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City of Seattle Department of Transportation

TRANSIT MASTER PLAN

How Transit Benefits Seattle

April 2012

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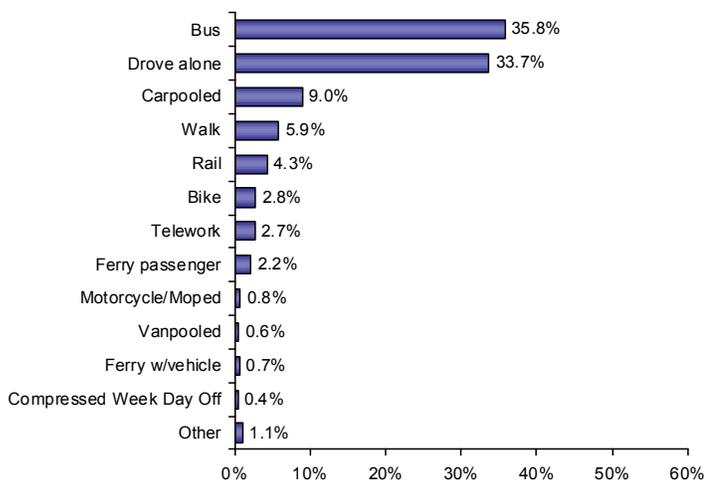
Seattleites use transit more frequently than residents of any other city in the Northwestern United States. Transit is particularly important for providing access to jobs and services in the Center City, but it also moves people between neighborhoods to attend school, shop, recreate, or simply explore the city. Seattle benefits from transit in ways that extend beyond basic mobility. This section summarizes some of the benefits Seattle residents and businesses receive from transit and illustrates the increasing need for and value of transit in a growing city.

Transit Supports Center City Growth and Prosperity

Transit Provides Safe, Convenient, and Reliable Access for Center City Jobs

Today, the Center City and directly adjacent neighborhoods have 230,000 jobs, expected to grow to 360,000 by 2030.¹ Transit provides safe, convenient, and reliable access for Center City employees from around the region. On a typical weekday, buses, trains, and ferries deliver 42% of Center City commuters starting work between 6 am and 9 am to their jobs. Without transit, Seattle's Center City economy would not be viable.

FIGURE 1 CENTER CITY COMMUTE MODE SHARE, % OF TRIPS BY MODE FOR EMPLOYEES STARTING WORK BETWEEN 6 AM AND 9 AM, 2010



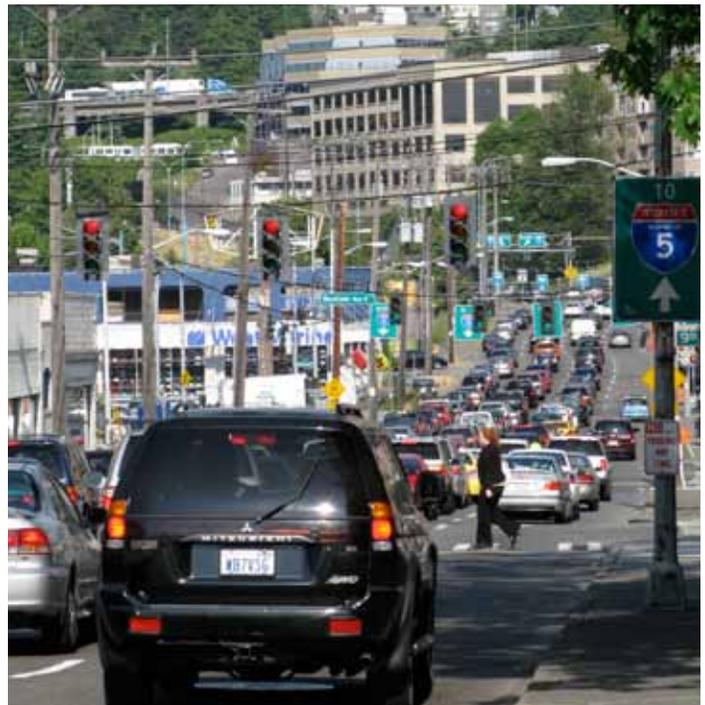
Nearly 36% of Center City commuters rode the bus in 2010, the highest share of any mode. Only about 34% of commuters drove to work alone.

Source: Commute Seattle, Commuter Mode Split Survey Results, March 2011

Transit Provides Mobility for a Growing Number of Center City Residents

According to Puget Sound Regional Council (PSRC) projections, the Center City will grow to from 50,000 to approximately 80,000 residents by 2030. More transit capacity and more frequent service will be needed to provide mobility between Center City neighborhoods for new and existing residents and to ensure they have access to employment in Seattle and around the region.

Estimates show that by 2030, transit will need to carry an additional 8,000 people per hour into and within the Center City during the morning peak period (6 am to 9 am).² This is equivalent to approximately 150 additional buses per hour on downtown streets, and would require the equivalent of two new bus-only lanes.³ Alternatively, if this demand was met using rail vehicles, 20 two-car or 10 four-car rail vehicles would be required (assuming 160 passengers per car).⁴



There is limited ability to expand already congested arterial streets in downtown Seattle.

Source: Flickr user Oran Viriyincy

Transit Makes Room for Historic and Productive Development

If this projected demand was met instead by building new roadway capacity instead of adding transit capacity, there would be demand for an estimated 5,000 additional vehicles during each hour of the morning rush hour traveling to or from the Center City.⁵ This does not include increases in traffic already assumed from growth. In perspective, seven or eight new lanes of arterial streets would be needed just to compensate for this increment of growth accommodated by transit.⁶

Given the assumption that all additional 2030 transit trips to the Center City would be made in private vehicles, new parking capacity would be required—approximately 15,000 additional parking spaces at a cost of \$240 million. These new parking spaces would require the equivalent of about eight 10-story parking garages covering an entire downtown Seattle block.⁷

Transit Makes Seattle a Better Place to Visit

Approximately nine million annual visitors spend \$5 billion in Seattle and King County, including nearly \$500 million on local transportation and gas. Tourism revenue supports jobs for more than 49,000 people in the region.⁸ Transit supports Seattle's tourism economy, helping make the city an attractive destination for regional, national, and international visitors.

Over half of these visitors arrive in Seattle by air, train, or means other than a private car. Many may prefer not to rent a car and want convenient access to major tourist destinations. International visitors—about 22% in 2009—have high expectations that there will be quality public transportation to get around the city.

Out-of-state visitors who pay taxes in their destination state represent not only an economic benefit for Seattle, but also an unambiguous gain for the state.⁹ Visitors who remain in the Seattle area are more likely to spend money locally. Visitors stay an average of over five nights, spending over \$200 per day.¹⁰

Transit Supports Events at Seattle Center, Waterfront, and Stadiums

Transit supports Seattle's ability to host multiple large events in the Center City and the University District while allowing people to go about their daily lives. Seattle's many sporting and entertainment events enhance quality of life in Seattle and support business activity and jobs:

- Seattle Center attracts 12 million visitors per year, generating \$1.15 billion in business activity and \$387 million in labor income for King County.¹¹

- Waterfront attractions are a major draw for visitors. The Seattle Aquarium had over 835,000 visitors in 2009, including about 535,000 state residents and 300,000 out-of-state visitors.¹²
- Seattle's stadiums attract large numbers of people to sporting and other special events. Safeco Field seats over 47,000 people and CenturyLink Field and Husky Stadium both seat up to 72,000 people. A 2002 survey (predating Link service) found that 25% to 30% of those who attended events at the SODO stadiums used non-auto modes of transportation.¹³ In 2008, Sounder trains served an average of nearly 2,500 passengers for 26 sporting events. The Link Stadium Station has additional tracks to store trains for post-game departures.¹⁴



Transit reduces the need for long-term auto storage, making space for more productive economic uses. Parking garages do not add visual interest, contribute to an attractive walking environment, or increase pedestrian activity and “eyes on the street.”

Image from Flickr user Eric Kornblum



Attractions and events at Seattle Center are a draw for both Seattle residents and visitors.

Image from Flickr user Transcendental



Link light rail service from SeaTac to downtown Seattle and Amtrak Cascades service to Union Station offer travelers convenient transit connections to the Center City.

Image from Flickr user Michael @ NW Lens



Link and Sounder trains provide train service to SODO special events from the Stadium and King Street Stations. Without transit, professional sporting events would create more significant traffic delays and require more parking.

Image from Flickr user Oran Viriyincy



King County Metro operates 14 electric trolley bus routes using 70 miles of two-way trolley wire and 159 vehicles.

Image from Nelson\Nygaard

Transit supports sustainable, healthy, and equitable growth

Transit Encourages Compact Development

Numerous studies demonstrate that people living in compact communities where they can easily walk to basic services and recreation drive less than people living in more “sprawling” areas. Higher residential and employment densities and integrated land uses are associated with lower per capita miles driven.¹⁵ The 2010 U.S. Census shows that residents living in larger multifamily buildings increased far faster than any dwelling type and single family living is declining as a percent of all residents. Concurrent with this trend, and as the overall number of housing units increased by 30,000, total average daily vehicle trips declined in Seattle.

Compact Development has Environmental and Public Health Benefits

Compact development reduces carbon emissions, lowers particulate levels, decreases water pollution, and reduces overall land consumption. Studies show that people living in compact neighborhoods drive 40-50% less miles annually than suburban neighbors. A report by the Urban Land Institute explores the connection between driving and CO₂ emissions and conservatively assumes that a 100% reduction in miles driven is associated with a 90% reduction in CO₂ emissions.¹⁶

Transit and Clean Energy Make Seattle's Neighborhoods Cleaner and Quieter

A person riding transit in Seattle produces lower per-passenger emissions than a driver or passenger of a private vehicle. Electric transit vehicles have even lower per-passenger greenhouse gas (GhG) emissions than a diesel bus. Implementing TMP-recommended corridors and electrifying some of the city's existing diesel bus corridors would reduce GhG emissions by about 2,700 metric tons annually.¹⁷ Electrification of all diesel Metro bus routes within the city of Seattle would reduce GhG emissions by about 62,000 metric tons annually.¹⁸ Electric trolley bus service has the additional benefits of being quiet and providing fast acceleration on steep Seattle hills. SDOT should work to increase the number of electrified transit routes.

Transit Makes Seattle More Affordable

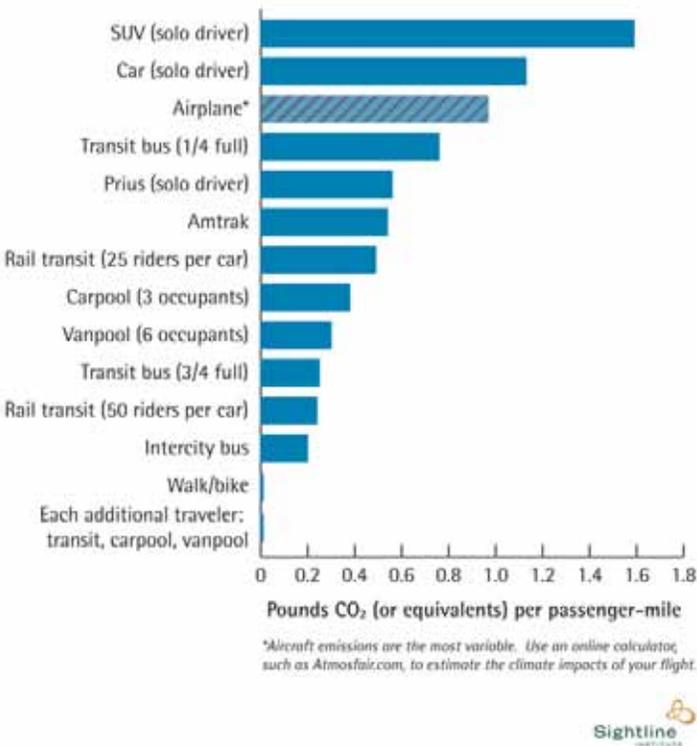
According to research by the Center for Neighborhood Technology (CNT), households in cities where jobs and services are readily accessible by transit are better able to respond to gas price increases.¹⁹ Access to transit helps reduce household transportation costs, saving families money and helping make Seattle a more affordable place to live. CNT's research shows that transportation costs can range from 15% of household income in compact, accessible neighborhoods to over 28% in locations with auto-oriented land patterns and limited access to public transit.

Transit Boosts Seattle's Economy and Creates Jobs

Reducing household spending on fossil fuels allows money to be spent in economic sectors that return a stronger benefit to the local economy. TMP transit corridor and service recommendations would reduce private vehicle gasoline consumption in Seattle by over a million gallons annually.²⁰ At \$3.50 a gallon, local residents could save millions of dollars annually by increasing spending power on local goods and services.

Operating transit services and investing in transit and street infrastructure projects create local jobs. A recent report by Smart Growth America analyzed stimulus-funded infrastructure projects and found that each dollar spent on public transportation created 31% more jobs and resulted in 70% more job hours than a dollar spent building roads. Investments in improving/maintaining existing streets generated 16% more jobs per dollar than building new roads.²¹

FIGURE 2 GHG EMISSIONS PER PASSENGER MILE



Average emissions per passenger mile are lower for transit than for passenger vehicles (assuming one or two occupants). Electric-powered transit offers Seattle a low-emissions transportation option.

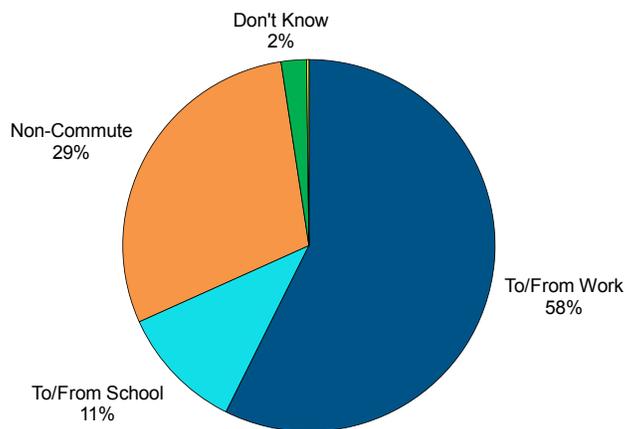
Source: Sightline Institute

Transit Provides Mobility for Everyone

Transit is not just for commuting; about 32% of regular riders use Metro for all of their transportation needs. About 40% of households in Metro's West Subarea (Seattle, Shoreline, and Lake Forest Park) have a regular Metro rider. Regular riders make an average of 25 trips per month, compared to two trips per month for infrequent riders.

Although transit is heavily used for commuting and school trips (about 70% of trips among regular riders), a large share of transit trips serve non-commute purposes at all times of the day.

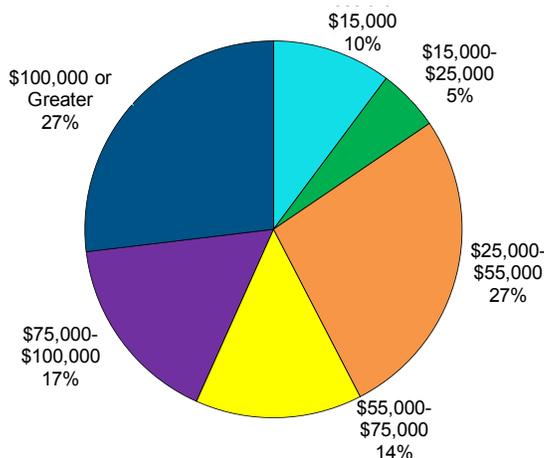
FIGURE 3 WHY PEOPLE RIDE METRO TRANSIT



In the West Subarea, 58% of regular Metro riders use transit for commuting, while 29% use it for non-commute purposes.

Source: Metro, 2009 Rider/Non-Rider Survey

FIGURE 4 HOUSEHOLD INCOME OF METRO TRANSIT RIDERS (SYSTEMWIDE)



In many cities, transit use is associated with lower-income levels, however transit riders in Seattle are distributed across a wide range of income levels. Frequent riders are less affluent than infrequent riders (median income of about \$67,000 compared to about \$73,000).

Source: Metro, 2009 Rider/Non-Rider Survey

ENDNOTES

- Including Lower Queen Anne, South Lake Union, Belltown, Denny Triangle, Commercial Core, First Hill, Pioneer Square/International District, and Stadium District.
- Based on an analysis of Seattle Travel Demand Model data.

Hypothetical Additional Transit Demand	2008	2030
New Passengers During Morning Peak (6:00 – 9:00 am) and Equivalent New Buses		
AM Peak transit trips to/within Center City	55,575	79,314
Hourly transit trips to/within Center City	18,525	26,438
Additional transit trips per hour	-	7,913
Demand can be met by:		
Additional buses per hour	-	150
OR Additional light rail trains per hour (two car trains)		20
OR Additional light rail trains per hour (four car trains)		10

- Based on analysis of Seattle Travel Demand Model data and additional calculations. Additional buses per hour calculation is a rough estimate based on an estimated load of 40 passengers per bus and assuming 25% of new capacity needs are accommodated on existing services.
- A maximum load factor of 2.0 during peak periods is assumed for rail; this is the assumption used in Appendix L (Operating Plan Summary) of the North Link Final Environmental Impact Statement. A seated capacity of 74 was assumed, thus there would be a maximum load of 148 passengers per vehicle. Assuming that 25% of new capacity needs can be accommodated on existing services, 5,935 new person trips per hour would need to be met using new service. Dividing 5,935 by 148 passengers per vehicle yields 40.1 vehicles. With two-car trains, 20 additional rail trips per hour would be required ($5935/296=20.05$). If four-car trains are used, 10 additional trips per hour would be required ($5935/592=10.03$).
- Without additional transit service to meet the demand, there would be an increased number of people driving. If every AM peak transit trip to and within the Center City were replaced by a driving trip, there would be approximately 4,946 additional vehicles per hour. This assumes an average vehicle occupancy of 1.6 passengers per vehicle (based on PSRC Transportation 2040 Final Environmental Impact Statement, 2010). Assuming a vehicle flow rate of 1,900 vehicles per lane per hour, 2.6 additional highway lanes would be necessary to accommodate the increased number of vehicles, or 5.2 total lanes (2.6 in each direction). In reality, all of the traffic would not be on a single road, but would instead be spread out across many streets.
- The table below lists the steps in this calculation.

Hypothetical Additional Vehicle Space Demand	2030	Source / Explanation
Additional AM Peak transit trips to/within Center City (2008-2030)	23,739	2008 Seattle Travel Demand Model
Additional hourly transit trips to/within Center City	7,913	AM Peak trips divided by 3
Additional hourly autos if additional transit riders drove instead	4,946	Assumes 1.6 persons per vehicle
Additional arterial street lanes to accommodate new cars (per direction)	7.1	Assumes capacity of 700 vehicles per lane per hour

- There would be 23,739 additional transit trips to and within the Center City during the AM peak (6:00 AM to 9:00 AM). If served by private vehicles, there would need to be parking spaces for an additional 14,837 vehicles, assuming that each vehicle would need its own space and an average vehicle occupancy of 1.6 persons. With an average cost of \$16,158 per space for a parking structure in Seattle, the construction cost of building parking spaces for those vehicles would be \$239,734,226. Additional parking spaces would also require land. Assuming 325 square feet per space in a parking structure, there would need to be the equivalent of 7.72 ten-story parking garages taking up entire downtown Seattle blocks.

Hypothetical Additional Parking Demand	2030	Source / Explanation
Additional AM Peak transit trips to/within Center City (2008-2030)	23,739	2008 Seattle Travel Demand Model
Additional cars in AM Peak if additional transit riders drove instead	14,837	Assumes 1.6 persons per vehicle
Cost for parking spaces in structure	\$239,734,226	Assumes parking structure cost of \$16,158 per space
Area required for parking spaces (sq. ft.)	4,821,984	Assumes 325 sq. ft. per space
Area required for 10 story parking garages (sq. ft.)	482,198	Parking area divided by 10
Land area of downtown Seattle block (sq ft)	62,500	Assumes block length of 250 feet
Number of city blocks needed for parking garages	7.72	Parking garage area divided by land area of downtown block

- Visit Seattle, Visitor Impact To Seattle/King County, 2009. <http://www.visitseattle.org/About-Us/Facts-And-Figures.aspx> and http://www.visitseattle.org/getattachment/About-Us/Facts-And-Figures/visitor_expend.pdf;
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13. Federal Highway Administration, Seahawks Stadium Case Study, http://ops.fhwa.dot.gov/publications/mitig_traf_cong/seahawks_case.htm
14. The Seattle Times, "Sports fans to find relief at Stadium light-rail stop," 7/11/2009. http://seattletimes.nwsourc.com/html/localnews/2009284443_ststadium.html
15. Eran Leck, "The Impact of Urban Form on Travel Behavior: A Meta-Analysis," *Berkeley Planning Journal* 19 (2006), 37-58
16. Reid Ewing et al., *Growing Cooler: The Evidence on Urban Development and Climate Change* (Washington D.C.: ULI, 2007)
17. Based on TMP analysis (see Chapter 3 of the Transit Master Plan Summary Report for results; additional detail on methodology is provided in Appendix B of the Transit Master Plan). Includes only transit-related emissions, not due to reductions in personal vehicle use.
18. Based on about 27 million diesel bus miles traveled within the city of Seattle, from the City of Seattle 2008 Greenhouse Gas Inventory.
19. Center for Neighborhood Technology, "\$4 per Gallon Gas – Are We Ready?", [http://www.cnt.org/repository/Published.Planetizen-\\$4perGallonGas.pdf](http://www.cnt.org/repository/Published.Planetizen-$4perGallonGas.pdf)
20. Transit Master Plan analysis
21. Smart Growth America, "Recent Lessons from the Stimulus: Transportation Funding and Job Creation," February 2011. <http://www.smartgrowthamerica.org/documents/lessons-from-the-stimulus.pdf>

