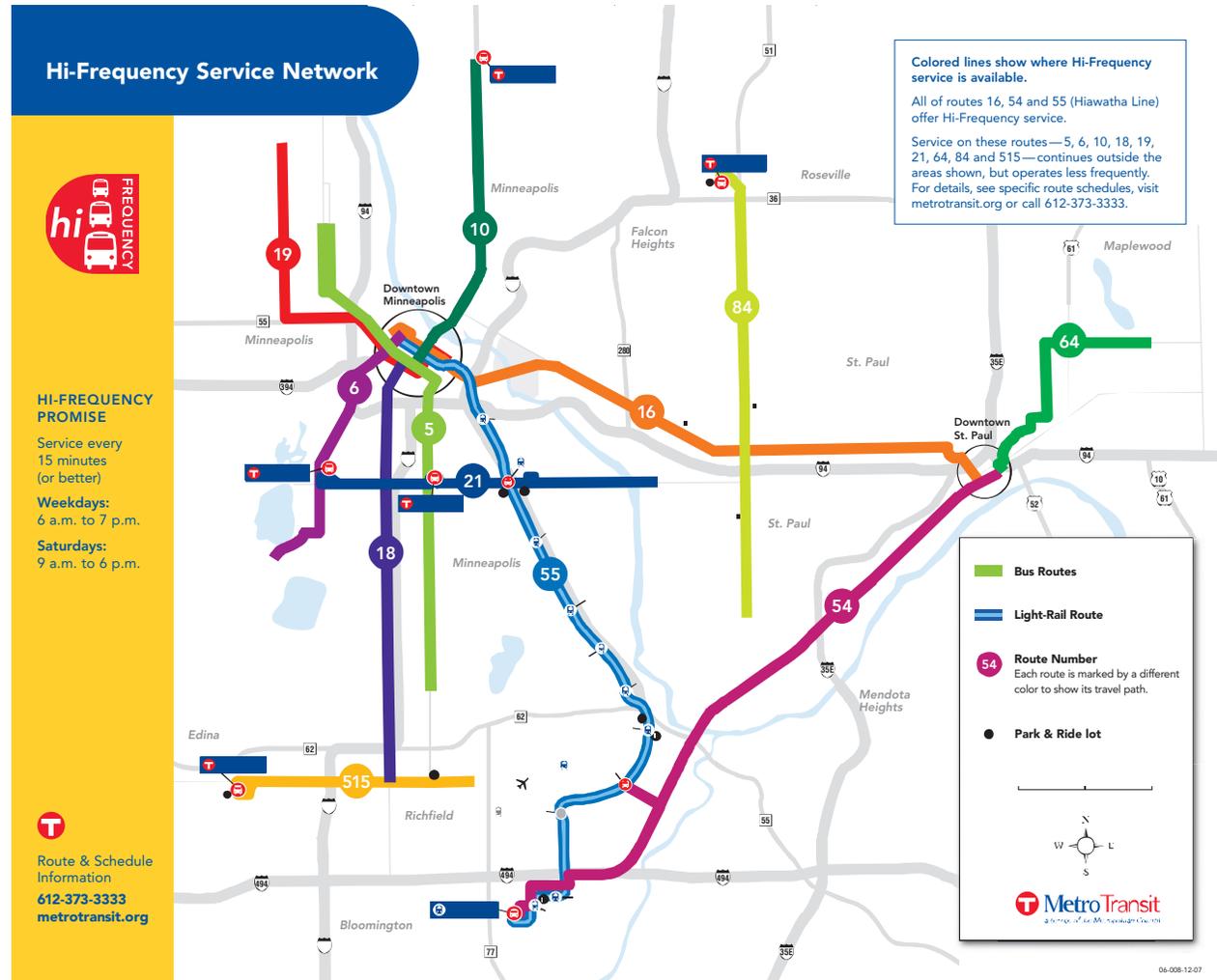
One attraction of rail transit for passengers is an expectation of frequent service and confidence in the route that it will follow. Minneapolis and Portland have created branded frequent service route networks to convey this expectation for transit service (bus and rail) that operates every 15 minutes or better, seven days a week, making it possible for riders to use transit without consulting a schedule. These routes help create a legible, high-quality core system whose coverage extends beyond rail or other high-speed lines (e.g., BRT or Rapid Bus). The red “hi-frequency” graphic is branded on the service map (Figure 5-29); bus stop signs (shown below); and schedules and route maps (Figure 5-28).

Downtown Wayfinding

While King County Metro’s downtown transit map and signage helps explain transit operations in downtown Seattle, Metro could draw on downtown wayfinding techniques used with stop-skip operations on transit corridors in Minneapolis (see Figure 5-21) and Portland. Sets of stops are assigned a letter and routes are organized into groups that stop at common locations. The letters are shown on downtown transit maps to allow passengers to find the closest stop location for their route.



FIGURE 5-29 MINNEAPOLIS BRANDED FREQUENT SERVICE NETWORK MAP AND ROUTE SIGNS



Branding for frequent service routes is included in electronic and printed materials (top) and bus stop signs (left).

Source: Metro Transit

CONCLUSIONS

The intent of this peer review is to highlight the strengths and weaknesses of transit in Seattle relative to peer cities and transit agencies. Conclusions that can be drawn from this comparison are discussed below.

- **Use and Efficiency of Transit Service:** Transit service in the city of Seattle is provided and used at a high level relative to its U.S. peers. Seattle has a 20% mode share and high per capita ridership, though it does not reach the level of San Francisco, Vancouver, or Ottawa. Seattle also has high downtown parking rates, providing downtown workers with a financial incentive to use transit, and high walking/biking commute rates that complement transit use. A key challenge for Seattle is to ensure that regional transit providers offer convenient, efficient, and easy-to-use service for its residents, balanced with regional connectivity and service goals. Additionally transit service should support the city's land use goals, e.g., connecting urban villages. As in other cities, delivering on this challenge requires a combination of physical infrastructure, effective marketing and design of the transit system, and coordination between agencies and jurisdictions. Several of Seattle's U.S. peers are making major investments in downtown transit infrastructure needed to manage transportation as their urban areas expand.
- **Trends in Transit Modes:** Seattle's transit system differs most significantly from its peers in the size of its light rail system, which is smaller than all of the peers except Ottawa. Like the Seattle region (with funding from Sound Transit

2), all of the peers are moving forward on light rail system expansion—even Ottawa, best known for its bus transitway, is undertaking a major light rail initiative. These initiatives generally emphasize high-capacity connections to and through downtowns—reducing bus volumes on congested surface streets and providing competitive travel times on exclusive or priority rights-of-way. At the same time, most of the agencies are also implementing high-speed, high-capacity rubber-tired services, particularly where land use or physical constraints make light rail less feasible. Several have created branded, high-frequency core local bus networks that complement frequent high-capacity services, helping provide efficient service connecting neighborhoods as well as serving downtown.

- **Cost Efficiency and Productivity:** Transit at the regional level—particularly King County Metro bus service which is and will remain the predominant service type within Seattle—has below average cost efficiency (cost per hour), productivity (boardings per hour), and cost effectiveness (cost per boarding) compared to the peer group. As illustrated in Figure 5-12, service in Seattle (Metro Transit West Subarea) is highly productive and cost effective. Coordinating improvements between the city of Seattle and King County Metro that will benefit transit speed and reliability, particularly on core routes that operate on the UVTN, should increase King County Metro's average operating speeds.

Light rail service in Seattle offers an opportunity to improve cost efficiency and reduce the required subsidy per trip by carrying more passengers with a single operator on highly productive

corridors. However, the limited duration of operation for Central Link precludes definitive comparisons with the peer group. As the Link system is built out in Seattle, the City and Sound Transit will need to balance access to service for Seattle's neighborhoods with adequate stop spacing and sufficiently high operating speeds to ensure competitive regional travel times.

- **Fare Structure and Policies:** Transit fares and passes in Seattle are approximately the median of the peer agencies, following the 25-cent fare increase effective January 1, 2011. However, with the additional 25-cent cost for travel during peak periods, single-zone peak fares match the highest fares among the peer group.

The number of providers in Seattle complicates ease of use and transfers between systems; however, the ORCA card streamlines fare integration and moves the region in the same direction as San Francisco, where there is an even larger number of regional providers.

While Seattle's downtown Ride Free Area and pay-on-exit policy on buses speed downtown boarding, the city can draw upon proof-of-payment boarding practices used to speed passenger boarding on rapid bus services in Vancouver and articulated and double-decker buses in Ottawa. Seattle may also be able to draw from the peak-hour premium practice used in Minneapolis to encourage use of off-peak transit capacity. As the light rail and RapidRide networks expand and fulfill a more comprehensive circulation function in downtown, Seattle could consider eliminating the Ride Free Area or restricting it to services that require off-board payment.

- **Downtown Circulation:** The peer cities/agencies have employed multiple strategies for transit circulation in their downtowns. Given the unique challenges for transit in downtown, approaches that may be applied in Seattle include:
 - Providing connected high-capacity/speed transit links and dedicated right-of-way as the backbone for downtown circulation.
 - Coordinating major urban development and transit station development with these high-speed transit connections, and using these projects to improve pedestrian linkages and connections with existing transit modes that serve downtown Seattle.
 - Providing additional transit priority on key facilities to ensure efficient operating speeds and travel times through downtown, including east-west routes, and approaches to downtown from central neighborhoods.
- **Private Providers:** Private employer shuttles such as the Microsoft Connector provide transit service for residents, without public cost. The shuttles offer direct transportation to work, with amenities such as WiFi that allow employees to start working on their trip to work. In some cases, they provide a connection that is not well-served by public transit. Seattle’s collaborative working relationship with private providers is a model for other cities. Nonetheless, as Seattle considers policies to balance private use of transit stops with public transit needs and manage conflicts that arise over the use of stops, it could look to other cities’ ongoing efforts in these areas, particularly those in San Francisco.
- **System Legibility:** Use of interactive maps to enhance trip planning capabilities, improved electronic and printed materials, and wayfinding make information about and navigation of the transit system more seamless, much as the ORCA card improves fare integration across providers.

