Seattle Transit Plan

To Get Seattle Moving

Final

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SDOT

Seattle Department of Transportation

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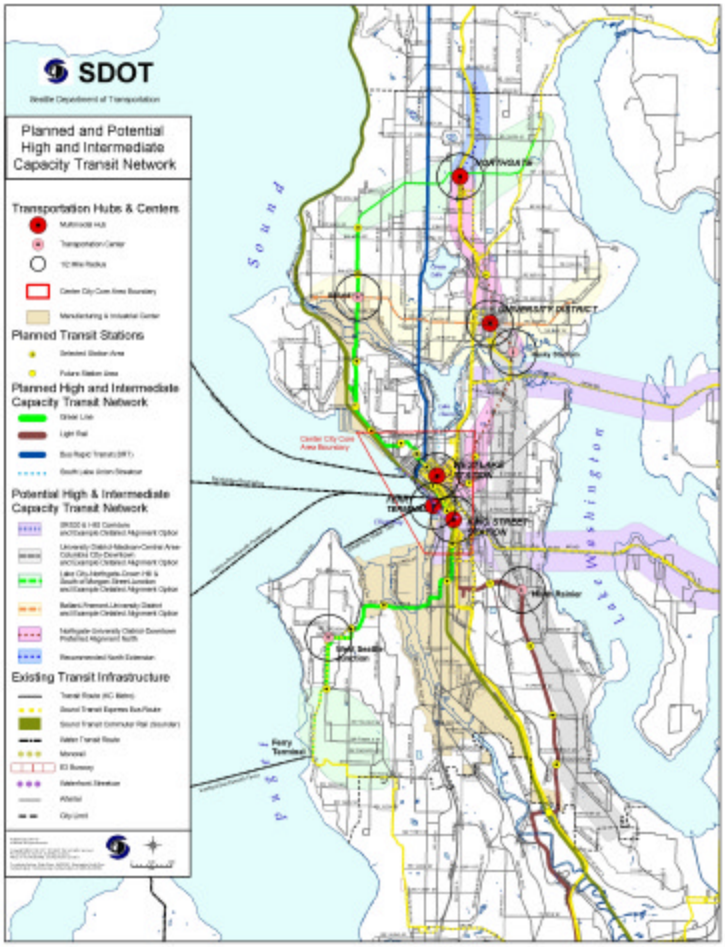
TSP Strategy {R1}:	Coordinate with Federal Government to Implement Transportation Policy and Projects.

EXECUTIVE SUMMARY

The City needs a plan for developing a transit system that supports as well as leads the development of Seattle's urban villages, as set forth by the Seattle Comprehensive Plan. Clearly, Seattle will need good transit service to provide people a real mobility choice. It is hoped that this Seattle Transit Plan will provide good direction on how Seattle can achieve the transit system it needs to grow gracefully.

The Vision

In fall 2003, the Seattle Department of Transportation (SDOT) held meetings internally, and externally with stakeholders, to draft a vision of Seattle's future transit network. The vision, as shown below, focused on showing Seattle's regional high and intermediate capacity transit corridors as well as key transit passenger facilities, e.g. multimodal hubs and transportation centers. Along with the Seattle urban village strategy, it provided the direction needed to develop the Seattle Transit Plan.



Plan Objectives

The purposes of the Seattle Transit Plan are:

- To get Seattle moving again and support economic growth. Seattle needs a transit plan that clearly shows how the Seattle urban village strategy will be supported. It will support updates of other City plans: Comprehensive Plan, Transportation Strategic Plan, neighborhood plans.
- To enable the City to be more proactive on the future of transit in Seattle. We want to know how various transit services and programs work together in an integrated transit network. The plan timeframe is 2005 to 2030.
- To help the City work better with our partner transit agencies by identifying Seattle's key transit corridors and needs. Each of these agencies do transit planning for Seattle, e.g. King County's Six-Year Transit Development Plan, Sound Transit's Phase 2 planning.
- To link City transit strategies to specific connections or corridors, i.e. making City policies and SDOT strategies operational.
- To estimate transit service funding needs by more clearly identifying the City transit priorities and corridor needs.

Key Plan Elements

The plan recommends Transportation Strategic Plan (TSP) strategies for making transit a "real choice". Many of them are related to the plan's six main elements:

1. Seattle Connections – The Urban Village Transit Network
2. Major Transfer Points -- Multimodal Hubs & Transportation Centers
3. Criteria for Evaluating Technologies
4. Transit Classifications
5. Transit Quality of Service Measures & Transit Priority Treatment Toolbox
6. Estimate of Service Funding Needs to Build the UVTN and Priorities for Transit Service Investment

1. Seattle Connections – The Urban Village Transit Network

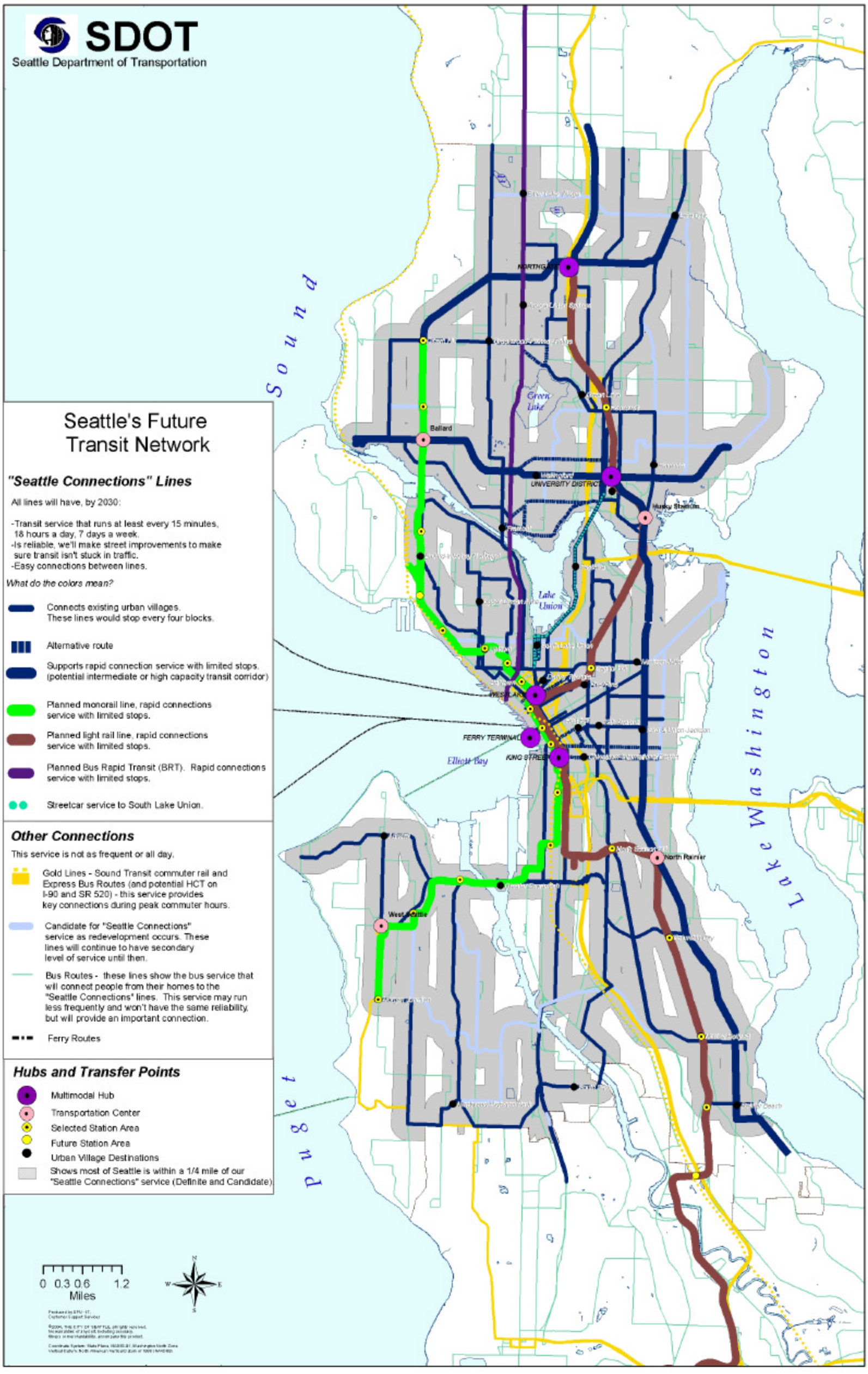
To support the Seattle urban village strategy, SDOT has developed an Urban Village Transit Network (UVTN) or "Seattle Connections" as shown in the next map. It represents the backbone of the Seattle transit network, carrying the majority of the Seattle transit system's riders.

Seattle Connections has the following characteristics:

- Connects Seattle's urban villages
- Provides 15 minute or better service frequency, 18 hours a day, 7 days a week, in both directions
- Fast and reliable
- Focused on performance rather than technology; it includes regional high capacity, intermediate capacity and local transit
- Easy connections between lines
- Has a sense of permanence to support transit oriented development and promote economic growth
- Performance monitoring using quality of service measures for service frequency, span of service, transit travel speed, passenger loadings and reliability.

The UVTN will allow Seattle to become a more livable city where we do not need a car for mobility.

In addition to the UVTN, there is the Secondary Transit Network or "STN". This network consists of service that is not part of the UVTN. Its primary function is to provide Seattle service coverage and serve specialized markets like commuter express service. Over time it will become a smaller share of the City's overall system.


SDOT
Seattle Department of Transportation
Seattle's Future Transit Network
"Seattle Connections" Lines
All lines will have, by 2030:
-Transit service that runs at least every 15 minutes, 18 hours a day, 7 days a week.
-Is reliable, we'll make street improvements to make sure transit isn't stuck in traffic.
-Easy connections between lines.
What do the colors mean?
Connects existing urban villages. These lines would stop every four blocks.
Alternative route
Supports rapid connection service with limited stops. (potential intermediate or high capacity transit corridor)
Planned monorail line, rapid connections service with limited stops.
Planned light rail line, rapid connections service with limited stops.
Planned Bus Rapid Transit (BRT). Rapid connections service with limited stops.
Streetcar service to South Lake Union.
Other Connections
This service is not as frequent or all day.
Gold Lines - Sound Transit commuter rail and Express Bus Routes (and potential HCT on I-90 and SR 520) - this service provides key connections during peak commuter hours.
Candidate for "Seattle Connections" service as redevelopment occurs. These lines will continue to have secondary level of service until then.
Bus Routes - these lines show the bus service that will connect people from their homes to the "Seattle Connections" lines. This service may run less frequently and won't have the same reliability, but will provide an important connection.
Ferry Routes
Hubs and Transfer Points
Multimodal Hub
Transportation Center
Selected Station Area
Future Station Area
Urban Village Destinations
Shows most of Seattle is within a 1/4 mile of our "Seattle Connections" service (Definite and Candidate)
0 0.3 0.6 1.2
Miles
Sound
Puget
Lake Washington
Ballard
UNIVERSITY DISTRICT
Green Lake
Lake Union
Elliott Bay
FERRY TERMINAL
KING STREET
North Rainier
West Seattle

2. Major Transfer Points – Multimodal Hubs and Transportation Centers

The plan identifies the city's "Multimodal Hubs" and "Transportation Centers" as well as other key transfer points.

The difference between a Multimodal Hub and a Transportation Center is the intensity of transportation activity and land use associated with each facility. The Multimodal Hubs are located in urban centers where multiple modes intersect. The Transportation Centers are mostly located in hub urban villages; they are also locations with mobility options.

As the City, we can work to make these places great public spaces that provide seamless connections between modes.

3. Criteria for Evaluating Technologies

All feasible technologies need to be considered for the UVTN corridors. The plan identifies the types of criteria the City would like planners to consider when developing proposals for the UVTN. The criteria are based on:

- Findings from recent Puget Sound Regional Council (PSRC) analysis of high capacity transit corridors
- Evaluation measures used in the City's Intermediate Capacity Transit (ICT) study. It began by evaluating 47 routes drawn from neighborhood plans, previous studies, public suggestions and input from the Elevated Transportation Company, King County and Sound Transit.

4. Revisions to the Transit Classification Map

The plan updates the City's Transit Classification map and characteristics of the different classifications. Some of the changes are:

- Update the Transit Way classification and add two Transit Way corridors to the classification map
- Show bus turnarounds on the classification map
- Increase maximum volume limits by 5 vehicles per peak hour to better match the Minor and Major Transit classifications to current bus volumes
- Add performance measures consistent with UVTN implementation.

5. Establishes Transit Quality of Service (QOS) Measures and Transit Priority Treatment Toolbox

By establishing transit quality of service (QOS) measures for transit in Seattle and using a transit toolbox, the City can save transit service hours and increase ridership. The plan identifies five QOS

measures for monitoring UVTN corridors performance: 1) service frequency, 2) span of service, 3) travel speed, 4) reliability, and 5) passenger loadings. It also describes the different tools that can be used to get transit moving faster and/or more reliably, i.e. make City policies operational.

SDOT will begin the performance monitoring process on a portion of the UVTN beginning with the frequency, span of service, and transit travel speed measures. SDOT's objective is to keep transit speeds in UVTN corridors above 30% of the posted speed limit consistent with existing resources. SDOT is working with Metro and other transit agencies to provide good service frequency and span of service in the UVTN corridors.

6. Provides Estimates of Service Funding Needed to Build the UVTN by 2030 and Prioritizes Transit Service Investments

Finally, the plan has service cost estimates for what it will take to make Seattle's transit vision a reality.

An important step the City can take to help reduce transit costs is to work with transit agencies on moving transit through congestion to make it quicker and more reliable. The plan estimates that if transit service currently using UVTN corridors operated at the policy speed threshold of 30% of posted arterial speed limit, Seattle could save 121,084 service hours annually or $11.5 million a year. Additionally, the annual cost of achieving the minimum service frequency and span of service for the entire UVTN (this is the 2030 goal) would drop from $73 million to $57 million if Seattle can achieve and maintain this minimum speed threshold.

An understanding of the Seattle's transit service needs makes it easier for the City to prioritize transit service resources as they become available and to make strategic investments. The plan's service investment strategy places an emphasis on completing the UVTN, provides criteria for making specific transit route investments, and describes how transit connections should be improved over time as more resources become available.

The plan should provide Seattle's citizens and the City's partner transit agencies, which are responsible for building and maintaining Seattle's transit network, a clearer context and vision of the City's transit priorities.

Next Steps

The plan will be finalized with adoption of the City's updated Transportation Strategic Plan (TSP), which is scheduled to occur during the second quarter of 2005. As we receive public feedback from this process we will review and revise our strategies to be consistent with the TSP strategies.

SDOT is working with King County Metro to begin implementation of a select number of UVTN corridors. This activity will begin with monitoring of transit service frequency, span of service, and transit travel speed plus identification of available resources that can be used to improve or maintain UVTN performance in these corridors.

The Seattle Transit Plan will be updated periodically to support major updates of the TSP and of our partner transit agencies' plans, e.g. King County's Six-Year Transit Development Plan.

INTRODUCTION

In fall 2003, the Seattle Department of Transportation drafted a Seattle transit vision to help coordinate and create stronger ties between the City's transit priorities and the transit plans of the different transit agencies serving Seattle. Once this step had been taken, it became clear that the City needed to have a set of strategies that could show how the vision could be achieved and its relationship to the transportation and land use goals and policies set forth by the Seattle Comprehensive Plan.

The purpose of the Seattle Transit Plan is to provide a more detailed explanation of how the City can support the Comprehensive Plan's urban village strategy with public transportation, thereby reducing people's reliance on the single occupant vehicle. Implementation of this plan should help Seattle meet many of its mobility needs in the future while making the City more economically competitive and minimizing long-term environmental impacts for the city and the region.

Chapter 1 of the Seattle Transit Plan describes Seattle current transit system and transit market. Some of the transit market information is taken from King County's annual rider/non-rider survey.

Chapter 2 describes a City transit vision for Seattle. It also summarizes Seattle transit plans that have been developed by the City's partner transit agencies. The City transit vision builds upon previous City transit planning efforts including the Seattle Transit Study for Intermediate Capacity Transit, which was the basis of the Seattle Monorail Project's Green Line. Besides identifying where the City should pursue future high and/or intermediate capacity transit investment, it shows the location of major transfer points, suggesting a hierarchy of intensity or priority for transit investment and City focus.

Chapter 3 provides an approach for the City to achieve its transit vision and prioritize limited transit resources. It introduces the concept of an Urban Village Transit Network or Seattle Connections. This is where people would be able to find fast, frequent, reliable, comfortable, safe, and convenient transit service connecting Seattle's urban villages most hours of the day and days of the week. All non-UVTN service is defined as the Secondary Transit Network or STN. It includes services that provide communities outside the UVTN access to the UVTN, peak period commuter express routes, and neighborhood circulators. Over time, STN service will increase but it will be a smaller share of Seattle's overall service investment. Major transfer points of the Seattle transit network are also identified.

Chapter 4 explains how the City would like to maintain its transit network. It includes an update to the City's transit classifications. Transit quality of service (QOS) measures for transit speed, service frequency, span of service, reliability, and passenger loadings are recommended for the UVTN. Performance monitoring will be done for all UVTN corridors, beginning with the corridors that already have significant service investment. A toolbox of transit priority treatments is also included to show what type of strategies the City and its partner transit agencies can consider for achieving transit speed and reliability in UVTN corridors.

Chapter 5 briefly describes the transit revenue sources that are available to fund the Seattle transit network.

Chapter 6 gives three transit investment programs for the current capital program cycle, a mid-range period (2010-2020), and long-range (2021-2030).

CHAPTER 1: SEATTLE'S TRANSIT SYSTEM

Seattle's transit system has taken many forms over the years. In the mid-1800's, when transit demand began to develop, the preferred option was waterborne transit to travel the waterways of Puget Sound and Lake Washington. Because of Seattle's hills, bodies of water, and rainfall, wagon travel was a difficult proposition. In 1884, Seattle received its first street railway: Frank Osgood's horse-drawn streetcar that operated along Second Avenue. This was soon followed by Seattle's first electric streetcar in 1889.

By 1892, Seattle had 48 miles of streetcar lines and 22 miles of cable car lines. Private entrepreneurs built this system to serve new (transit-oriented) real estate developments.

In 1902 West Seattle became the first city in the United States to own and operate a streetcar line. The City of Seattle soon followed in 1911 after it voted to fund its own streetcar line; built in 1914, it provided service between Ballard and downtown Seattle. Seattle voters approved a $15 million purchase of street railway from Stone & Webster in 1918 to create a Seattle municipal railway system, which, by 1936, had 410 streetcars on 26 electric routes and three cable car lines with a total of 231 miles of track. It also operated 60 gasoline-powered buses on 18 routes.

Due to financial troubles, however, the City decided in 1939 to replace the streetcars with trackless electric trolleys and buses, becoming the Seattle Transit System. The last streetcar made its final run to Fremont on April 13, 1941. Seattle Transit's annual ridership peaked in 1944 at 130 million passengers.

As the region grew, so did the demand for a more regional transit system. In 1972, the same year Seattle voters approved the scrapping of the R. H. Thomson Expressway, King County voters approved creation of Metro Transit and a 0.3 percent sales tax for bus service. By this time, Seattle and suburban annual transit ridership had dropped to 31 million passengers. Seattle Transit and the privately owned Metropolitan Transit Corporation, serving the suburbs, were also in financial trouble. Metro Transit purchased Seattle Transit for $6.5 million and the Metropolitan Transit Corporation for $1.5 million and began its operations on January 1, 1973. By 1980, Metro Transit had more than doubled annual ridership to 66.1 million.

Seattle and Puget Sound area voters have continued to support transit investments. In 1996, voters in King, Pierce, and Snohomish counties approved the Central Puget Sound Regional Transit Authority, or Sound Transit, to provide a regional high capacity transit system. In November 2002, Seattle voters approved creation of the Seattle Popular Monorail Authority to build a monorail line from Ballard to West Seattle through downtown Seattle.

Existing Seattle Transit System

Local Transit

King County Metro (Metro) provides most of Seattle's local (and local express) transit service. In 2002, Seattle, Shoreline, and Lake Forest Park, i.e. the West subarea, received almost 1.89 million annual service (platform) hours, generating slightly over 60 million annual rides[1]. This was about 71

[1] 2002 is the most recent subarea data. Ridership data does not include ride free area passengers.

percent of Metro's total system ridership of slightly over 85 million annual rides (excludes ridership from Sound Transit buses operated by Metro and ride free area passengers). The West subarea generated about 66 percent of Metro's fare revenue in 2002.

Systemwide, Metro achieved a 23.2 percent operations revenue-to-operating expense ratio (OR/OE) for its bus services in 2003 (this was below the Metro's policy target of 25%). For buses (excluding paratransit, water taxi, vanpool and rideshare services), the operating cost per boarding was $3.49 in 2003.[2]

Metro's bus system is primarily focused on four areas: 1) increasing peak market share, 2) expanding core network services, 3) integrating with Sound Transit, and 4) addressing local subarea priorities. In 2003, it served a King County population of over 1.779 million in a 2,134 -square-mile service area. It operates 1,248 coaches, including 850 gas/diesel buses, 146 electric trolley buses, and 216 dual mode buses that will soon be replaced with electric-diesel hybrid buses, on 235 routes. Metro also operated 84 buses for Sound Transit.

Metro has bike racks installed on all of its buses. There are also bike racks and lockers at some of Metro's Seattle park-and-ride lots and the Northgate Transit Center. A bike station was recently installed near the King Street Station.

The electric trolley buses use 68.61 miles of two-way overhead electric trolley wire in Seattle, with 31 substations. Trolleys produce no tailpipe emissions and are considerably quieter than diesel buses.

The George Benson Waterfront Streetcar Line is operated by Metro. It includes five streetcars, nine stations, and more than two miles of rail. The tracks and overhead wire run along Alaskan Way and South Main Street from Myrtle Edwards Park to the International District. In 2003, it used 12,737 annual service hours and had 403,590 passenger boardings.

All buses operating in downtown Seattle are free to riders from 6:00 a.m. to 7:00 p.m. The ride-free area boundaries are Battery Street, Sixth Avenue, I-5, Jackson Street, and the waterfront. Tunnel stations are included in the ride free area while the Benson Waterfront Streetcar is not part of the ride free area. Metro estimates that the ride free area has 7.6 million passenger trips each year, 20 to 40 percent of which would probably have been taken the bus if a fare were charged.

The ride-free area significantly improves downtown Seattle circulation by encouraging people to use transit instead of cars for short trips within the downtown area. It increases transit ridership and reduces downtown bus operating costs because it takes less time to load and unload passengers.[3]

In 1997, Metro began operating the Elliott Bay Water Taxi on a seasonal basis. It currently runs between Seacrest Park in West Seattle to Pier 55 in downtown Seattle. In 2003, the water taxi used 1,844 annual service hours and had 116,833 passenger boardings between April 21 and November 28, with a cost per boarding of $3.63.

[2] General Manager's Quarterly Management Report, Year-end 2003
[3] King County Metro, Background Paper on Activity Center Mobility, and Proposed Strategy S-13, June 2004

Metro's vanpool program generated 1,793,748 passenger trips in 2003 with 663 vans in service. It is the largest vanpool program in the country. The direct operating cost per passenger trip is $1.36.

Transportation for people with disabilities and low-income seniors is provided by Metro through either the ADA Paratransit Program or the Paratransit Options Program. Their services include a taxi subsidy using scrip and the ACCESS Transportation Van Service. In 2003, Metro provided 1,024,491 ACCESS passenger rides and 52,264 taxi passenger rides. The adjusted direct operating costs per passenger rides using ACCESS and taxis was $30.62 and $7.12, respectively.

Other Metro programs and services include custom buses, special event service, the U-Pass program with the University of Washington, bikes on buses, vanpools, and a ride-match service.

Metro has the following facilities in Seattle:

- Operating Facilities: Atlantic, Ryerson, Central
- Maintenance Facilities: Atlantic, Ryerson, Central, and Waterfront Streetcar Barn
- Transit Centers: Northgate, Downtown Seattle Transit Tunnel

Of Metro's approximately 9,596 bus stops (zones), about 3,857 (or 40 percent) are located in Seattle. They also have 293 bus layover stops in Seattle where bus drivers park their buses prior to beginning their next run.

The E-3 busway and downtown Seattle transit tunnel provide Metro, as well as Sound Transit, exclusive right-of-way for its bus operations. In addition, Seattle provides bus only lanes on some its arterials. Since 1994, transit only or HOV lanes have been built along Aurora Avenue North, Howell Street in downtown Seattle and the West Seattle Freeway.

With Metro Transit's current bus network, almost all Seattle households are within a one quarter-mile of a bus stop or park-ride lot. Figure 1 shows that almost every area of Seattle has this type of transit access.[4]

Metro refers to its all-day, two-way service as its core service or core network. The core network for Seattle is listed in Table 1.[5] The core network connects the King County's urban centers and other major activity centers. It operates on freeway and city arterials where good transit speed and reliability can be achieved. Figure 2 shows the core network's direct connections between designated urban centers and manufacturing and industrial centers in King County.[6] Appendix 1 lists Metro's West subarea bus routes and their service levels (assuming Six-Year Plan recommended service investments by 2007).

[4] Figure 3-1, King County Metro Six-Year Transit Development Plan for 2002 to 2007, adopted December 2002
[5] King County Metro Six-Year Transit Development Plan for 2002 to 2007, adopted December 2002
[6] Figure 4-2, King County Metro Six-Year Transit Development Plan for 2002 to 2007, adopted December 2002

Figure 1: King County Metro Bus System – Distance from Transit

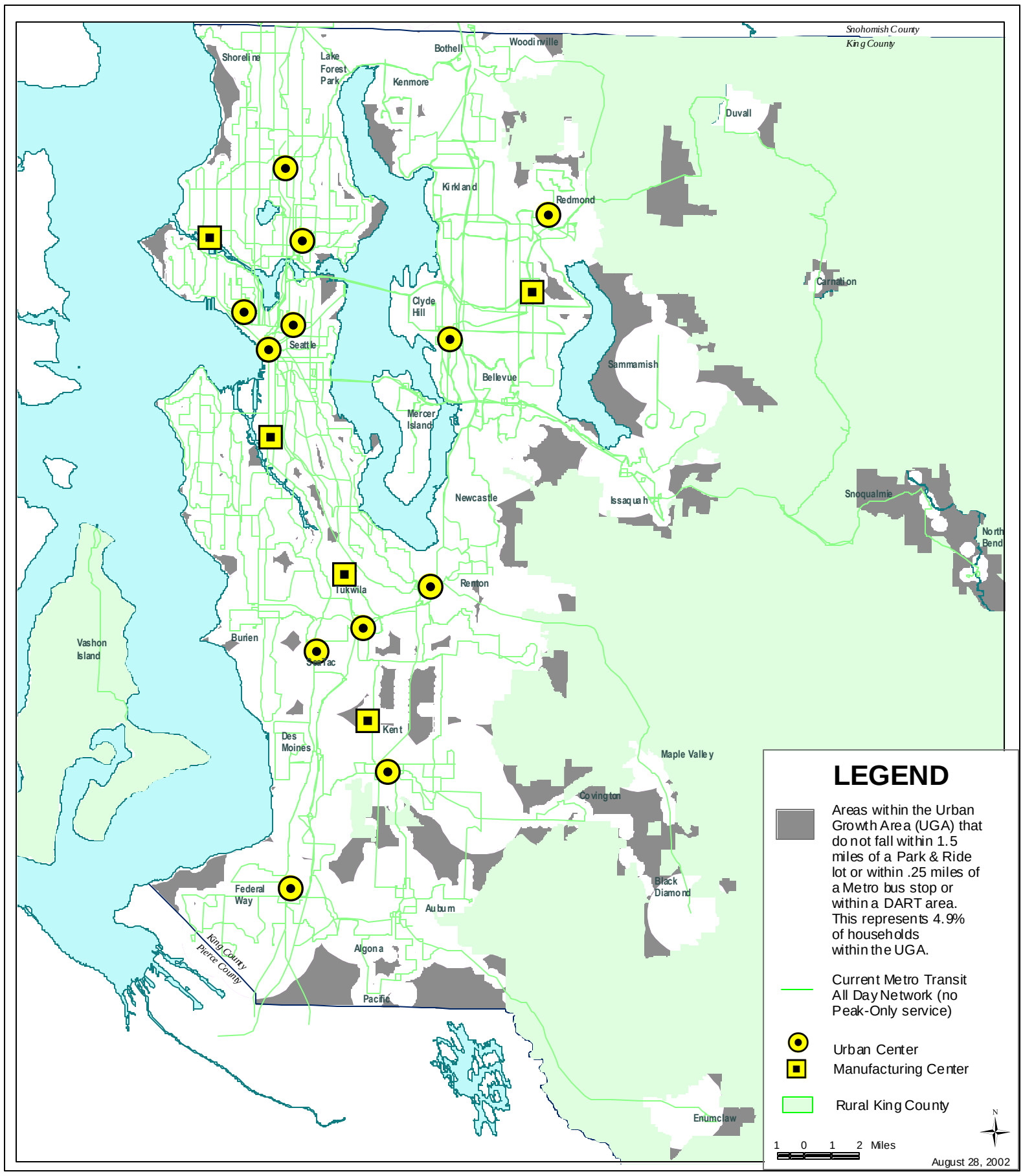


Figure 3-1 King County Metro Bus System - Distance from Transit

3-7 King County Metro Six-Year Transit Development Plan
September 2002

Table 1: Seattle's Core Service Connections

Description			2001 Frequency
Between these places		**Via Primary Corridor and Destination**	**2001 Actual peak/mid/eve**
Admiral	White Center	California Ave. SW	30/30/30
Aurora Village	Seattle CBD	Aurora Ave. N	10/20/30
Ballard	Northgate	24th Ave. NW, Holman Rd. NW	30/30/60
Ballard	Seattle CBD	15th Ave. W	10/10/30
Ballard	U District	NW Market St., N & NE 45th St.	10/15/15-30
Beacon Hill	Seattle CBD	Beacon Ave. S	5-10/10/20-30
Bellevue	U District	SR-520	15/30/60
Burien	Seattle CBD	Ambaum Blvd. SW, Delridge Way SW	15/30/30
Capitol Hill	Seattle CBD	15th Ave. E, Pine St.	10/15/30
Capitol Hill	Seattle CBD	Broadway E, Pine St.	10/10/30
Capitol Hill	Seattle CBD	Madison St.	10/15/30
Capitol Hill	Seattle Ctr.	Denny Way	15/30/30
Central Area	Seattle CBD	Jefferson - James	7-8/7-10/15
Federal Way	Seattle CBD	I-5	30/30/-
Fremont	Seattle CBD	Dexter Ave. N.	10-15/15/30
Greenwood	Seattle CBD	Greenwood Ave. N	15/15/30
Kent	Seattle CBD	W Val Hwy., Southcenter Blvd., Interurban, I-5	15/30/30
Kirkland	Seattle CBD	108th NE and SR-520	10-15/30/30
Loyal Hts.	U District	NW 85th St.–15th Ave. NE	10/15/30
Madrona	Seattle CBD	Union St.	15/15/30
Northgate	Seattle CBD	I-5	4-8/15/60
Northgate	Seattle CBD	Wallingford Ave. N., Aurora Ave. N	20/20/30
Northgate	U District	Roosevelt WY. NE, 5th Ave. NE	10-15/15/30
Queen Anne	Seattle CBD	5th Ave. N., Taylor Ave. N.	10-15/20/30
Queen Anne	Seattle CBD	Queen Anne Av. N	5-10/15/15
Rainier Beach	Seattle CBD	Rainier Ave. S	10/10/30
Renton	Seattle CBD	MLK WY., I-5	7-15/30/--
Sea-Tac Airport	Seattle CBD	I-5	30/30/30
U District	Seattle CBD	Pine St., 23rd Ave. E	10-15/15/30
U District	Seattle CBD	I-5	5-8/7-10/--
U District	Seattle CBD	Eastlake Ave. E, Fairview Ave. N	12/15/15
U District	Columbia City	23rd Ave. E, MLK Jr. Way S	10/15/30
U District	Woodinville	SR-522, Bothell	30/60/--
West Seattle	Seattle CBD	Fauntleroy Ave. SW, W. Seattle Bridge	15/15/30
Core Service Connections in King County Served by Sound Transit			
Bellevue	Seattle CBD	I-90, Bellevue WY. NE	5-8/15/30
Issaquah	Seattle CBD	I-90	30/30/60
Redmond	Seattle CBD	SR-520	15/30/30
Woodinville	Seattle CBD	SR-522, I-5	30/30/30

Figure 2: Direct Connections between Designated Urban Centers and Manufacturing Center in King County

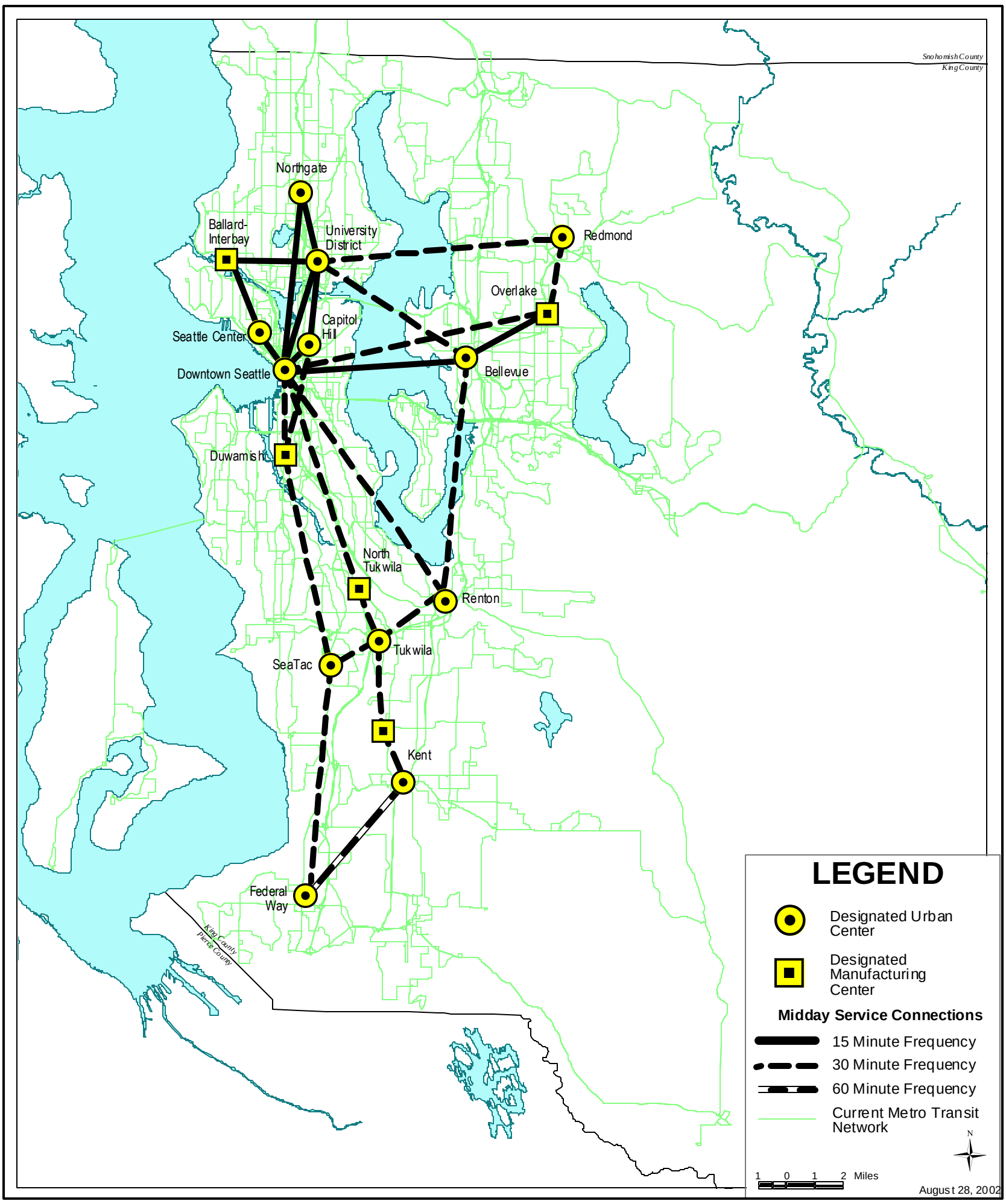


Figure 4-2: Direct Connections Between Designated Urban and Manufacturing Centers in King County

Metro and WSDOT operate 10 permanent and 3 leased park-and-ride lots in Seattle with approximately 2,100 parking spaces. The Northgate Transit Center south of the Northgate Mall provides almost 800 of the spaces. The park-and-ride lots are free of charge. [7]

The City of Seattle operates a monorail on a mile of elevated guideway between Westlake Mall in downtown Seattle and the Seattle Center. It carried about 2 million riders in 2002. [8] Due to a fire in 2004, this monorail has not been operating. The Green Line, discussed in the next section, may soon replace it.

Intermediate Capacity Transit

The City identifies intermediate capacity transit as being "enhanced-capacity transit services that would be interconnected, and operate faster and more reliably than existing bus service".[9] In November 2002, Seattle voters approved an intermediate capacity transit project when they created the Seattle Popular Monorail Authority, also referred to as the Seattle Monorail Project (SMP). SMP's purpose is to fund, build, operate, own, and maintain a 14-mile monorail Green Line, connecting the Crown Hill Residential Urban Village, Ballard Hub Urban Village, Uptown/Queen Anne Urban Center, Downtown Urban Center, Duwamish Manufacturing/Industrial Center, West Seattle Junction Hub Urban Village, and the Morgan Junction Residential Urban Village.

The Green Line, shown in Figure 3, is the first phase of a planned five-line citywide monorail system.[10]

Cost and financing issues have delayed the implementation of the Green Line project, originally scheduled for completion by December 2009.

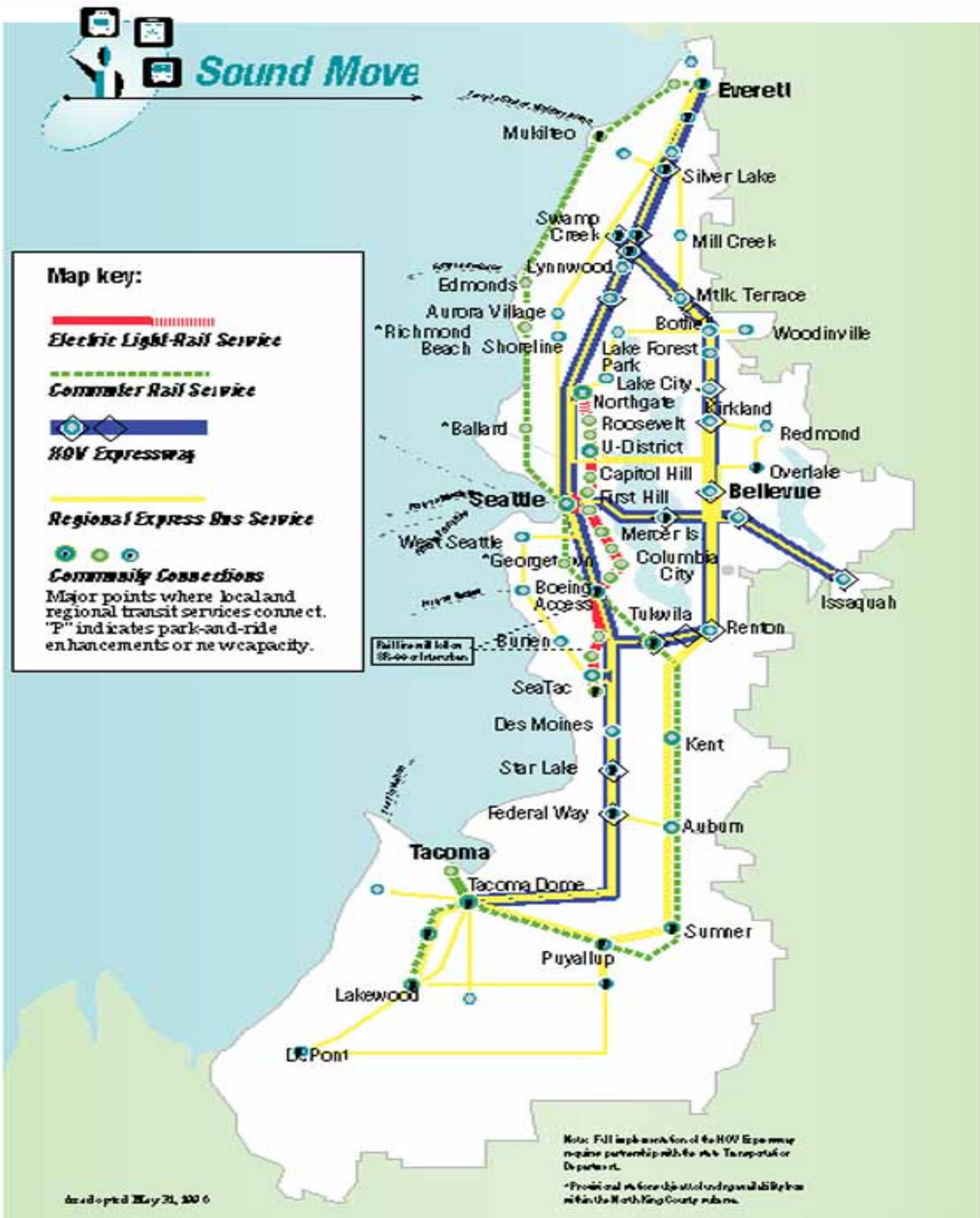
Regional High Capacity Transit

Sound Transit is the regional transit authority for the Puget Sound area (which includes portions of King, Snohomish and Pierce Counties.) It was created in 1996 by voters within its boundary, and has been planning and implementing the first phase of its "Sound Move" regional transit plan. The Sound Move plan includes: operation of a 24-mile light rail system (called "Link") between SeaTac and the University District (via downtown Seattle and the Rainier Valley), with possible extension to Northgate; peak period commuter rail services (called "Sounder") along existing rail lines between downtown Seattle, Tacoma and Everett; and regional bus services connecting major centers throughout Sound Transit's service area.[11]. Figure 4 shows the Sound Move ten-year plan.

[7] King County Metro 2003 4th Quarter Park and Ride Lot Utilization Report
[8] 2002 National Transit Database
[9] City of Seattle, Seattle Transit Study for Intermediate Capacity Transit, Final Report 2001, page 5
[10] Elevated Transit Company, Seattle Popular Monorail Plan, August 2002
[11] Sound Move, Sound Transit, May 1996

Figure 3: Seattle Monorail Project Green Line

Figure 4: Sound Move Regional Transit System Plan, Phase 1



The initial segment of Link will be 14-miles long connecting the Downtown Urban Center, North Beacon Hill Residential Urban Village, North Rainier Hub Urban Village, Columbia City Residential Urban Village, MLK at Holly St Residential Urban Village, and south to the City of SeaTac. A shuttle bus will connect passengers from the South 154th Station to Seattle-Tacoma International Airport until the light rail station is constructed in 2011. Link trains will start service from downtown Seattle to South 154th Street by 2009 and by 2020 are projected to carry at least 42,500 riders a day.

Sound Transit's Regional Express provides express bus service between suburban areas in the three-county service area and downtown Seattle, West Seattle, and the University District. There are a total of 20 bus routes that provide this all-day, two-way express service with limited stops. They try to make maximum use of region's HOV lane system and other transit priority measures, such as HOV direct-access freeway ramps. Regional Express also makes investments in transit centers and park-and-ride lots. In 2002, Regional Express buses carried 6,388,162 annual passenger trips using 445,939 annual service (platform) hours.

Sounder commuter rail service between Tacoma and Seattle began in 2000 and between Everett and Seattle in 2003. Besides the King Street Station, where the Tacoma and Everett services will serve downtown Seattle, there are two provisional Sounder stations identified for Seattle in Georgetown and Ballard. Sounder will be capable of moving 6,000 people per hour (peak direction during rush hours). In 2002, Sounder carried 817,405 annual passenger trips using 9,494 annual service hours.

Amtrak Cascades is a partnership between WSDOT, Amtrak, and Oregon. It provides intercity passenger rail service for bnger distance travel between cities in the Cascadia corridor. In 2002, there was one daily round trip between Seattle and Vancouver B.C., one daily round trip between Seattle and Bellingham, and three daily round trips between Seattle and Portland and two daily round trips between Portland and Eugene, Oregon. These trips generated an annual ridership of 584,346.

Waterborne Transit

Washington State Ferries (WSF) is operated by the Marine Division of the Washington State Department of Transportation (WSDOT). It serves the Colman Dock Ferry Terminal in downtown Seattle and the Fauntleroy Ferry Terminal in West Seattle. More than half of the WSF ridership is commuters.

In 2002, Colman Dock averaged 27,510 ferry passengers per day and carried 8,022 vehicles per day. There are three routes that serve the Colman Dock: 1) Bainbridge-Seattle, 2) Bremerton-Seattle, and 3) Vashon-Seattle. The Seattle-Vashon route is a peak period, commuter passenger only ferry service for the weekdays and Saturdays.

Only the Vashon Island ferry serves the Fauntleroy ferry terminal.

In 2002, the annual ridership for WSF Seattle routes to Colman Dock was: Bainbridge-Seattle, 6,727,650; Bremerton-Seattle (passenger only); 681,830; Bremerton-Seattle, 2,212,150; Vashon-

Seattle (passenger only), 228,327. Therefore, the total 2002 WSF ferry riderhip at Colman Dock was 9,849,957.

The Fauntleroy-Vashon-Southworth route carried 3,108,107 in 2002.

King County operates an Elliott Bay water taxi with temporary terminals at the Seacrest Dock in West Seattle and Pier 54 in West Seattle. The water taxi service has been operating mostly on a seasonal basis (e.g. May through September) since 1997.

The Victoria Clipper provides daily hydrofoil service between Seattle and Victoria, British Columbia.

The Port of Seattle operates a cruise ship terminal at Pier 66/Bell Harbor. In 2004, there is expected to be 140 cruise ship visits carrying 500,000 cruise ship passengers.

Seattle's Transit Market

According to Census 2000, Seattle has a population of 563,374, households of 258,499, and a median household income of $45,736. Seattle's population was estimated to have grown to 571,900 persons in 2003. In 2002, Seattle had 479,241 jobs.

Seattle is projected to grow by approximately 47,000 households (about an 18 percent increase from 2000) and 84,000 jobs (about a 18 percent increase from 2002) by 2020. The majority of this growth will be experienced in the city's designated urban centers, hub urban villages, and residential urban villages, which are shown in Figure 5.

Seattle's Residential and Employment Densities

Seattle has six urban centers: Downtown Seattle, First Hill/Capitol Hill, Uptown Queen Anne, University Community, Northgate, and South Lake Union. Urban centers must have zoning that permits them to have a minimum of 15,000 jobs located within a half mile of a possible future high capacity transit station; an overall employment density of 50 jobs per acre; and an overall residential density of 15 households per acre.

Figures 6 and 7 show Seattle's current population and employment densities and how they will change by 2030.

Hub urban villages must have zoning that permits them to accommodate a minimum of 25 jobs per acre and a residential density of at least 15 units per acre. Seattle has six hub urban villages: Lake City, North Rainier, Bitter Lake Village, Ballard, West Seattle Junction, and Fremont. South Lake Union, which is currently a hub urban village, is being reclassified as an urban center.

Residential urban villages must have zoning that permits them to achieve a density of 8 to 15 units per gross acre. There are 18 designated residential urban villages.

Figure 5: Seattle Comprehensive Plan Urban Villages

Figure 6: 2000 Population and Employment Density with Transit Ridership

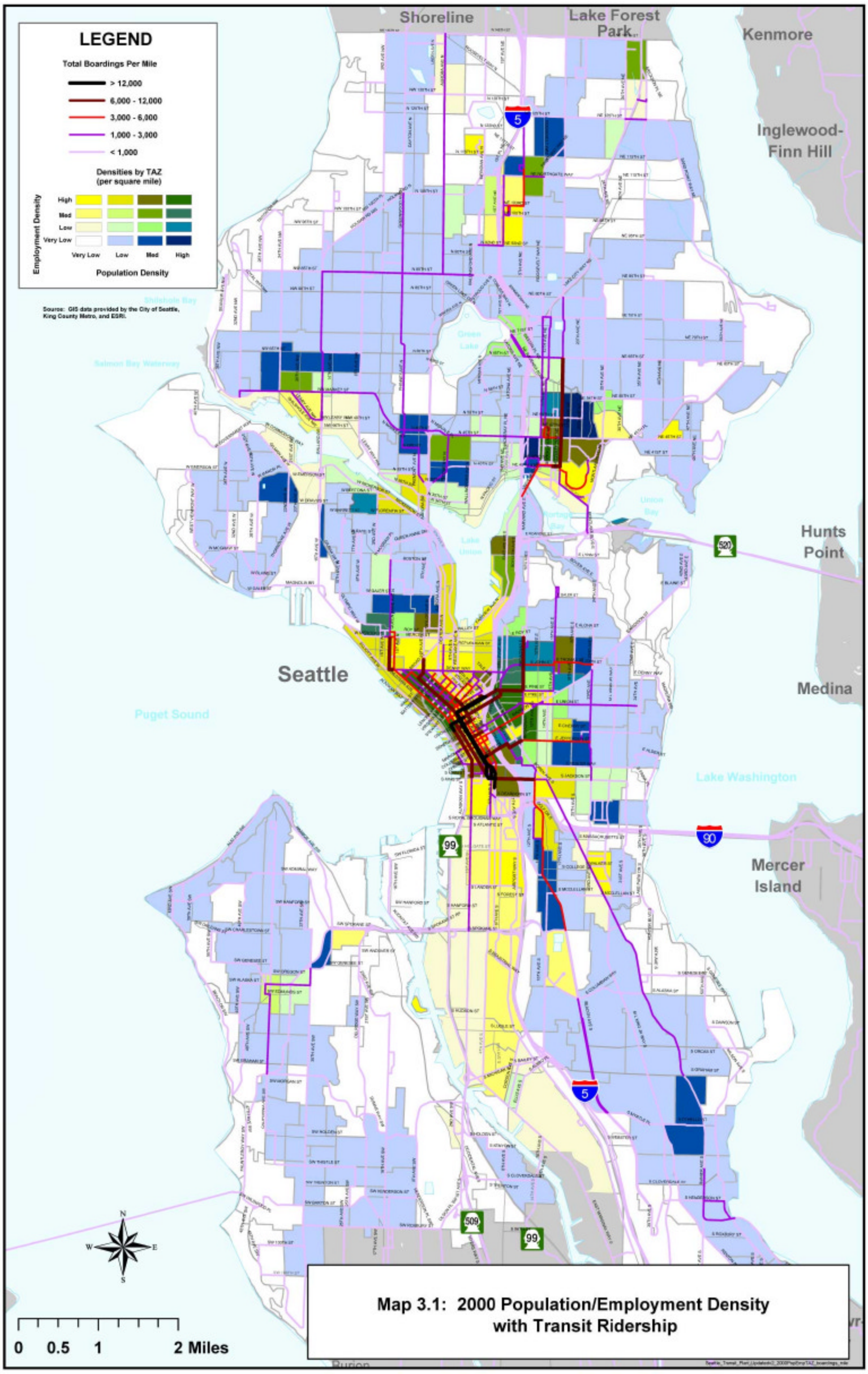
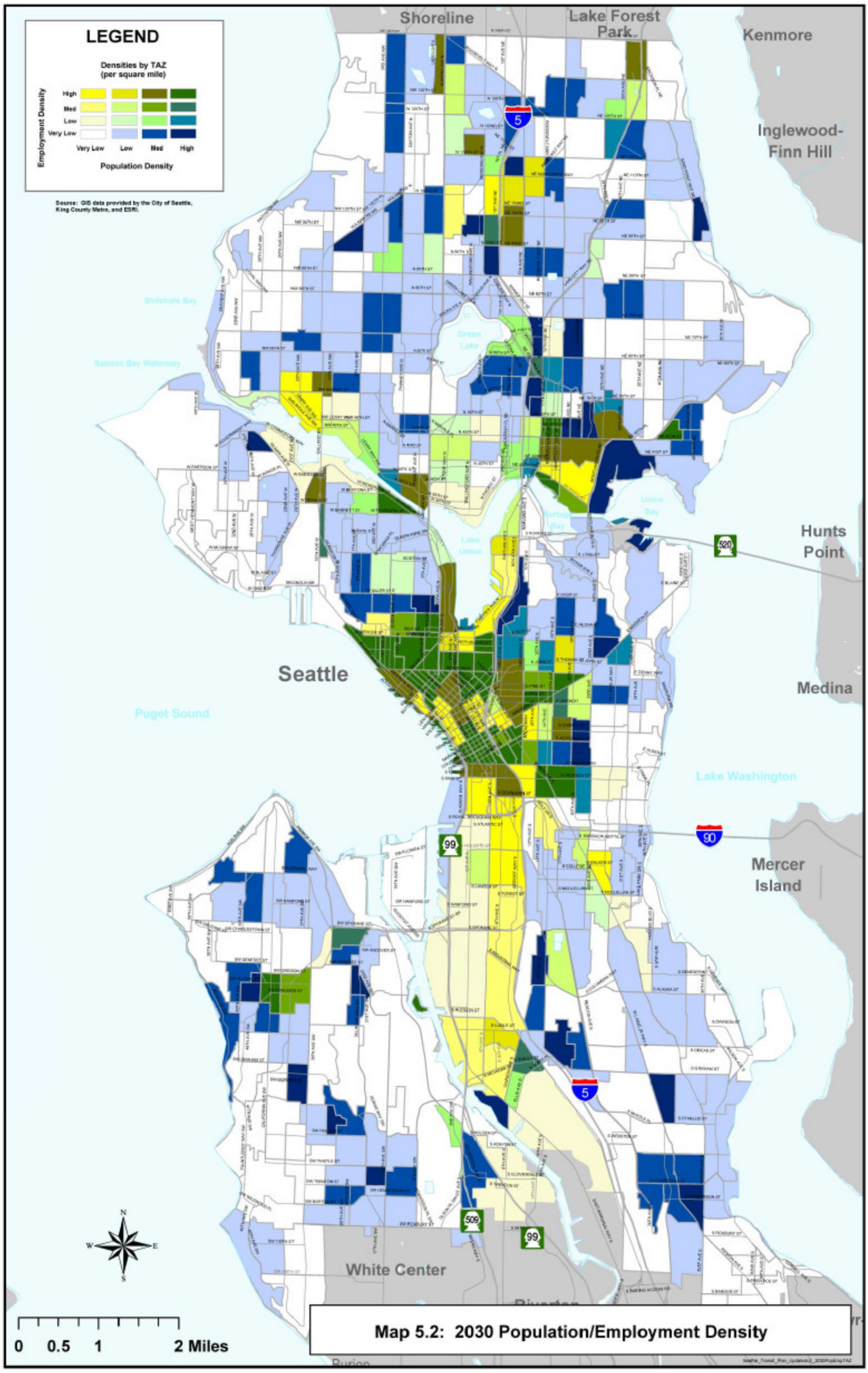


Figure 7: 2030 Population and Employment Density

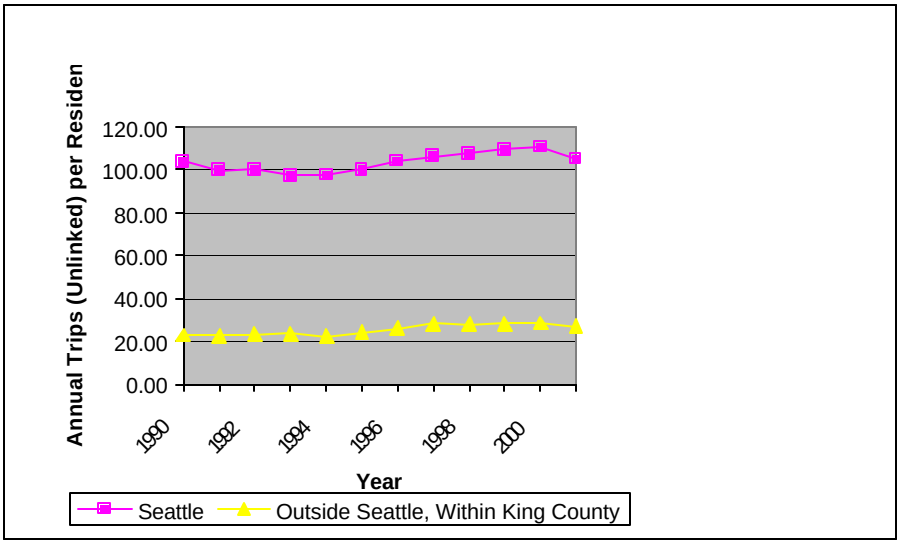


Seventeen percent of Seattle workers use public transportation to get to their jobs, which is above the U.S. average and ranks the city tenth nationally, according to the U.S. Census. The cities with the highest transit use were New York and Washington D.C. at 37 percent. Seattle was tied with Minneapolis.

The U.S. Census 2000 also indicates that it takes the average Seattle worker 23.8 minutes to get to work, which was less than the U.S. average of 24.4 minutes. Seventy percent of Seattle workers commuted by car, truck or van; 59 percent drove alone; 11 percent carpooled and 3 percent worked at home.

Seattle transit rider ship per capita has slightly increased from 1994 to 2001. In 2001, there were slightly over 105 transit rides per capita, as shown in Figure 8.

Figure 8: Annual King County Metro Transit Rides Per Capita in King County



King County Metro 2003 Rider/Non-Rider Survey – Selected Results for North King County

King County Metro performs an annual telephone survey of transit riders and non-riders to provide useful information on King County's transit markets. The survey respondents represent:

- Regular Riders – Residents who made 5 or more transit trips in the last 30 days excluding rides entirely in the Seattle Ride Free Area.
- Infrequent Riders – Residents who made 1 to 4 transit trips in the last 30 days excluding rides entirely in the Seattle Ride Free Area.
- Non-riders – Residents who did not use transit in the past 30 days.

- Commuters – People going to work or school regardless whether they use transit.

Data was collected from each of King County's three geographic subareas (East King County, South King County, and North King County) to provide a statistically reliable subgroup analysis by ridership category and geographic area of residence.

Some of the results from the 2003 Rider/Non-Rider Survey[12] are presented below giving a sense of the transit market in North King County, which includes Seattle, Shoreline and Lake Forest Park. Appendix 2 contains additional survey results for North King County.

- Riders per North King County Household – There are .64 regular riders 16 and older per household in North King County. The proportion of households with 2 or more regular riders 16 or older is 13%; and, the proportion of residents 16 and older who are regular riders is 26%.

- Ridership Characteristics Compared to Rest of King County Riders – Riders in North King County compare to riders in the rest of King County in the following ways:

  – Slightly younger on average

  – Lowest median income

  – Smallest household size on average

  – Fewest adults per household

  – Least likely to have a working auto available.

- Number of Rides in the Past 30 Days – Thirty-one percent of North King County riders said they made 21 or more transit trips in the last 30-days; 20% made 11 to 20 trips; 11% made 8 to 10 trips; 14% made 5 to 7 trips; 23% made 1 to 4 trips.

- Two-Zone Trips – In North King County, the percentage of riders who take two-zone trips dropped from 24% in 2000, 16% in 2002, then increased to 18% in 2003. The percentage of riders taking two-zone trips in East and South King County in 2003 was 68% and 56%, respectively.

- Access to Bus Stop – Ninety-two percent of North King County riders claimed that they usually walk to their bus stop, 6% drive to a park-and-ride lot, and 7% access bus service in other ways.

- Distance to Stop – Forty-two percent of North King County riders say that they usually walk a block or less to their stop.

- Travel Time to Stop – Seventy-four percent of North King County riders say they reach their bus stop in five minutes or less, including 18% who say it takes a minute or less to get to there.

[12] King County Metro 2003 Rider/Non-Rider Survey Findings, February 2004

- Number of Transfers – Among North King County riders 62% experience 0 transfers, 26% experience 1 transfer, and 12% experience 2 or more transfers, during their trips.

- Wait Time between Transfers – For North King County riders, the average wait time for a transfer has steadily decreased from 17.5 minutes in 2000 to 14.0 minutes in 2003. In 2003, the average wait time for all King County riders was 14.5 minutes.

- Satisfaction with Metro – Ninety-three percent of North King County riders were satisfied with Metro in 2003.

Table 2: North King County Respondents' Overall Satisfaction with Metro

Satisfaction Level	Percentage of North King County Respondents
Very Satisfied	50%
Somewhat Satisfied	43%
Somewhat Dissatisfied	5%
Very Dissatisfied	1%
Don't Know/Neutral	1%
Total	100%

North King County resident are "very satisfied" with specific elements of Metro listed in Table 3.

Table 3: North King County Respondents' Satisfaction with Specific Transit Elements

Specific Transit Elements That North North King County Riders are Very Satisfied With	Percentage of Riders Identifying the Element
Personal safety related to operation of the bus	65%
Driver courtesy	62%
Personal safety on the bus during the daytime	54%
Personal safety at the park and ride lot	51%
Availability of seating on the bus	44%
Inside cleanliness of buses	40%
Travel time by bus	39%
On-time performance of the buses	38%
Security of your automobile at the park and ride lot	33%
Personal safety on the bus after dark	24%
The wait time when transferring buses	21%
Personal safety waiting for the bus after dark	21%

CHAPTER 2: SEATTLE'S VISION FOR TRANSIT & LAND USE

Seattle's land use vision is reflected in the City's future land use map, shown in Figure 9.

This map also shows the location of Seattle's urban villages. The main goal of Seattle Transit Plan is to provide Seattle a transit system that supports Seattle's land uses and helps urban villages achieve their full potential.

Seattle Comprehensive Plan – The Urban Village Strategy

Seattle's urban village strategy combines transit supportive changes in the city's development pattern with a more complete and competitive intermodal public transportation system. It provides more desirable and affordable housing, investment in facilities and service delivery systems to support areas where growth will occur and reflects local decisions and neighborhood priorities.

The urban village strategy recognizes the relationship between transit and land use by focusing development in concentrated rather than linear patterns. Transit investments are directed to link these transit supportive areas to provide people an attractive option to the single occupant vehicle, which cannot accommodate the city's planned growth.

Achieving urban center growth targets is an important element of the urban village strategy. Seattle's public transportation system will need to carry more people to meet the City's mode choice goals for work trips and all trips to Seattle and its urban centers. The City's mode choice goals for urban centers and the entire city are identified in Table 4 and Table 5[13].

Table 4: Mode Choice Goals for Work Trips to Seattle and its Urban Centers – Proportion of Work Trips Made Using Non-SOV Modes

Urban Center	2000*	2010 Goal	2020 Goal
Downtown	56%	62%	70%
1st Hill/Capitol Hill	31%	37%	50%
Uptown/Queen Anne	33%	37%	50%
South Lake Union	30%	37%	50%
University District	56%	62%	70%
Northgate	26%	30%	40%
Seattle	**39%**	**42%**	**45%**

* 2000 mode choice numbers are from the U.S. Census for the year 2000 journey to work data by place of employment.

[13] The mode choice goals listed in the tables are from the Seattle Comprehensive Plan, January 2005.

Figure 9: Seattle's Future Land Use

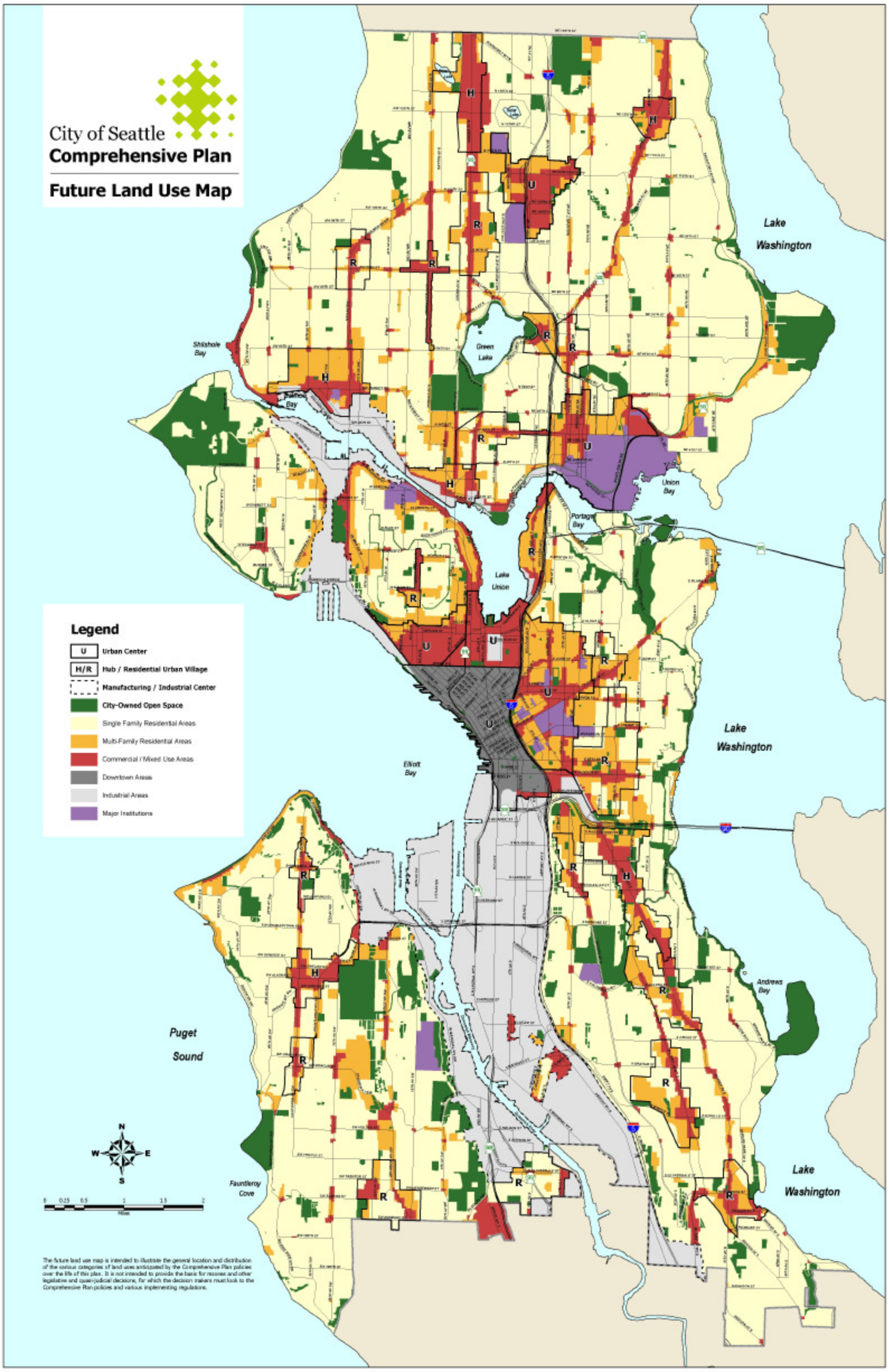


Table 5: Mode Choice Goals for Residents of Seattle and its Urban Centers – Proportion of All Trips Made Using Non-SOV Modes

Urban Center	2000*	2010 Goal	2020 Goal
Downtown	72%	80%	90%
1st Hill/Capitol Hill	69%	75%	80%
Uptown/Queen Anne	59%	70%	75%
South Lake Union	60%	70%	75%
University District	70%	75%	80%
Northgate	50%	55%	65%
Seattle	**44%**	**50%**	**60%**

* 2000 mode choice numbers are preliminary estimates from the Puget Sound Regional Council Regional Travel Demand Model (2004 preliminary model update) for Home-Based Work and Home-Based Non-Work Trips.

A greater reliance on public transportation will improve mobility by increasing the person-carrying capacity of the city's transportation system. It will also decrease the environmental degradation caused by the growing use of single-occupant vehicles. This shift will require some major investments in transit infrastructure and services as well as changes in priorities for street use.

The policies and goals listed in the below table are from the Transportation Element, "Increasing Transportation Choices – "Making Transit a Real Choice" section of the Mayor-recommended amendments for the 2004 Seattle Comprehensive Plan update. They provide the City and its partner transit agencies direction for making good transit investments that will support the urban village strategy.

Table 6: Seattle Comprehensive Plan Goals and Policies for Public Transportation – Transit Section

Goal/Policy Number	Seattle Comprehensive Plan Goal or Policy
TG12	Create a transit-oriented transportation system that builds strong neighborhoods and supports economic development.
TG13	Provide mobility and access by public transportation for the greatest number of people to the greatest number of services, jobs, educational opportunities, and other destinations.
TG14	Increase transit ridership, and thereby reduce use of single-occupant vehicles to reduce environmental degradation and the societal costs associated with their use.
T20	Work with transit providers to provide transit service that is fast, frequent, and reliable between urban centers and urban villages and that is accessible to most of the city's residences and businesses. Pursue strategies that make transit safe, secure, comfortable, and affordable.
T21	Support development of an integrated, regional high capacity transit system that links urban centers within the city and the region.
T22	Pursue a citywide intermediate capacity transit system that connects urban centers, urban villages and manufacturing industrial centers.
T23	Pursue a citywide local transit system that connects homes and businesses with neighborhood transit facilities.
T24	Work with transit providers to design and operate transit facilities and services to make connections within the transit system and other modes safe, easy, and convenient. Integrate transit stops, stations, and hubs into existing communities and business districts to make it easy for people to ride transit and reach local businesses. Minimize negative environmental and economic impacts of transit service and facilities on surrounding areas.
T25	Work with transit providers to ensure that the design of stations and alignments will change how people move through and perceive the city, contribute positively to Seattle's civic identity and reflect the cultural identity of the communities in which they are located.
T26	Discourage the development of major, stand-alone park-and-ride facilities within Seattle. Situations where additions to park-and-ride capacity could be considered include: ▪ At the terminus for a major, regional transit system; ▪ Opportunities exist for "shared parking" (e.g., where transit commuter parking can be leased from another development, such as a shopping center, movie theater, or church); and ▪ Areas where alternatives to automobile use are particularly inadequate (e.g., lack of direct transit service, or pedestrian and bicycle access) or cannot be provided in a cost-effective manner.
T27	Encourage and support transit services that address the needs of persons with disabilities, the elderly, and other people with special needs, and people who depend on public transit for their mobility.
T28	Support efficient use of ferries to move passengers and goods to and from Seattle. Encourage the Washington State Ferry System to expand its practice of giving loading and/or fare priority to certain vehicles, such as transit, carpools, vanpools, bicycles, and/or commercial vehicles, on particular routes, on certain days of the week, and/or at certain times of day. Encourage the Ferry System to integrate transit loading and unloading areas into ferry terminals, and to provide adequate bicycle capacity on ferries and adequate and secure bicycle parking at terminals.
T29	For waterborne travel across Puget Sound, encourage the expansion of passenger-only ferry service and land-side facilities and terminals that encourage walk-on`(by foot, bicycle, or transit) trips rather than ferry travel with automobiles.

Other notable transit policies and goals in the Transportation Element are shown in Table 7.

Table 7: Additional Seattle Comprehensive Plan Goals and Policies for Public Transportation

Goal/Policy Number	Seattle Comprehensive Plan Goal or Policy
T4	Provide sufficient transportation facilities and services to promote and accommodate the growth this Plan anticipates in urban centers, urban villages, and manufacturing/industrial centers while reducing reliance on single occupancy vehicles.
T5	Establish multi-modal hubs providing transfer points between transit modes in urban centers and urban villages.
TG4	Promote adequate capacity on the street system for transit and other designated uses.
T9	Designate, in the Transportation Strategic Plan, a transit network to maintain and improve transit mobility and access, compatible with the transportation infrastructure and surrounding land uses. Through the network, focus transit investments and indicate expected bus volumes and transit priority treatments appropriate for the type and condition of the street.
T31	Integrate pedestrian and bicycle facilities, services, and programs into City and regional transportation and transit systems. Encourage transit providers, the Washington State Ferry System, and others to provide safe and convenient pedestrian and bicycle access to and onto transit systems, covered and secure bicycle storage at stations, and especially for persons with disabilities and special needs.
T39	Restrict on-street parking when necessary to address safety, operational or mobility problems. In urban centers and urban villages where such restriction is being considered, the pedestrian environment and transit operations are of primary concern, but decisions should also balance the use of the street by high-occupancy vehicles, bicycles, and motor vehicles; access to local businesses; control of parking spillover into residential areas; and truck access and loading.
T40	In commercial districts prioritize curb space in the following order: 1) transit stops and layover, 2) passenger and commercial vehicle loading, 3) short-term parking (time limit signs and paid parking), parking for shared vehicles; and vehicular capacity.
T43	In residential districts, prioritize curb space in the following order: 1) transit stops and layover, 2) passenger and commercial vehicle loading, 3) parking for local residents, and 4) vehicular capacity.
TG24	Actively engage other agencies to assure that regional projects and programs affecting the city are consistent with City plans, policies, and priorities.
T58	Coordinate with regional, state and federal agencies, local governments, and transit providers when planning and operating transportation facilities and services in order to promote regional mobility for people and goods and the urban center approach to growth management
T59	Support completion of the freeway high-occupancy vehicle (HOV) lane system throughout the central Puget Sound region. Maintain the HOV system for its intended purpose of promoting non-SOV travel.
T61	Support a strong regional ferry system that maximizes the movement of people, freight, and goods.
T66	Define transit level-of-service (LOS) to be the ratio of measured traffic volumes to calculated roadway capacity at designated screen lines, each of which encompasses one or more arterials, on some of which transit operates, as shown in Transportation Figure 2. Measure peak hour directional traffic volumes on the arterials crossing each screenline to calculate the screenline LOS. To judge the performance of the transportation system, compare the calculated LOS for each screenline with the LOS standard for that screenline shown in Transportation Figure 3.
TG28	Recognize and promote the urban village strategy when making transportation investments.
T69	Support regional and local transit resource allocations, as well as efforts to increase overall transit funding that are consistent with the City's urban village strategy and the region's urban centers policies.
T70	Pursue strategies to finance repair of road damage from heavy vehicles in a way that is equitable for Seattle's taxpayers.

1998 Transportation Strategic Plan

In October 1998, the City of Seattle adopted its first Transportation Strategic Plan (TSP). It contains strategies in the following areas:

- Operations and Maintenance – identified in the plan as the City's highest transportation priority
- Moving People – addresses cars, walking, bicycling, public transit, and transportation demand management
- Protecting and Enhancing Neighborhoods – ensure that neighborhoods are pedestrian-friendly and livable
- Protecting Our Environment – reduce environmental degradation caused by driving
- Moving Freight and Goods – provide freight and good mobility for a healthy economy
- Parking – managing parking to achieve transportation goals
- Funding – increasing transportation funding to pay for improvements
- Priorities – establish guidelines and criteria to make transportation investment decisions
- Evaluation – measure the effectiveness of transportation investments.

In the Transit section of the TSP, there is recognition that the City does not own and manage the major transit systems that operate within its boundaries, yet it does own and manage the street rights-of-way. It admits that extraordinary measures need to be taken for the City to achieve its mode split targets for 2010. The City can play a major role in this effort through managing street use, regulating parking, serving on regional bodies that make decisions about transit, and finding ways to increase transit service and capital resources.

This plan has recommendations for updating the strategies in the 1998 Transportation Strategic Plan, which is scheduled to be completed in August 2005.

Seattle Transit Vision

In fall 2003, a draft Seattle transit vision was completed to coordinate and create stronger linkages between the City's transit plans and the transit plans of different transit agencies serving Seattle, e.g. Metro, Sound Transit, Seattle Monorail Project, and WSDOT (including ferries and Amtrak). The vision, shown in Figure 10, includes the following existing and planned transit connections that are being funded:

- Central Link light rail transit (LRT) – LRT connection between the Downtown Urban Center, North Beacon Hill Residential Urban Village, North Rainier Hub Urban Village, Columbia City

Residential Urban Village and MLK at Holly St Residential Urban Village. Its alignment is subterranean, at-grade and aerial.

- Sounder commuter rail – Diesel train service operating in the Burlington-Northern right-of-way. It provides the Downtown Urban Center, at King Street station, regional connections to Snohomish County, south King County, and Pierce County. It operates mostly at-grade and in a tunnel through downtown Seattle.

- Regional Express bus – Regional bus connections from the Northgate, University Community, and Downtown Urban Centers, to major activity centers elsewhere in King County and in Snohomish and Pierce Counties.

- Green Line monorail – Elevated monorail, an intermediate capacity transit option, connecting the Crown Hill Residential Urban Village, Ballard Hub Urban Village, Ballard-Interbay-Northend Manufacturing/Industrial Center, Uptown Urban Center, Downtown Urban Center, Duwamish Manufacturing/Industrial Center, West Seattle Junction Hub Urban Village, and Morgan Junction Residential Urban Village.

- Aurora bus rapid transit (BRT) – BRT service on Aurora Avenue North connecting the Bitter Lake Hub Urban Village, Aurora Licton-Springs Residential Urban Village, Wallingford Residential Urban Village, Fremont Hub Urban Village, South Lake Union Urban Center, Uptown Urban Center, and Downtown Urban Center.

- Cross Puget Sound ferry routes – Ferry service connecting the Downtown Urban Center to Vashon Island and Kitsap County, and Vashon Island to the Fauntleroy Ferry Terminal in West Seattle. Passenger ferry service between Vashon Island and the Downtown Urban Center is also included.

- Amtrak – Intercity rail connection between the Downtown Urban Center at King Street station and other cities and towns in the U.S. and Canada. Amtrak links the cities of Vancouver, British Columbia; Seattle; Tacoma; Portland; and Eugene.

Other high and intermediate capacity transit corridors included in the vision are:

- North Link LRT – LRT connection between the Downtown Urban Center, First Hill/Capitol Hill Urban Center, University Community Urban Center, Roosevelt Residential Urban Village, Green Lake Residential Village, and Northgate Urban Center. The vision recognizes that LRT could be extended north of Northgate as part of a Sound Transit Phase 2 plan.

- Ballard-U-District – A high or intermediate capacity transit connection between the Ballard Hub Urban Village and the University Community Urban Center via the Fremont Hub Urban Village and/or the Wallingford Residential Urban Village.

- University District-Madison-Central Area-International District-Columbia City – An intermediate capacity transit connection between the University Community Urban Center, Madison-Miller Residential Urban Village, 23rd and Jackson Residential Urban Village,

Chinatown-International District Urban Center Village, North Rainier Hub Urban Village, Columbia City Residential Urban Village, and Rainier Beach Residential Urban Village.

- Lake City-Northgate-Crown Hill – An intermediate capacity transit connection between the Lake City Hub Urban Village, Northgate Urban Center, and Crown Hill Residential Urban Village.
- South of Morgan Junction – An intermediate capacity transit connection south of the Morgan Junction Residential Urban Village to the south City limits, south King County and/or Fauntleroy Ferry Terminal.
- State Route 520 – A high or intermediate capacity transit connection between east King County and the University Community Urban Center and possibly the Downtown Urban Center.
- Interstate 90 – A high or intermediate capacity transit connection between east King County to the North Rainier Hub Urban Village and the Downtown Urban Center.
- South Lake Union Streetcar – An intermediate capacity transit connection between the University Community Center, Eastlake Residential Urban Village, South Lake Union Urban Center, and Downtown Urban Center.

These potential corridors are based on current transit plans from the City and its partner transit agencies. For instance, King County's Six-Year Transit Plan for 2002 to 2007 identifies Aurora Avenue North as a candidate arterial BRT corridor.

Another source of the vision was the Seattle Transit Study for Intermediate Capacity Transit (ICT), Phase 1. It identified the following seven corridors as good candidates for intermediate capacity transit[14]:

1. Lake City-Northgate-Ballard-Downtown
2. Aurora-Greenwood-Fremont-Downtown
3. Ballard-Fremont-University District
4. University District-Madison-Central Area-Columbia City-Downtown
5. Downtown and environs
6. Beacon Hill-Central Area-Capitol Hill
7. West Seattle-Delridge-Downtown.

Three technology categories were used in the ICT study to define intermediate capacity transit: BRT, streetcar (or tram) and elevated transit (either steel-wheeled or rubber-tired, operated by a driver or fully automated).

[14] Seattle Transit Study for Intermediate Capacity Transit, Final Report, page 1

The vision includes five Multimodal Hubs (see Table 8) and four Transportation Centers (see Table 9). The Multimodal Hubs are located in the vicinities of: 1) the Northgate Transit Center, 2) Westlake Station in downtown Seattle, 3) King Street Station in downtown Seattle, 4) the Colman Dock Ferry Terminal along the Central Waterfront, and 5) the University District along University Way.

The four Transportation Centers are located at: 1) the Ballard Hub Urban Village, 2) the North Rainier Hub Urban Village, 3) the West Seattle Junction Hub Urban Village, and 4) near Husky Stadium.

The difference between a Multimodal Hub and a Transportation Center is the intensity of transportation activity and land use associated with each facility. In terms used by the Transit Capacity and Quality of Service Manual (TCQSM)[15], Transportation Center's would be similar to "transit centers" and Multimodal Hubs would be most like "intermodal terminals"[16]. The TCQSM also defines bus stops, busway stations, light rail stations, heavy rail stations, commuter rail stations, and ferry docks and terminals.

Table 8: Seattle Multimodal Hubs

Multimodal Hubs	Transportation Uses	Land Uses	Other Comments
Northgate	Link LRT, Monorail, Sound Transit Buses, Community Transit Buses, Metro Buses, Bikes, Peds	Urban Center – major shopping district, transit-oriented development, high density residential and employment	A north gateway
Westlake Station	Link LRT, Monorail, Community Transit Buses, Metro Buses, South Lake Union Streetcar, Bikes, Peds	Urban Center – major shopping and hotel district, tourists, high density residential and employment	
King Street Station	Amtrak , Sounder, Link LRT, Sound Transit Buses, Community Transit Buses, Metro Buses, Waterfront Streetcar, Bikes, Peds	Urban Center – major shopping district, sports stadium district	A south gateway
Colman Dock Ferry Terminal	WSF Ferries (Auto and Passenger), Link LRT, Monorail, Waterfront Streetcar, Metro Buses, Bikes, Peds	Urban Center – tourists, heavy pedestrian and auto traffic	A west gateway
University Community	Link LRT, Community Transit Buses, Metro Buses, South Lake Union Streetcar, Bikes, Peds	Urban Center – Univ. of Washington campus, student housing	

[15] Transportation Research Board, Transit Cooperative Research Program, Transit Capacity and Quality of Service Manual, 2nd edition
[16] Transit Capacity and Quality of Service Manual – 2nd Edition, page 7-3 – 7-5.

Figure 10: Planned and Potential High and Intermediate Capacity Transit Network

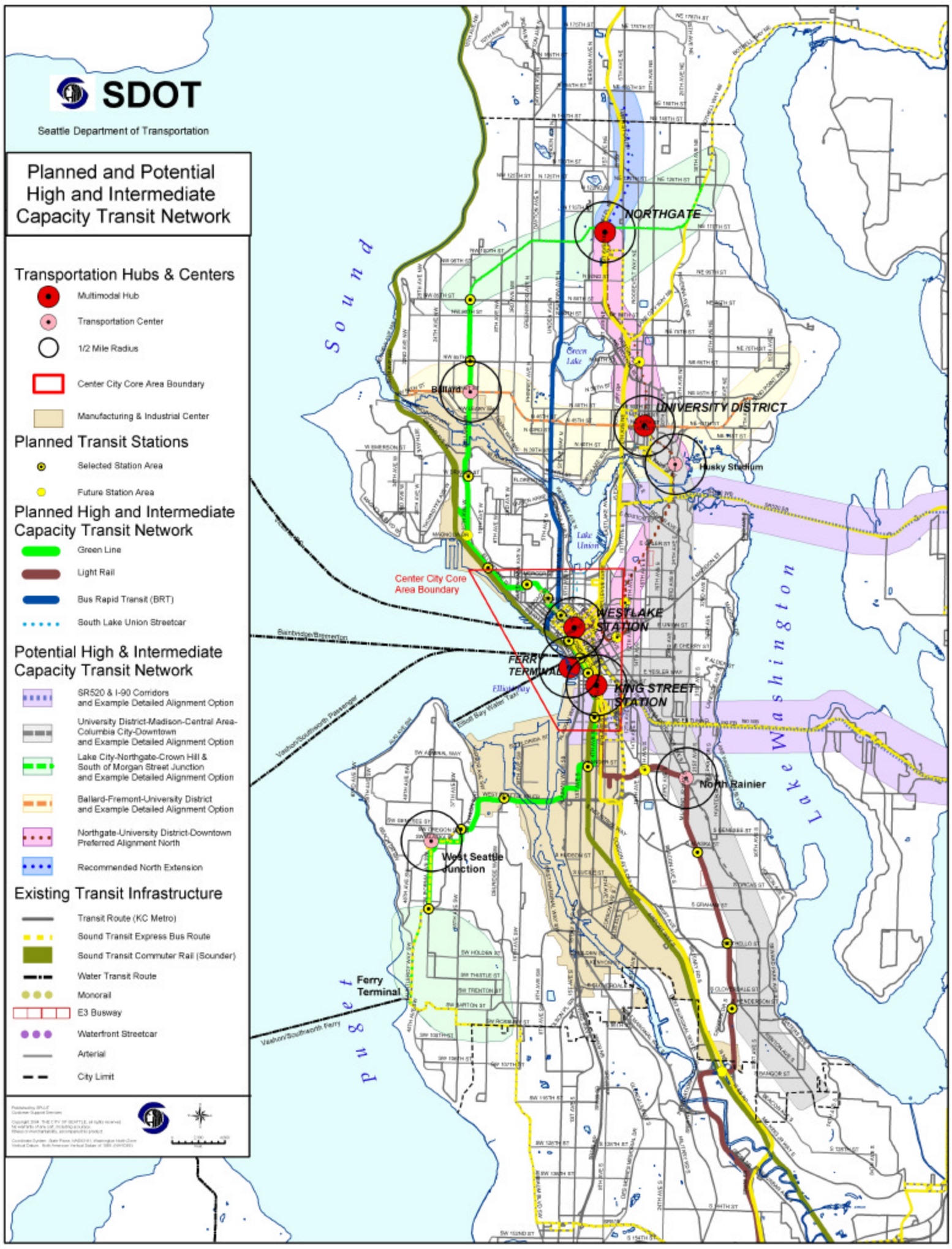


Table 9: Seattle Transportation Centers

Transportation Centers	Transportation Uses	Land Uses	Other Comments
Ballard	Monorail, Metro Buses, Bikes, Peds	Hub Urban Village – shopping, residential, employment	
North Rainier	Link LRT, Metro Buses, Bikes, Peds	Hub Urban Village - shopping, residential, employment	An east gateway.
West Seattle Junction	Monorail, Metro Buses, Sound Transit Buses, Bikes, Peds	Hub Urban Village - shopping, residential, employment	
Husky Stadium	Monorail, Metro Buses, Sound Transit Buses, Bikes, Peds	Urban Center – sports, stadium, Univ. of Washington Hospital	An east gateway

Recommended TSP Strategy {TR1.1}

Maintain a Vision of Seattle's Future Transit System that Integrates Planned and Potential High, Intermediate, and Local Capacity Transit Investments.

Maintain a map of Seattle's high and intermediate capacity transit systems showing important transit corridors and transfer points. The current version of this map is included as Figure 10: Planned and Potential High an Intermediate Capacity Transit Network.

Other Important Transportation and Transit Plans

Destination 2030 Metropolitan Transportation Plan

The Destination 2030 Metropolitan Transportation Plan (MTP) is the adopted regional long-range transportation plan for the central Puget Sound region. The MTP comprises all transportation projects and programs planned for implementation by 2030 (funded and unfunded).

The MTP's general investment strategies are to:

1. Complete the regional Roadway system
2. Invest in vehicle trip reduction programs
3. Develop traveler information and management technology
4. Expand transit services in strong existing and future markets

5. Expand auto and passenger ferry service

6. Invest in non-motorized transportation

7. Invest in freight mobility

8. Support the intercity rail program

9. Improve commercial and general aviation in the region

10. Undertake regional programs and non-project action that facilitate plan implementation.

Many of the strategies are presented with a ten-year investment program (2010 Action Strategy) and a long-range investment plan (2011 to 2030).

Seattle Popular Monorail Plan

In August 2002, the Elevated Transportation Company (ETC) adopted the Seattle Popular Monorail Plan. Seattle voters later approved this plan when they passed Petition 1 in November 2002 to create the Seattle Monorail Project. The Seattle Popular Monorail Plan describes a 58-mile, five-line citywide monorail system with the Green Line proposed as a stand alone, first phase, of the system. The monorail system plan map is shown in Appendix 3.

The Green Line connects Crown Hill to West Seattle via Ballard and downtown Seattle. Cost and financing issues have delayed the implementation of the Green Line project, originally scheduled for completion by December 2009.

The other four monorail lines in the Seattle Popular Monorail Plan are:

- Gold Line: Downtown Seattle - International District - Capitol Hill - University of Washington - Lake City.
- Purple Line: Shilshole Marina - Magnuson Park
- Blue Line: Northgate - Greenwood - Downtown Seattle - SODO – South - Georgetown
- Red Line: South Park – Rainier Valley.

The plan estimated that the Green Line would have approximately 20.4 million annual passenger boardings by year 2020. There would be up to 19 stations with trains running every 4 to 6 minutes during peak times and every 8 to 10 minutes during other times. The Green Line was estimated to cost about $1.29 billion to build (in 2002 dollars) and would have a total project cost of $1.79 billion (in year of expenditure dollars).

Sound Transit Sound Move

In 1996, voters of the Central Puget Sound Regional Transit Authority (RTA) district approved Sound Move -- the Ten-Year Regional Transit System Plan. This is Phase 1 of Sound Transit's Long-range Regional Transit Vision, which voters also approved.

The Sound Transit Board amended its long-range plan in July 2005. Appendix 4 shows the adopted 2005 Long-range plan map. Sound Transit Phase 2 will be based on the new long-range plan.

The purpose of Sound Move is to expand the capacity of the region's major transportation corridors by adding new high-capacity transportation services and facilities. Sound Transit was authorized to collect a .4% sales tax and a .3% MVET to undertake the following tasks:

- Regional rail system – Plan, develop and provide for the operation of a regional rail system composed of commuter rail and light rail technologies and necessary rail system improvements, such as acquisition of rights of way and real property interests, rail lines and rolling stock, rail stations and appurtenant facilities.

- High-occupancy-vehicle expressway with regional express buses – Plan, develop and provide for the operation of regional express bus routes, linking urban and suburban centers, operating primarily in the existing and in an expanded high-occupancy-vehicle (HOV) lane system. The HOV expressway will be developed through a partnership between the RTA and the state Department of Transportation. The RTA will fund special access ramps to make it easier for transit and carpools to reach and use the HOV expressways.

- Transportation facilities and community connections – Plan, develop and provide for the operation of transportation facilities and services as may be necessary to support the regional rail and bus system. Such facilities and services will include: rail stations; transit centers; park and ride lots; bicycle facilities; fare integration programs; intergovernmental programs with local and state agencies to coordinate transportation service and to provide a uniform, single-ticket fare system; features and services that increase passenger security, comfort and safety; and other facilities and services necessary to support or implement the Ten-Year Regional Transit System Plan.

- Innovation fund – Establish an innovation fund, within the Sound Transit Board's regional fund, to provide resources to evaluate and develop technological innovations, environmental benefits and incentive programs to encourage public transit use, including, but not limited to, uniform passes or tickets and integrated fares for regional, multi-system services.

A key financial policy of Sound Move is subarea equity. "Equity" is defined "as utilizing local tax revenues and related debt for projects and services, which benefit the subareas generally in proportion to the level of revenues each subarea generates."

King County Comprehensive Plan for Public Transportation

King County's Comprehensive Plan for Public Transportation, also know as the Long-range Policy Framework (LRPF), presents King County's public transportation vision for the year 2020. It was adopted in 1993 by the Municipality of Metropolitan Seattle (METRO) prior to the merger with King County. King County later ratified the plan by operation of Ordinance 11032, Section 28, and amended by Ordinance 12060, section 1.

The Comprehensive Plan describes a system of locally based, regionally linked services designed to fulfill a broad range of community and regional needs. It includes goals, objectives, and policies for transit planning. The plan's goals are:

- Ensure the ability to move around the region – provide reliable, convenient and safe public transportation services throughout the region for King County.
- Support growth management goals – this includes preserving communities and open space, supporting communities' ability to develop in ways that preserve and enhance their livability and limiting intrusion into rural areas.
- Improve the region's economic vitality – increase access to job, education and other community resources.
- Preserve environmental quality – conserve land and energy resources, and reduce air pollution.
- Be a responsible regional partner – build partnerships with state and local jurisdictions, members of affected communities, employers, neighboring transit agencies and the regional transit authority to maximize the effectiveness and efficiency of transit services.
- Coordinate land use and transportation planning and implementation – Work with jurisdictions to ensure that land use and transportation planning and implementation are coordinated.

The only change King County has made to this plan since it was adopted in 1993 is the amendment of Policy 3.4.1, Operating Subsidy Allocation. This policy was removed during the adoption of the Six-Year Transit Development Plan for 2002 to 2007. The amended LRPF policy says that the "distribution of any new service resources shall be consistent with the Six-Year Transit Development Plan, as it may be amended from time to time".

King County Six-Year Transit Development Plan

King County's Six-Year Public Transportation Development Plan for 2002 to 2007 or the "Six-Year Plan", establishes objectives and strategies for transit, paratransit, rideshare services and supporting capital facilities in King County, and establishes the policy basis on which Metro Transit's operating and capital program decisions are made. The plan's eight objectives for achieving the goals of the LRPF are:

1. Design and modify services to be more efficient and effective. Reinvest resources from unsuccessful services in a manner which is consistent with the overall service concept.

2. Provide higher bus service levels to established urban and manufacturing/industrial activity centers in King County. Develop service improvements within urban areas along key freeway and Regional Arterial Network (RAN) corridors.

3. Enhance service to and within jurisdictions that aggressively implement local land use plans, growth management strategies and regulations to facilitate development that is supportive of transit service and ridership.

4. Provide and support transportation demand management actions in conjunction with major employers, local jurisdictions, and other agencies.

5. Improve public transportation access to travel destinations by reconfiguring current service, adding new services and passenger facilities, and pursuing innovative solutions and partnerships.

6. Make improvements to the transit operating environment in locations and along corridors where actual or potential for high ridership exists and where local jurisdictions provide the necessary supporting plans, policies, permits and/or funding to do so.

7. Improve access for pedestrians (including persons with disabilities) and bicyclists as well as the waiting environment at transit facilities with the highest use.

8. Design and provide efficient service to major destinations and along corridors through an integrated network of service provided by King County Metro, Sound Transit, Community Transit, Pierce Transit, and the Washington State Ferry System.

The Six-Year Plan is adopted following a recommendation from the King County Council's Regional Transit Committee. The City of Seattle, which has two seats (or votes) of the 12 total votes on this committee, did not, and does not, support the adopted Six-Year Plan because of the service resource allocation policy change recommended by the Regional Transit Committee and adopted by the King County Council. This policy allocates new service resources to each King County planning subarea in the following shares: East 40%, South 40%, Seattle/North King County 20%. It further states that any systemwide reduction will be distributed among the subareas in proportion to each subarea's share of the total service investment, i.e., the Seattle/North King County subarea would accept the majority of the reduction even though it would reduce ridership and farebox revenue the most.

Community Transit Six-Year Transit Development Plan

Community Transit's Six-Year Transit Development Plan for 2004-2009, recently adopted, has the following goals and objectives:

- Goal 1: Increase Use

  - Objectives: Increase Ridership, Improve Market Share, Improve Quality of Service

- Goal 2: Increase Opportunities for Use
  - Objectives: Increase Access and Reduce Gaps, Improve Intersystem Connectivity

- Goal 3: Improve Efficiency and Effectiveness
  - Objectives: Improve Cost Efficiency, Increase Service Effectiveness, Increase Cost Effectiveness

One of Community Transit's unfunded system development priorities is to implement bus rapid transit along SR-99.

Washington State Ferries Strategic Plan

The WSF 2002 strategic plan consists of four goals with a business plan and funding plan to achieve them. The WSF goals are:

1. Continually improve and refine business processes
2. Broaden the revenue base and reduce costs
3. Promote and assist in the planning of regional transportation centers
4. Redefine WSF.

The WSF business plan is designed to achieve greater operating efficiencies, new sources of revenue and predictable fare increases. Its main objectives are to reduce costs by 5%, increase fares by 5%, and generate 5% in new revenue.

The WSF capital plan is focused on providing critical major maintenance projects and new vessel construction. This will be done with the business plan, service reductions, and vessel retirements. In the long-term to 2013, WSF expects to build three new boats, and possibly relocate a terminal.

CHAPTER 3: MAKING GOOD CONNECTIONS

As stated previously, the purpose of this Plan is to make it possible for Seattle to have a transportation system, specifically a transit network that will support its growth management strategy. It describes an Urban Village Transit Network or "UVTN" with a supporting Secondary Transit Network or "STN" to serve the city's urban villages and neighborhoods.

Building the Urban Village Transit Network

How can the City encourage denser, transit-supportive development in areas where transit service is inadequate and/or unattractive? In dense cities such as Seattle, transit quality is a key criterion for land use development, and yet land use is also a key criterion for transit service. The only answer to this "chicken-and-egg" problem is for the two to occur together through policies that ensure quality transit will be available if land use and street design take certain transit-oriented forms.

Dense, transit-oriented development is the rule in Seattle's comprehensive planning, as demonstrated through the City's urban village strategy. To support this concept, Seattle must build an "Urban Village Transit Network" that will be the backbone of the City's transit system and carry its highest concentrations of transit trips[17].

The UVTN will consist of all transit lines (regardless of mode or operating agency) that operate at least every 15 minutes all day for at least 18 hours every day in two directions. The 15-minute headway represents the point at which you no longer need to consult a schedule to use the service. It also permits transfers to be made rapidly even without timing of connections. For these reasons, the threshold frequency of 15 minutes is a point at which the benefits of transit tend to grow exponentially.

Recommended TSP Strategy {TR1}

Develop and Implement Seattle's Future Transit Network.

Develop, map, and implement Seattle's future transit network; the transit system needed to connect neighborhoods and support growth. The transit network is called the Urban Village Transit Network (UVTN) or Seattle Connections. It represents the backbone of the City's transit system, carrying its highest concentrations of transit trips. It means managing Seattle's streets so that the combination of King County Metro buses, the monorail, light rail, and streetcars provides frequent and reliable service at least every 15 minutes, 18 hours a day, seven days a week in both directions. Seattle Connections (or UVTN) service will be fast and reliable. It is important to establish this network to support the City's land use plans, i.e. urban village strategy. SDOT will play a major role in helping the UVTN achieve desired speed and reliability levels. The Seattle Connections map is included as Figure 11: Seattle's Future Transit Network – Seattle Connections.

[17] Seattle Transit Network Development Plan, Draft Final Report, September 2004.

Figure 11: Seattle's Future Transit Network – Seattle Connections

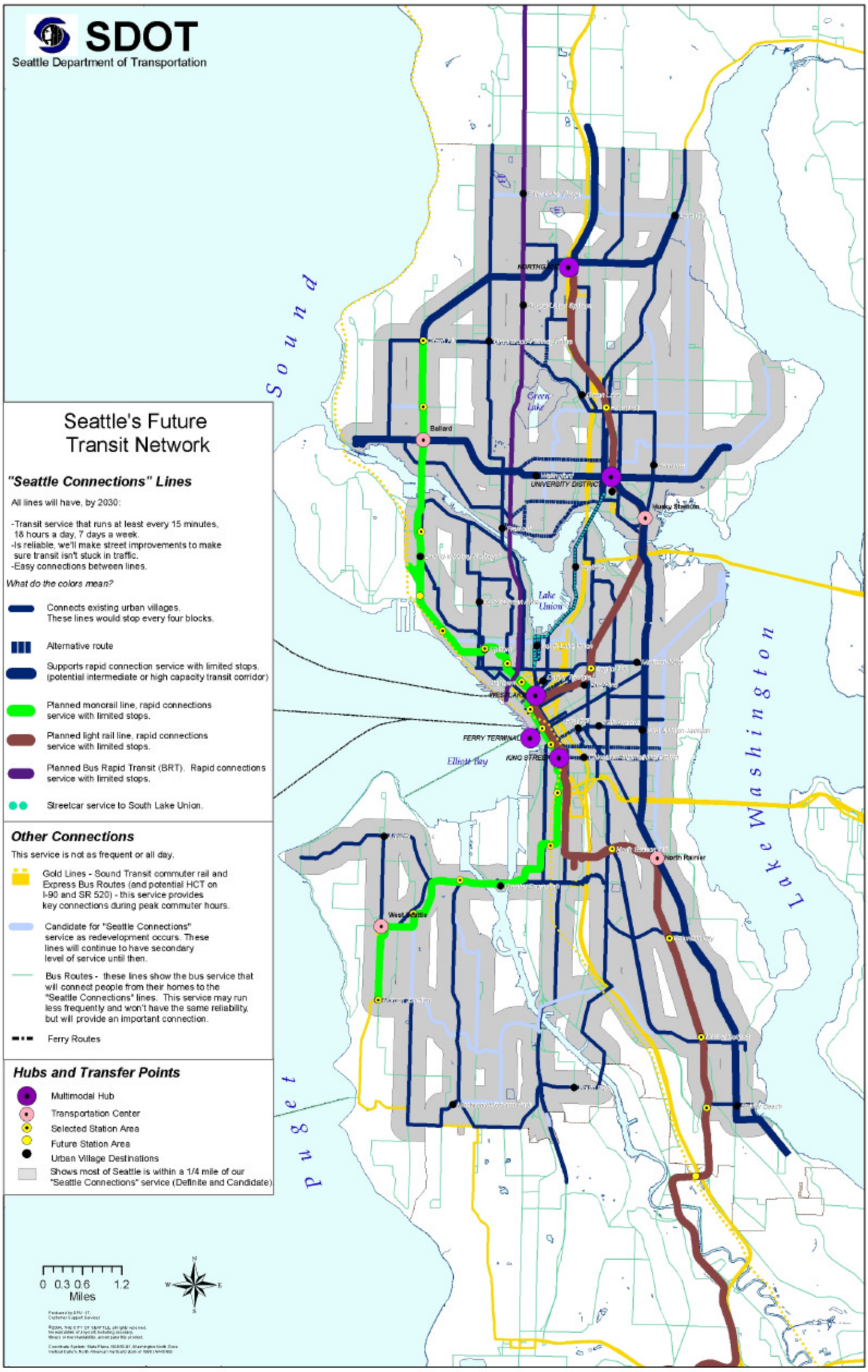


Figure 11 shows the UVTN or "Seattle Connections". Corridors are presented as either Definite (dark blue) or Candidate (light blue), and are shown by type of technology, if planned. Table 10 presents more information on the difference between Definite and Candidate UVTN corridors, which are considered part of the Secondary Transit Network until approved as Definite UVTN corridors (some of which are planned, in implementation, or operating).

Appendix 5 shows all of the bus corridors in the Definite 2030 UVTN and Appendix 6 shows Candidate 2030 UVTN corridors.

Portions of the UVTN exist today, and the Monorail and Central Link LRT will of course become part of it. The main role of the UVTN is to provide a policy tool that defines corridors where transit quality of service can be expected in the future, as buildout of planned or zoned development occurs in the city's urban villages. It is a commitment that if developments along a corridor:

- achieve the minimum density required to support UVTN service,
- street design and management permits the operation of service at a given minimum speed and reliability, and maximizes the pedestrian access to each stop on the corridor, and
- funding sources are available for high-transit ridership investments,

then, the corridor will be permanently upgraded to UVTN service levels, along with corresponding higher priority for passenger amenities, fleet improvements, and other elements of transit quality.

Recommended TSP Strategy {TR1.2}

Consider Rapid Transit Investments, i.e. High and Intermediate Capacity Transit, for the Urban Village Transit Network, Consistent with the City's Transit Vision.

Build the UVTN through regional high and intermediate capacity transit improvements. The UVTN recognizes that the Green Line, and Central and North Link corridors need high or intermediate capacity transit investments. It will be appropriate for future expansions of these investments to be in other connecting UVTN corridors that are designated for higher capacity transit. This will help free up bus service hours for reallocation to other parts of the UVTN that are not funded for high and intermediate transit capacity improvements or, to improve service in the Secondary Transit Network (STN), including candidate UVTN corridors.

While the development and redevelopment of cities is an intrinsically uncertain process, significant benefit can be derived when a degree of certainty is provided to the different players in the planning process. These players include: transit providers, infrastructure providers, economic planners etc. It

will be especially important for the City's transit partners to join the City in a commitment to maintaining UVTN performance.

In the case of the UVTN, the following characteristics could be defined in association with other authorities: Network, likely staging / service delivery date, integration nodes etc.

The UVTN, by its nature, is a network in constant development. The different stakeholders need to recognize, therefore, that the network of today will need to evolve into the network of the future, and the land use today needs to evolve into the land use of the future. The need to manage the process should be recognized by the different parties.

There are significant broader economic benefits derived from the provision of an attractive and valued transit network. One of the clearest benefits comes from land value increases. The City should investigate scope for harnessing some of this 'value-added' that could be redirected to urban improvement programs or transit service subsidies.

Table 10 provides an indication of the recommended relationship between land use development or redevelopment, degree of UVTN infrastructure implementation and UVTN quality of service delivery.

Table 10: Relationship between the UVTN and Land Use

Stage of UVTN Development	Stage of land use development/ redevelopment to level required by UVTN	UVTN infrastructure - Degree of implementation/ level of commitment	UVTN - quality of service delivery at UVTN levels
Operating	Complete and fully occupied.	In place	Running
In Implementation	Partially Complete	Under construction or in place when development densities reach UVTN threshold requirements.	Funded, running when development densities reach UVTN threshold requirements.
Definite	Zoned to exceed UVTN threshold requirements and buildable given existing uses.	Funded, planned, designed.	Committed. (Funding may be contingent on a degree of buildout).
Candidate	In study for rezoning or barrier-removal so as to exceed UVTN threshold requirements, OR just below a UVTN-threshold that may be refined downward based on further study.	Possibility of future UVTN service is incorporated in street planning.	Possibility of future UVTN service is incorporated in financial planning.
Possible	Theoretically capable of being rezoned to UVTN –supportive level, but not yet zoned.	None, other secondary transit facilities provided.	None, other secondary transit service provided.
Non-UVTN	Unlikely to ever constitute UVTN supportive land use	None, other local transit facilities provided.	None, other local transit service provided.

The UVTN will be an organizing tool for both transit planning and land use, ensuring that each takes into account the intrinsic economics and logic of the other in the areas where the stakes are highest. It has other uses as well. For example, if a planned land use is known to require transit, as social service offices and senior facilities do, then the UVTN is the best place to locate this use and be

assured of transit service; conversely, if an entity needing transit chooses not to locate on the UVTN, they do so with the knowledge that they may not get the best transit service, or any at all.

The UVTN is the focus of the City's transit quality of service (QOS) measures. It will also be reflected in the transit street classification system described in Chapter 4.

UVTN Criteria

The following known relationships between transit and land use and realities of transit economics were used to determine the UVTN and develop the necessary quality of service measures:

- Necessary Land Use Intensity Along the Length of an UVTN corridor: A UVTN corridor in aggregate needs to have a certain density, considering both population and employment. Setting these thresholds requires an understanding of how ridership varies with various development types.

- Walking Distance Standards: An area is considered served if it is within a 1/4 mile of a UVTN route, which in general means that parallel UVTN routes should be at least 1/2 mile apart outside of the CBD. Exceptions may be made where barriers to access exist -- cliffs, water bodies, freeways, etc. -- but the (eternal) operating cost of the exception must be weighed against the (fixed) capital cost of surmounting the barrier (with a bridge, elevator, etc.). Features that discourage pedestrians must also be distinguished from features that prohibit them. For example, a steep slope with a sidewalk is not ideal, but it provides more access than a cliff. A bridge with a poor sidewalk should be improved, but it is still better than no bridge at all.

- Policy Minimum Operating Speed: Most transit systems in growing communities are very gradually slowing down. Many agencies lose 1% or more per year in average operating speed, due to a combination of rising patronage (which increases boarding times) and increased traffic congestion. Because the high frequencies and ridership of the UVTN will magnify this effect, there must be a policy commitment to halting the loss of operating speed on this network, so that resources can be devoted to increasing service rather than paying drivers to spend more time sitting still. Policy operating speeds would be the basis for determining when and where provisions are needed to expedite transit -- such as faster-boarding buses, signal priority, or transit lanes. The UVTN should help provide the political will to achieve a policy operating speed wherever the necessary land use intensity is achieved, but in practice, if the operating speed cannot be protected, the corridor cannot be considered part of the UVTN.

- System Connectivity: The UVTN must cohere as a network, so that it typically provides the most direct routing between almost any two points within it. UVTN lines must intersect or converge to the degree necessary to provide this connectivity.

- Systemic Travel Time: Overall travel times between two points on the network must meet a certain standard. This should serve the purpose of identifying the need for rapid transit corridors -- bus, LRT, monorail, or ferry -- that run longer distances at higher speeds by making fewer stops than local bus service does. It should not be necessary, for example, to ride from Loyal

Heights to Fauntleroy on buses that stop every two blocks. From this follows the special importance of transfer points between the rapid-transit element of the UVTN, which connects stations, and the more linear element, which stops frequently enough to effectively serve a 1/2 mile band on either side of the line.

- Permanence: To achieve the degree of permanence that developers often perceive in rail lines, all thresholds defining what qualifies as a UVTN corridor should err in the more stringent direction. To put it another way, policies should err in the direction of the minimal necessary UVTN. The shorter the total line mileage of the UVTN, the cheaper it is to run and to enhance with amenities. On the other hand, a minimal UVTN, given the priority that its ridership deserves, is easier to protect from a future funding crisis, such as the one brought on by Initiative 695.

- Partnership: The UVTN will not be complete until it reflects a commitment on the part of all the agencies that provide parts of the network, especially the city's main transit provider, King County Metro. The proposed definitions in this report are a starting point for a discussion that should ultimately lead to a clear interagency agreement on the UVTN as the organizing principle for high-intensity transit service, at least within Seattle.

Whether formed by light rail, monorail, ferries, or bus service, the UVTN is a foundational element of Seattle's infrastructure. For the high-density portions of the city, it is as essential as sewers.

In developing the UVTN, the City needs to be sensitive to impacts UVTN construction may have on neighborhood businesses and residents.

Recommended TSP Strategy {TR4}

Maximize the Direct Economic Benefits of Rapid Transit Construction and Operation.

Provide resources to neighborhoods and small businesses, in partnership with partner transit agencies, to address impacts of major transit construction activities, including information programs, mitigation plans, and temporary business support and relocation assistance. Labor, materials, and other business expenditures of rapid transit projects offer a tremendous opportunity for job development and training initiatives. Simultaneously, communities and businesses will be affected by construction and staging activities.

Table 11 shows the location of UVTN corridors, according to the criteria, that are desired for implementation by 2030[18]. There are 53 UVTN corridors identified for implementation by 2030.

[18] Seattle Transit Network Development Plan, Final Draft, September 2004

The table also shows which corridors the City can begin monitoring UVTN quality of service by 2007; they are in the shaded rows. These corridors were selected because they have:

1. Significant Existing Service Investment - No resources exist to deploy new high-frequency service, so 2007 corridors must be places where this service already exists.

2. Existing Speed/Reliability Initiatives - Efforts are already underway to improve speed and reliability in the corridors. Where these have been completed or are already programmed, the UVTN seeks to include these corridors.

3. Plausible Speed/Reliability Initiatives – The corridors have been reviewed with the aim of setting challenging but realistic goals for the City and its transit partners.

4. Part of the 2030 UVTN – The 2030 UVTN represents a long-term transit commitment on which many economic development and capital project planning is based. For this network to be credible, Phase 1 implementation must be a subset. Where existing service is different than the 2030 UVTN, it is not part of the UVTN; therefore, it is not a priority for capital investments, unless those investments pay for themselves within a few years and make sense even if the ultimate alignment is different. If there is a consensus for longer-term improvement on a corridor that is not on the 2030 UVTN, the 2030 UVTN should be expanded to include this corridor before proceeding.

Some of the corridors included in Phase 1 are noted as difficult because they are already operating at or below 30% of posted speed limit; the significance of this threshold will be explained in the next chapter. Figure 12 provides a map of the Phase 1 UVTN corridors.

Table 11: UVTN Corridors for 2030 & Phase 1 Implementation

No.	Primary Street of Corridor Segment	Between …	And …	Phase 1 Implementation		
				Yes	Yes But Difficult	Defer
1	Fairview, Stewart/Virginia OR Westlake, Fairview, Eastlake	Stewart	University Dist.	✓		
2	1st, Cedar	Denny & QA Ave	3rd & Cedar			✓
3	3rd	Cedar	Jackson		✓	
4	James OR Yesler, 9th	3rd	9th & Jefferson			✓
5	Olive OR Stewart OR Virginia	1st	I-5		✓	
6	Pike/Pine	1st & Pike/Pine	Pine & Summit		✓	
7	Yesler OR Jackson	1st	MLK			✓
8	14-15 Av, Boston, 10th Av E, Roanoke, Harvard	Jackson	University Dist.			✓
9	Broadway, 10th Av E, Roanoke, Harvard	Jackson	University Dist.			✓
10	Jefferson, Cherry	9th & Jefferson	MLK & Cherry		✓	

Table 11: UVTN Corridors for 2030 & Phase 1 Implementation (continued)

No.	Primary Street of Corridor Segment	Between …	And …	Phase 1 Implementation: Yes	Yes, But Difficult	Defer
11	Madison	6th Av	23rd Ave			✓
12	Madison, Marion	Western Av	6th Av			✓
13	Olive, John, Thomas	Pine & Summit	23rd & Thomas			✓
14	Pine, Union	Pine & Summit	MLK & Union		✓	
15	23-24th Av	Montlake Stn	McClellan LRT	✓		
16	92nd St, 1st Av NE	92th & Meridian (NSCC)	Northgate LRT			✓
17	Aurora LIMITED STOP	Denny	145 St	✓		
18	Green Lake, 65th. (Options for Aurora to Wallingford Ave: Either Green Lake OR 85th, Wallingford)	85th & Aurora	Roosevelt LRT			✓
19	Greenwood, Phinney, 43 St, Fremont	Fremont Br & Nickerson	NW 145 St (City limits)	✓		
20	N 45 St OR N 50 St.	Stone Way	University Dist.		✓	
21	Wallingford, Meridian (NSCC)	85th & Aurora	Northgate LRT			✓
22	N 115 St, Meridian Av	115 & Aurora	105 & Meridian			✓
23	N/NE 40 St OR N/NE Pacific St.	Stone Way	University Dist.	✓		
24	Holden, NE 105 St, Northgate Way	Crown Hill	Northgate LRT			✓
25	5 Av NE	Roosevelt LRT	Northgate LRT	✓		
26	15 Av NE	University Dist.	Roosevelt LRT			✓
27	15 Av NE, Pinehurst	Northgate LRT	145 St	✓		
28	25 Av NE	University Dist.	NE 65 St			✓
29	Lake City Way	Roosevelt LRT	145 St	✓		
30	Montlake Av	Montlake Stn	NE 45 St			✓
31	NE 45 St, Sand Point	University Dist.	Princeton/Sand Pt (NE 50 St)			✓
32	NE 65 St	Roosevelt LRT	25 Av NE			✓
33	Pacific St	Montlake Stn	University Dist.	✓		
34	24 Av NW	NW 65 St	NW 85 St			✓
35	Leary, 20 Av NW	20 Av & Market	14 Av NW & Leary			✓
36	Leary, NW 39 St	14 Av NW & Leary	Stone Way			✓
37	Market, N 46 St	32 Av NW & Market	Stone Way		✓	
38	NW 85 St	24 Av NW	Aurora	✓		
39	1 Av S	Yesler	Spokane	✓		
40	15 Av S, Albro, through Georgetown and South Park to White Ctr	Jackson	Westwood Vlg. / White Center			✓
41	4 Av S, Michigan, 1 Av S Br, SR 99 LIMITED STOP	Spokane	South Park is last Seattle stop. Could continue to Burien.			✓

Table 11: UVTN Corridors for 2030 & Phase 1 Implementation (continued)

No.	Primary Street of Corridor Segment	Between …	And …	Phase 1 Implementation		
				Yes	Yes But Difficult	Defer
42	Beacon, Myrtle, Othello	12th & Jackson	East end of Othello	✓		
43	E3 Transitway, LIMITED STOP	King St LRT	Spokane	✓		
44	Rainier, Rainier Beach	Jackson	Henderson LRT	✓		
45	Columbia, Alaska, Spokane, Admiral	Rainier & Alaska	63 Av SW & Admiral			✓
46	California	Admiral	Morgan Jct			✓
47	Delridge	Spokane	Westwood Vlg. / White Center	✓		
48	Morgan, 35 Av SW, Roxbury	Morgan Jct	Westwood Vlg. / White Center			✓
49	5 Av N, Taylor Av N, Boston	Denny & 5 Av N	3 Av W & McGraw	✓		
50	Dexter, Nickerson	Denny & Dexter	Fremont Br & Nickerson	✓		
51	Nickerson, 15 Av W	Dravus & 15 Av NW	Fremont Br & Nickerson			✓
52	Olympic, 10 Av W, Gilman Dr W	Denny & QA Ave	Dravus & 15 Av NW			✓
53	Queen Anne Ave., McGraw, 3rd Av W	Denny & QA Ave	Nickerson & 3rd Av NW			✓

Because it is designed to serve a large share of the city's population with a minimum of line miles, the UVTN can offer not only the best frequencies and spans of service, but also many other premium features, including:

- Priority for low-floor, high-capacity coaches and any new coach technologies that expedite comfort or operations.
- Premium shelters with many of the amenities associated with rail stations.
- Information features, including real-time information in shelters (the number of minutes until the next bus comes) and informational displays within buses (such as the time and the next stop.)
- A distinct image that sets the UVTN apart from the less-frequent supporting services.
- Reinforced street pavement for smooth travel and fewer maintenance interruptions.

The UVTN should not only create an intensification of land use around existing UVTN services, it should also promote the development of new UVTN corridors contingent on land use plans that will provide the ridership needed to support primary service. This element of the UVTN strategy is critical for dealing with corridors that are not currently built to the necessary densities, but might be.

In terms of land use, the following are the three primary factors that are preliminary necessary conditions for the UVTN:

1. Along a given corridor, aggregate average density within a quarter mile radius of each stop should fall into the "Medium" population and/or employment density categories, corresponding to at least 3,000 daily boardings per route mile in 2000.

2. Urban villages of greatest intensity, however, including all places that fall into "High" population and/or employment density categories, must be linked to one another along logical routes.

3. Anchors for each UVTN line – the start point and end point – should be either an urban village of greatest intensity or a logical transfer point such as a rail or monorail station.

Important information for determining the feasibility of high and intermediate capacity transit investments is a GIS database of barriers to access to provide critical input to integrated transit and land use planning. Barriers to access would be defined as any area at least 1/4 mile wide that pedestrians cannot cross. It would incorporate such things as:

- Absolute topographical barriers such as cliffs or steep slopes

- Barriers caused by infrastructure such as bridge approaches, freeways, access-limited roadways and easements (e.g., railways)

- Barriers caused by property holdings (e.g., large industrial lots).

A separate category could include "partial barriers," which are disincentives but not absolute blockages to pedestrians. These could include areas of unpleasant pedestrian environment, and steep grades that will dissuade some pedestrians more than others could.

This mapping or database would provide a centralized data source for transit planning and would provide useful input into processes such as patronage assessment, prioritization of works and service adjustments, disability access planning. A more refined UVTN definition would consider these barriers where they obstruct transit access, and policies could be developed to support the decision process regarding whether to provide service despite a barrier or make the physical or political investment in permeating the barrier for pedestrians.

The UVTN's primary purpose is to link and serve the key urban villages designated in Seattle's Comprehensive Plan. It will carry the heaviest passenger loads at the greatest level of convenience. The UVTN includes existing and candidate corridors.

Shaping the Secondary Transit Network

The Secondary Transit Network (STN) represents Seattle transit service that is not part of the UVTN, i.e. all routes that are not part of the UVTN will form the Secondary Transit Network (STN). The STN has two main functions or categories:

1. UVTN Supplementary – Service that supplements the UVTN in areas of high ridership or high density that do not meet the requirements for full UVTN service levels, e.g. candidate UVTN corridors, which are not at the stage of land use or infrastructure development to be part of the UVTN given resource constraints. These can include specialized service for predictable peak demands, as well as circulator services within urban villages and downtown.

2. Basic ("Lifeline") Coverage – Service needed to provide some transit access or coverage to all neighborhoods.

The need for UVTN Supplementary service will change over time:

- New rapid transit lines will replace express routes (less supplementary service, more UVTN service).
- New neighborhood circulators, e.g. streetcars, will be needed to support new rapid transit lines (more supplementary service)
- Neighborhood circulators or connectors will be added to the UVTN (less supplementary service, more UVTN service).
- Service consolidation to improve service efficiency and effectiveness (less supplementary service more UVTN service).

Table 12 lists corridors that King County Metro has identified for service consolidation.

Table 12: Seattle Service Consolidation Corridors

Corridors Targeted By King County Metro for Service Consolidation		
Corridor	**Corridor**	**Corridor**
Northgate to Seattle CBD via I-5	NE 45th St	Lake City - U. District via Lake City Way/25th Ave NE.
SR-522	SR-520	Broadway Avenue E
Rainier Ave. S	Delridge Ave. SW	Roosevelt Way NE
Ambaum Blvd. SW	California Ave. SW	West Seattle Bridge

Basic Coverage service will always be needed in Seattle because many neighborhoods will not have good access to the UVTN and the UVTN Supplementary service is not available. Many people who rely entirely on transit for their travel and mobility live in these areas of Seattle. There are also cases where this service can be used to grow new transit markets e.g. new transit oriented development. It contributes to the City's overall transportation goal of reducing car ownership ("voluntary transit dependence") by providing transit users accessibility to all parts of the city, recognizing that transit

travel to and from remote areas of the city will continue to be more challenging than between urban centers and villages.[19]

The STN will typically have the quality of service and amenities that are common in lower-density parts of Seattle today. For example, STN service will:

- Operate every 30 minutes all day, with some skeletal weekend and evening service. Some lines, as mentioned earlier, will be more frequent to meet peak period demand, e.g., express routes.
- Connect to the nearest point on the rapid transit system, but not run through to downtown.
- Extend far enough so that over 95% of city residents, jobs, and activity centers are within ¼ mile walk of service.

The City will need to balance the demands for increasing STN service levels with the need to complete UVTN implementation. Clearly, STN resources come at the expense of UVTN and vice versa. While both networks are important, the City will need to build the UVTN to meet its growth management goals.

To achieve the goals of the UVTN, the resources to operate this network must be protected. Just as agencies must set aside money to cover the costs of paratransit service, the City should work with Metro to establish policies on the minimum quality of service to be provided outside the UVTN. This would establish a "set-aside" ensuring minimal *coverage* for lifeline access -- that is, for the STN.

The "set-aside" for the STN should shrink over time as a percentage of all transit resources. Unlike cities at the edge of the region, Seattle has no space into which to expand, so it cannot add new low-density area requiring STN-quality of service. Meanwhile, densification will cause STN corridors to shift into the UVTN through a managed process outlined below. Once a "set-aside" is established for the STN, then, it should not need to grow faster than the growth in operating cost, and any further resource growth can be devoted to the UVTN.

[19] For example, many of Seattle's recreational destinations, such as Discovery Park and the Arboretum, are not on the UVTN, but access to them will still be a citywide interest.

Recommended TSP Strategy {TR1.5}

Develop and Implement the Secondary Transit Network.

Develop and map the STN to represent transit service in Seattle other than the UVTN. It includes service that is needed to provide coverage and service to commuters. The STN will typically have the levels of service and amenities that are common in lower-density parts of Seattle today. With limited resources, these travel markets do not warrant the high service levels of the UVTN.

For example, STN service will:

- Operate every 30 minutes all day, with some skeletal weekend and evening service. Some lines, as mentioned earlier, will be more frequent to meet peak period demand, e.g., express routes.
- Connect to the nearest point on the rapid transit system, but not run through to downtown.
- Extend far enough so that over 95% of city residents, jobs, and activity centers are within ¼ mile walk of service.

Since the UVTN will be a high frequency, fast and reliable system there should be more opportunities to improve system efficiency and effectiveness through service consolidation and restructures that can improve a riders overall trip through connection to the UVTN.

Recommended TSP Strategy {TR5}

Advocate for Effective and Fair Redeployment of Existing and New Transit Resource Investments.

Advocate for Seattle's transit resources to be used effectively and allocated fairly. Service hours freed up in Seattle by consolidation, efficiency improvements, and reductions of unproductive service need to be reallocated to other service in Seattle.

Urban Center Circulation

There are a number of ways to improve circulation in urban centers. One approach is to increase the supply or quality of transit service, e.g. shuttles, circulator routes.

Recommended TSP Strategy {TR6}

Encourage Testing of New, Innovative Transit Services and Technologies.

Support efforts to develop and test new, innovative transit services that could help achieve the City's transit goals. Transit services will need to change and improve to achieve the increased ridership envisioned by the Comprehensive Plan, as well as to respond to changing demographics and urban development patterns.

A second approach is to make the existing transit easier to use and more convenient compared to other mobility options.

Recommended TSP Strategy {TR7}

Consider Expanding or Adding New Ride Free Areas.

Investigate, with King County Metro, Sound Transit and the Seattle Monorail Project, opportunities for expanding the downtown Seattle ride free area or starting new ride free areas in other major Seattle activity centers. The ride free area affects travel demand because it encourages high levels of transit usage downtown for short trips, reducing auto travel downtown during the day. Additionally, the ride free area eases loading and unloading of passengers in the downtown, speeding bus travel. Coordinate any study efforts with Neighborhood Plan recommendations to expand existing ride free areas. SDOT currently subsidizes the downtown Seattle ride free area and supports Strategy S-13 (Activity Center Mobility) of the King County Six-Year Development Plan for 2002 to 2007.

Neighborhood Circulators

Recommended TSP Strategy {TR8}

Ensure Access to Transit.

Recognize that people use the full range of transportation options to get to the rapid rail transit and bus stops; they walk, bicycle, take feeder bus service, and drive. The City does not want to encourage people to drive to the rail station or bus stop if other options are available. These short driving trips negate much of the air quality benefits of the transit trip, because more than half of a car's emissions occur at the beginning and end of a vehicle trip.

Recommended TSP Strategy {TR8.1}

Encourage Access to Transit in Seattle by Walking or Bicycling.

Identify and implement a set of transit, walking, bicycling, and parking management strategies around rapid rail transit and major bus stops to facilitate access.

Establishing City Transit Service Priorities

To achieve the UVTN, the City will need to coordinate with other transit agencies to ensure that the UVTN and other transit network development strategies, such as King County Metro's "Core Service Priority Corridors" are similar and represent the logical next priorities for investment. This will ensure that service and capital investments are coordinated to the maximum extent possible and improvements to streets, bus stops and frequencies go hand in hand.

Recommended TSP Strategy {TR2}

Prioritize Transit Service Investments to Achieve Basic Mobility and Ridership Goal.

The City's transit service goal is to provide a basic level of transit service throughout the city that ensures a minimum level of mobility for city residents and reinforces walking, bicycling, and transit as the preferred modes for in-city trips. It will achieve this goal by:

- Implementing the Urban Village Transit Network to maximize ridership and support growth by improving transit service in the areas of the city with the highest densities and in areas where housing density is increasing
- Implementing the Secondary Transit Network to maintain a basic level of service coverage for Seattle neighborhoods.

Implementation of the networks will be achieved by first focusing service resource investment (both new service resources and re-investment of existing resources) on the implementation of the UVTN, especially those corridors that have a commitment for speed and reliability; then additional investment in the STN. These investments would be timed in a way to achieve the greatest benefit from the implementation of scheduled service and capital investments, such as Link and the Green Line.

Within these investment priorities of implementing the UVTN, comprised of corridors or segments, and the STN, the City will need to work with its partner transit agencies to prioritize the specific routes that should receive investment. To phase UVTN development, the City will use the following criteria to prioritize route specific transit service improvements:

a. Ridership Potential – the more passengers being carried per hour of bus service, the more people being served by the transportation network.

b. Support Growth in Urban Centers – higher transit frequency on bus routes connecting urban centers will help the city achieve the Seattle Comprehensive Plan's urban center mode split goals for non-single-occupant vehicle modes.

c. Corridor Completion – the more a specific route investment falls within the UVTN the better. This criterion should also promote route simplification if routes are changed to match corridors.

d. Center City Mitigation – Center City bus capacity constraints and major project construction impact mitigation will require route investments that will shift trips to transit through construction areas and will increase seat utilization of existing Center City transit services.

e. Route Development - some funds can be allocated to investments in developing new transit markets as well as testing new, innovative services and technologies. This type of service investment is more attractive when implementing the UVTN and when it attracts private sector contributions or new partnership opportunities.

Successful implementation of the UVTN (shown in Figure 11 and described in Table 11) depends upon the availability of transit service and capital resources, supportive City street right-of-way management and land use policies, and transit service priorities that allocate most of the available service resources towards UVTN implementation and performance maintenance. Complete UVTN implementation is estimated to cost an additional 600,000 annual revenue service hours (this assumes the policy threshold for speed performance is achieved). The STN is estimated to need an additional 128,000 annual revenue service hours. At a cost of $80 per service hour, this is roughly $58.2 million annually (if a $95 per service hour cost is assumed, the annual cost would be about $69.2 million annually). Recognizing that current funding sources will not allow us to meet this goal all at once, the strategy shows how we can achieve it incrementally.

The City has worked with its partner transit agencies, primarily King County Metro, to identify UVTN corridors that can be implemented immediately, i.e. Phase 1 UVTN corridors. Implementation means there is a commitment to achieve minimum UVTN performance thresholds, including frequency of service, in the corridor as well as regularly monitor its performance.

The City will experience greater success with its commitment to good UVTN corridor speed and reliability performance if the corridor's transit service target goals are being met; people will better understand why transit is a priority. Similarly, transit service investment will be more effective if it is located in a corridor where transit is a priority, where additional service is not delayed by traffic congestion.

The City would like to build the UVTN in phases. Each phase would attempt to achieve all of the performance thresholds in corridors that have a commitment. Ideally, UVTN corridor implementation would occur in sequence, i.e. once a corridor is fully implemented the next corridor would be completed. It will also need to be done consistent with SDOT's program and project evaluation process, which evaluates each program or project on its merits according to the following criteria: 1) safety, 2) preserving and maintaining infrastructure, 3) cost effectiveness or cost avoidance, 4) mobility improvement, 5) economic development, 6) Comprehensive Plan/urban village land use strategy, and 7) improving the environment.

Implementation of the networks will be achieved by prioritizing service resource investment (both new service resources and re-investment of existing resources) in the following priority order (assuming 730,000 annual revenue service hours are needed to fully implement the UVTN and STN. To provide context for this service hour amount, King County Metro's unused .1% sales tax authority could generate countywide about $40 million annually or 500,000 annual service hours if $80 per service hour is assumed. The West subarea consumed 1.89 million service hours in 2002. In 2003, Route 358 used 52,590 service hours. An estimated additional 18,000 service hours are needed over 2005 service levels to get the Route 358 to the UVTN service frequency threshold.):

- Priority 1 – Provide first 100,000 annual revenue service hours to:

a. UVTN corridors, overcrowding, and high growth potential: Any UVTN corridor that has poor passenger loading performance, i.e. overloads, or are expected to have significantly higher

demand within five years, i.e. anticipated increase in riders per hour. Specific route examples are Route 36, Route 358, and the South Lake Union Streetcar.

b. Phase 1 UVTN corridors, service frequency and span: Phase 1 corridors (see Figure 12) should attain at least a 15 minute or better service frequency for peak (6-9 a.m., 3-6 p.m.), midday (9 a.m. - 3 p.m.), and evening hours (6-9 p.m.), seven days a week. Specific route examples are the Route 48 and Route 120. Attainment of 15 minute or better service frequency for night hours (9 p.m.-12 midnight) is a Priority 2 investment described below.

c. Optimize timing and implementation of service and capital investments: Service resources should be made available to match facility capacity increases, such as rail investments, speed and reliability improvements, or, to implement bus route restructures that are consistent with UVTN implementation. Specific examples are the Route 41 service increase to support Northgate Park and Ride lot capacity increases or additional service hours to achieve bus service integration with Central Link and the Green Line.

While STN improvements are not listed as a high priority, transit agencies may need to address service quality issues for some STN services. This is acceptable if the total STN investment does not increase. This situation could occur, for example, during service restructures to improve the UVTN; some STN service may be added, while some is being reduced. [A description of the STN, including candidate UVTN corridors, was provided on pages 46-48 and 55].

- Priority 2 – Use next 200,000 annual revenue service hours to:

  Meet first priority investments, and then make investments to:

  a. UVTN corridors, service frequency and span: UVTN corridors that have a commitment to meet speed and reliability performance thresholds or are close to receiving a commitment should attain at least a 15 minute or better service frequency for peak (6-9 a.m., 3-6 p.m.), midday (9 a.m. - 3 p.m.), and evening hours (6-9 p.m.), seven days a week. This will be followed by additional service investment in the night periods to fully achieve the service frequency and span of service thresholds.

  b. STN service investments: Address overcrowding problems on STN services. Consider STN service investments that provide congestion relief, e.g. additional peak, midday, or evening service.

- Priority 3 – Use remaining 430,000 annual revenue service hours to**:**

  Meet first and second investment priorities, and then make further investments to the STN consistent with Seattle neighborhood plan recommendations and subarea priorities identified through King County Metro's subarea-based community planning process to improve basic coverage and circulation within urban villages.

Figure 12: Phase 1 UVTN Corridors

The City recognizes that many of the UVTN corridors are comprised of individual transit routes. To achieve UVTN performance thresholds, it will be necessary to achieve similar performance on a transit route or routes. The following criteria will be used to select the appropriate route investments:

a. Ridership Potential – the more passengers being carried per hour of bus service, the more people being served by the transportation network.

b. Support Growth in Urban Centers – higher transit ridership on bus routes connecting urban centers will help the city achieve the Seattle Comprehensive Plan's urban center mode split goals for non-single-occupant vehicle modes.

c. Corridor Completion – the more a specific route investment falls within the UVTN the better. This criterion should also promote route simplification if routes are changed to match corridors.

d. Center City Mitigation – Center City bus capacity constraints and major project construction impact mitigation will require route investments that will shift trips to transit through construction areas and will increase seat utilization of existing Center City transit services.

e. Route Development - some funds can be allocated to investments in developing new transit markets as well as testing new, innovative services and technologies. This type of service investment is more attractive when implementing the UVTN and when it attracts private sector contributions or new partnership opportunities.

There may be some service hours set aside or earmarked for specific purposes, e.g. special events, demonstration projects, and waterborne transit. In many cases, these special services will have their own funding source, such as grants, private investment, or voter approved tax revenues. The City will work with its partner transit agencies to ensure that these service investments are consistent with the City's transit and land use plans.

As noted earlier, resources used for the STN should shrink over time as a percentage of all transit resources and the "set-aside" should not need to grow faster than the growth in operating cost, and any further resource growth should be devoted to the UVTN.

The City as well as Seattle's citizens should communicate their transit priorities (service and supporting capital projects) to Seattle transit agencies, e.g. King County Metro, Sound Transit, WSF, and Seattle Monorail Project on a regular basis (Appendix 7 lists transit recommendations from the City's 38 neighborhood plans). Using the priorities and criteria described above will provide the greatest number of people frequent, reliable and quick transit service which will allow Seattle and the rest of the region to grow and maintain livability.

Recommended TSP Strategy {TR9}

Support and Promote Public Involvement in the Decision-making Processes of Transit Partners.

Support effective public involvement as essential to implementing well-used transit service. Seattle's citizens, as transit riders and potential transit riders, can contribute expertise and experience to help King County Metro, Sound Transit, Washington State Ferries and Seattle Monorail Project in their decision-making.

Waterborne Transit

Waterborne transit, or ferry, service for Seattle is currently provided by the Washington State Ferries, e.g. Bremerton-Seattle auto/passenger service, Vashon-downtown Seattle passenger only service, and King County Metro, e.g. Elliott Bay Water Taxi. As areas on both the east side and west side of Puget Sound continue to grow and traffic congestion remains a problem, ferry travel demand will likely grow – not only for crossing Puget Sound but also for crossing water bodies like Lake Union and Lake Washington. The Seattle transportation system impacts of this growing travel market will depend where the ferry terminals are located and how much auto and passenger traffic they generate. Ferry services will also impact other water traffic on the water bodies where they are located.

An increase in ferry service that carries automobiles, such as the kind WSF provides, can be a problem for Seattle if it means adding more cars to streets that are already congested. High ferry auto traffic would have negative impacts from more cars queuing for ferries to increased pollution and congestion at the terminals and throughout the city. If, on the other hand, it means more passenger only ferry service, this would not be a major problem as long as the terminal locations are properly developed.

Recommended TSP Strategy {TR11}

Work to Focus the Washington State Ferry System Growth on Moving People Rather than Cars.

The areas served by the ferry system on the other side of Puget Sound are growing rapidly. Demand for ferry service will increase as Kitsap County grows. How that demand is managed has major implications for Seattle. Increasing walk-on passenger traffic will contribute to a vibrant multimodal transit hub on Seattle's Central Waterfront. Increasing vehicle traffic, however, has a host of negative impacts ranging from large expanses of waterfront areas being used to store vehicles to board boats, increased pollution from idling vehicles, and congestion at terminals and throughout the city from cars queuing to access terminals facilities. Work with the Washington State Ferries to focus on an expansion of fast passenger-only ferries, growth of walk-on passengers on large vessels, and limit the expansion of vehicle ferry service. Ferry pricing, boarding policies, and terminal planning should be adjusted to make travel by single-occupant vehicles less attractive and encourage travel by other modes (walk-on passengers, bicycles, carpools, vanpools, transit).

As mentioned earlier, Washington State operates the Puget Sound ferry system and makes decisions about how to accommodate increasing demand--whether to provide additional ferry capacity for vehicles or passengers or both. Additional vehicle capacity has a much greater transportation system impact than additional person capacity.

Many ferry commuters drive onto the ferry and then through Seattle streets because there are no convenient transit connections to their ultimate destinations.

In recent years, WSF has decided to focus more on its auto and passenger ferry service and less on its passenger only ferry service due to budget constraints. This has prompted local transit agencies and private ferry operators to consider serving the Puget Sound's passenger only ferry market. King County Metro, for instance, has been testing an Elliott Bay water taxi that runs between West Seattle and downtown Seattle; it continues to generate good ridership and farebox recovery during the summer months. Kitsap County tried unsuccessfully within the last few years to increase the sales tax and vehicle license fee to fund passenger only ferry across Puget Sound. Following this result, private operators have started to develop plans to operate passenger only services.

There may be other Seattle water corridors besides those in Puget Sound that can be served by passenger only ferry or water taxi service. For instance, there is Lake Washington between Seattle and eastside suburbs, and a potential for water transit connections into and within Lake Union and Portage Bay.

Water taxis are another transit alternative that can be used to get people out of their cars. It can provide riders with good speed and reliability and may even be a good stimulus for economic development and tourism.

Recommended TSP Strategy {TR10}

Expand Options for Waterborne Transit Service.

Explore route, funding, and governance options for waterborne transit service. The City of Seattle Department of Transportation will also coordinate with other communities, like Kitsap County, planning waterborne transit service to Seattle.

Critical to the success of water taxi operations is a well-sited docking facility, or terminal, and vessel sized to meet rider demand and constructed to handle water conditions and traffic.

In 1999, the City completed a docking study for the Elliott Bay Water Taxi. The following criteria were used for deciding to inventory a potential docking site:

- Historical use of the site for ferry service or other marine uses.
- Land area sufficient for an inclement weather shelter, unisex restroom, a pull-out drop-off area for busses/shuttle vans/cars, and if possible a small commuter parking area to support 30 to 40 vehicles.
- Physical proximity to a street suitable for van routing to an activity center if not already located in one.
- Physical proximity to retail, tourist, business and entertainment centers as well as marine infrastructure and intermodal connections if located in an activity center.

The potential docking sites were ranked according to 13 characteristics, including, terminal cost, traffic and parking impacts, safety, and boat travel times.

Based on the above criteria, the study recommended that water taxi termini be Harbor Avenue at Bronson Way on the west side of Elliott Bay and Washington Street at Alaskan Way on the east side.

Choosing Capacities and Technologies

The UVTN can be built through regional high and intermediate capacity transit improvements. The UVTN already includes the Green Line monorail corridor and Central and North Link light rail. It will be appropriate for future expansions of these systems to be in other UVTN corridors. This will help free up bus service hours for reallocation to other parts of the UVTN that are not funded for high and intermediate transit capacity improvements or to improve service in candidate UVTN corridors or in the STN.

High and Intermediate Capacity Transit Technologies

There have been some recent efforts to evaluate transit technologies that can be used for high and intermediate transit investments. In March 2004, the Puget Sound Regional Council formed a peer review panel to assess whether the region's proposed high capacity transit corridors are ready for investment and what would be the appropriate technology to use in these corridors[20].

They assessed the following corridors:

- TransLake – Seattle CBD to Bellevue and other points in East King County
- North – Northgate to Everett CBD via Lynwood
- South – SeaTac to Tacoma CBD via Federal Way
- Eastside – SeaTac to Lynwood via Tukwila, Renton, Bellevue.

They evaluated the following technologies[21]:

- Enhanced Bus (e.g. electric trolley buses) – A Seattle example of enhanced bus is electric trolley coaches. They are rubber-tired vehicles that are powered by electricity collected from fixed overhead wires. Trolley coaches now generally operate in mixed traffic, but can operate in an exclusive ROW with signal priority, or in a subway. Trolley coaches produce zero emissions and are particularly effective on steep grades. In 2002, 36 percent of Metro's revenue hours were operated by trolley coach, carrying over 23 million riders. Conversion to trolley coach operation is desirable in more locations because trolley coaches are quiet, clean vehicles that enhance the quality of life in an urban setting. Limited and express service would remain operated by diesel coaches so they can pass vehicles on wire.

  ⇒ Cost per mile: $6.6 million

- Bus Rapid Transit (BRT) – BRT is a rubber-tired vehicle operation that is configured to offer speeds and capacity similar to rail transit, with exclusive travel lanes, limited stops and signal pre-emption. Other characteristics include the use of low-floor transit vehicles, a prepaid fare system that expedites boarding, and stations that provide shelter and passenger information. Because transit vehicles are separated from other vehicles and stop less frequently, travel time decreases. BRT is appropriate in corridors with high ridership where there is sufficient ROW to provide dedicated lanes. BRT does not require as much capital infrastructure as LRT, and may serve as the first phase of implementing light rail transit.

  In the Seattle Transit Study for Intermediate Capacity Transit BRT service would be provided on articulated transit buses operating in bus only lanes on city arterial streets. Proposed BRT lanes were assumed to be curbside with stops and stations in the sidewalk area. Proposed BRT service

[20] Puget Sound Regional Council Expert Review Panel
[21] Technology descriptions and cost estimates from GA0, Mass Transit, September 2001; San Francisco Municipal Railway, A Vision for Rapid Transit in San Francisco

would be on low-floor clean diesel, rubber-tired vehicles, operating at peak-hour headways of 5 minutes and off-peak headways of 7.5 minute. The average speed of these systems (including dwell time) was estimated to be 11 miles per hour. BRT routes were assumed to have approximately four stops per mile, with variations depending upon route and areas served. These systems were assumed to have the following costs per mile:

⇒ Cost per mile, busways: $7 million to $55 million
⇒ Cost per mile, HOV lanes: $1.8 million to $37.6 million
⇒ Cost per mile, arterial streets: $200,000 to $9.6 million

- Light Rail Transit (LRT) Surface – LRT is a cost-effective rail mode powered by electricity from overhead wires producing zero emissions. LRT on surface streets operates most effectively in exclusive rights-of-way, where traffic is prohibited (possibly by a physical barrier) from traveling in the same lane as the transit vehicle but is allowed to cross the tracks. LRT ideally operates with signal preempts, allowing it to travel relatively unimpeded from station to station. Exclusive rights-of-way may be located along the curb or down the center of the street. Where space is limited or other conditions require, surface LRT may operate in mixed flow.

  ⇒ Cost per mile: $58.7 million

- Light Rail Transit (LRT) Subway – In addition to running in surface operations, light rail can operate in subways in congested areas. LRT operation is most efficient in an exclusive right-of-way with no conflicts with other vehicles and pedestrians, where speed is maximized and train control can be automated. This is only possible in a grade-separated right-of-way, such as a subway. Although subway is the most efficient environment for light rail, it also has the highest capital costs. Conceptually, a subway, once built, can accommodate electric trolley as well as light rail. The cost of building a subway is justified where there is a high density of population, destinations, and traffic, such as downtown.

  ⇒ Cost per mile: $365.4 million

- Elevated Transit/Monorail - Guided transit mode with vehicles riding on or suspended from a single rail, beam or tube. Vehicles employ steel wheel or rubber tire support and steering; they usually operate in fixed train sets of two to six permanently connected cars. There are two basic types of monorail systems, suspended and supported. The term "monorail' is used to describe almost any transit system using an overhead structure and vehicles with arrangements of support and guidance wheels that run not on a single rail, but on the surface of a rather large beam, or inside an enclosed box structure. Most monorail systems are on aerial structures, but at-grade and tunnel segments are also possible. Maximum service speeds are in the range of 40 to 50 miles per hour.

  ⇒ Cost per mile: $125 million (based on Green Line cost estimates)

Appendix 8 has more information on transit technologies[22].

The evaluation considered the following characteristics:

[22] Survey of Transit Technologies, Sound Transit, September 2002

- Capacity
- Operating Speeds
- Station Spacing
- Headways/Frequency
- System Integration
- Land Use Impacts
- Implementation Risk
- Reliability
- Right-of-way Requirements
- Profile Constraints

The assessment resulted in the following recommendations:

- Land Use Characteristics Supporting HCT Applications
  - It is important to recognize the value of transit modes in helping to guide community development.
  - Include cost analyses at an earlier phase.
  - Strengthen highway and road planning into an overall transportation system plan.
- Geographic Areas Supporting HCT
  - Sound Transit's long-range plan needs to be taken to its next logical step for all corridors.
  - Prioritize corridors that build on Phase 1 improvements.
  - Given the projected growth initiatives, there is a need to commence as soon as practicable.
  - The North and Cross-Lake corridors appear to have a higher potential for near-term development.
  - In the long-term, all corridors are ready for HCT development.
- Application of Appropriate HCT Assessment Methodologies
  - Further analysis of congestion factors will assist in the planning process.

- Conduct an "alternatives analysis" to evaluate the full benefits of each alternative within the comprehensive multimodal evaluation.

- HCT Technologies Appropriate to Corridors
  - Ranges need to be developed for the projected performance of technologies under consideration.

Recommended TSP Strategy {TR1.6}

Select Preferred Rapid Transit Technologies and Alignments Following Corridor Studies That Consider All Feasible Alternatives.

Make new rapid transit investment decisions after an evaluation of feasible alternatives using criteria similar to those used in the Seattle Transit Study for Intermediate Capacity Transit and the August 2004 high capacity transit corridor assessment prepared by the Puget Sound Regional Council.

When the Seattle Transit Study evaluated intermediate capacity transit routes and possible technologies, they used the criteria listed in Table 13. In general, the study's findings support the relative ranking of technologies as shown in the table.

Table 13: Seattle Transit Study Evaluation Criteria

Evaluation Criteria	LRT Surface	LRT Subway	LRT Elevated	Monorail	BRT
Ridership					
Boardings	0	+	+	+	-
New Trips	-	+	+	+	0
Cost					
Capital Cost by Component	0	-	-	-	+
Capital Cost per Mile	0	-	-	-	+
Operations and Maintenance Cost	-	0	0	0	+
Impacts					
Natural Environment	Variable	Variable	Variable	Variable	Variable
Built Environment	0	+	-	-	0
Economic Development	+	+	+	+	0
Parking	-	+	0	0	-
Traffic	-	+	0	0	-
Measures of Effectiveness					
Transit Mode Share	-	+	+	+	0
Travel Speed	-	+	+	+	-
Cost Effectiveness					
Annualized Cost per ICT Boarding Passenger	-	0	0	0	+
Incremental Cost per Incremental Passenger	-	0	0	0	+
Annual Value of Travel Time Savings per Annualized Cost	-	0	0	0	+
Incremental O & M Cost per Incremental Passenger Mile	-	+	+	+	0

+ = best, 0 = middle, - = worst
Source: Seattle Transit Study for Intermediate Capacity Transit, December 2001

Recommended TSP Strategy {TR3}

Work with Partner Transit Agencies to Make the Best Possible Rapid Transit Investments.

Play a strong role in the development of Seattle rapid transit plans. Advocate with Sound Transit, Seattle Monorail Project, King County Metro, and the Puget Sound Regional Council for the best possible rapid transit investments that are consistent with the City's Comprehensive Plan and the transit vision described in the Seattle Transit Plan.

Improve Center City Access and Circulation

In 2003, SDOT issued its Center City Circulation Report. The goal of the report was to develop a conceptual approach for maximizing access to downtown Seattle by improving and integrating downtown's public transit, bicycle and pedestrian networks. It considered planned growth and development in the Center City study area and planned major transportation projects, such as Link light rail, Green Line monorail, Alaskan Way Viaduct and seawall, Colman Dock Ferry Terminal, and King Street Station.

The Center City study area boundaries were Elliott Bay to the west, South Lake Union to the north, Broadway on Capitol to the east, and Holgate Street in the SODO neighborhood to the south.

Good transit circulation in the Center City is a key factor to achieving an attractive Seattle transit network that is cost-effective and will increase transit's market share of travel. The Center City report made the following recommendations for actions to improve the Center City transit network:

- Create a Third Avenue Transit Spine.
- Use Second and Fourth Avenues for Regional Express and peak service.
- Use First Avenue for transit service, possibly a streetcar line, connecting Seattle Center to the International District.
- Connect Aurora Avenue BRT service directly into Third Avenue.
- Create 10 key transit corridor "Fingers" or route groupings, feeding into or through the Third Avenue Transit Spine:

    1. Ballard/Magnolia
    2. West Queen Anne
    3. East Queen Anne
    4. Dexter Avenue North
    5. Virginia/Stewart Streets, continuing as Fairview Avenue
    6. Pike/Pine Streets
    7. Madison/Marion Streets
    8. James/Jefferson Streets
    9. Yesler Way
    10. Jackson Street

- All-day frequent express routes using the downtown Seattle transit tunnel or Third Avenue Transit Spine.
- Create three major intra-neighborhood routes: Denny Way, Broadway, and Mercer Street, so other major inter-neighborhood routes can avoid downtown congestion.
- Comprehensively study streetcar options and establish streetcar operating standards to achieve full benefits of investment.

All of the above recommendations are designed to achieve more efficient and effective bus routing that will:

- Break transit through the Center City's "ring of congestion"
- Improve Central Link and Green Line integration
- Improve transit, pedestrian and bicycle network integration
- Emphasize the importance of three key mulitmodal Hubs in downtown: Westlake Station, King Street Station, and the Colman Dock Ferry Terminal.

Figure 13 shows a general description of the Center City transit network recommendations, including possible streetcar options. Figure 14 shows the recommended frequent transit network – the basis for Center City UVTN corridors -- to be achieved by 2010-2015.

Figure 13: Center City Transit Network Recommendations

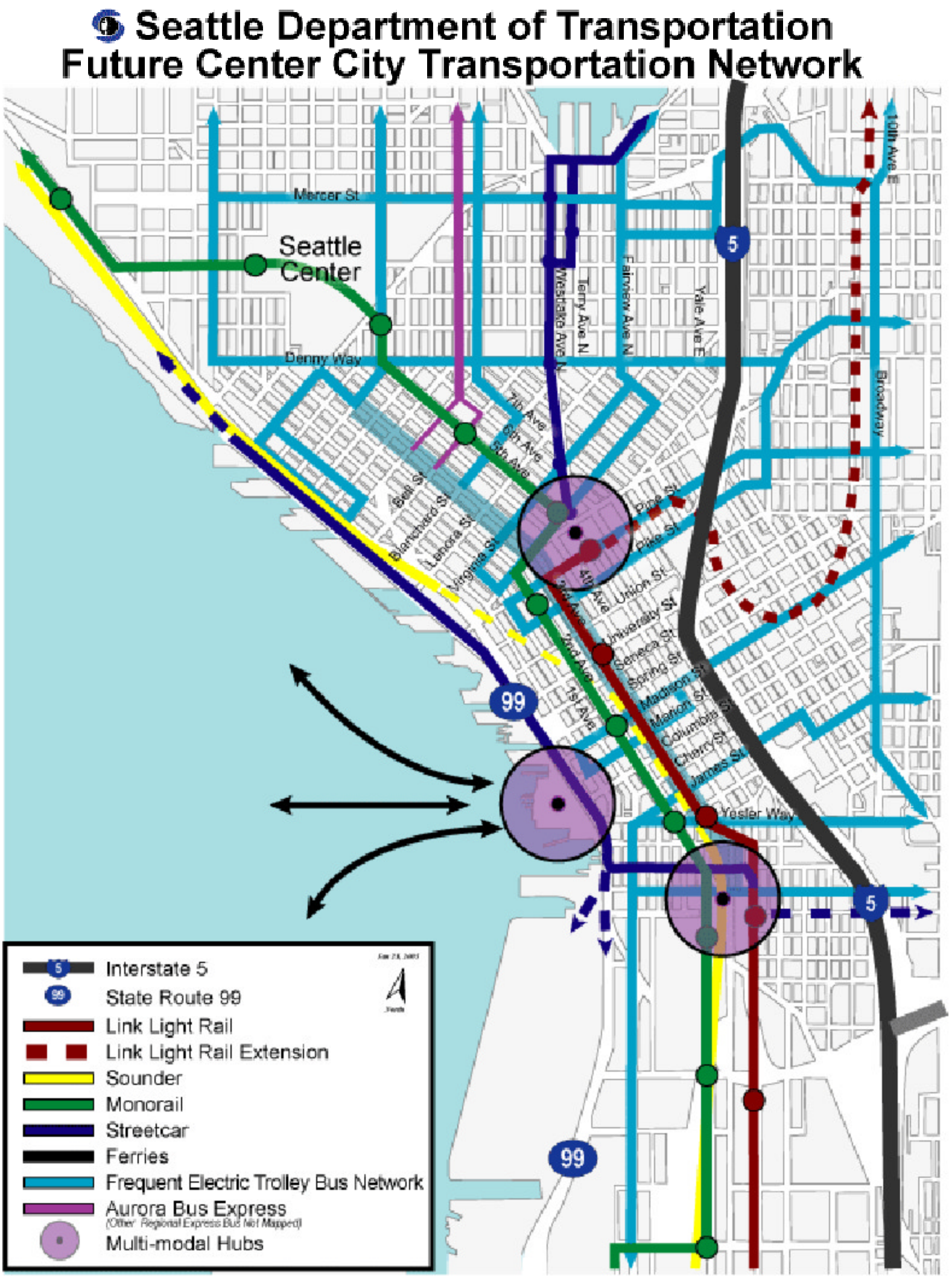


Figure 14: Center City Frequent Transit Network and Facilities, 2010-2015

Establish Multimodal Hubs and Other Key Passenger Facilities

Recommended TSP Strategy {TR12}

Make Transit Convenient, Understandable, and Easy to Use.

More people ride transit when:

- Transfers are easy and quick.
- The system is visible, comprehensible, and easy to use.
- They feel safe walking to and from the transit stop, at the transit stop, and on the transit vehicle.

Multimodal Hubs

Multimodal Hubs are the focal points of terminating transit lines (bus or rail) and transit staging activities that generate significant economic and travel opportunities. They are designed for the highest passenger volumes, with many of the passenger trips being long distance. In addition, they can become great locations for transit oriented development to further increase transit demand and reduce single occupant vehicle use.

Businesses will be attracted to Multimodal Hubs because they will have good access to a broad labor supply. They will generate jobs in areas that will welcome job growth. When transit provides good travel speed and reliability, employees can get to work fast and on time. Conversely, Seattle residents who live within a half mile of a Multimodal Hubs will have a wide range of walk-accessible mobility options for their local and regional trip-making. As the Seattle Transit Vision indicates there are three Multimodal Hubs in the Downtown Urban Center: King Street Station, Westlake Station and Colman Dock Ferry Terminal. There are also a Multimodal Hubs in the Northgate and University Community Urban Centers.

It is critical that the Multimodal Hubs have adequate facilities so that they work effectively for the services and people that use them. The following types of facilities are typically needed at or near Multimodal Hubs:

- On- and off-street layover spaces
- Transit priority roadways
- Good pedestrian and bicycle access to bus stops and stations

- Shelters or other protections against wind and rain
- Pedestrian-oriented lighting
- Wayfinding signage
- Real time transit information

The Downtown and University Community Multimodal Hubs share an important characteristic: they are in or near areas with venues that generate significant special event traffic. For example, the Downtown Urban Center is impacted by special events at Seattle Center, the Convention Center, and the football and baseball stadiums in the SODO neighborhood. The University Community is impacted by special events at Husky Stadium. To function properly, Multimodal Hubs, and the corridors they serve, need to be protected from the traffic congestion generated by special events.

Recommended TSP Strategy {TR12.1}

Develop Designated Multimodal Hubs in Urban Centers.

Develop Multimodal Hubs as the focal points of terminating transit lines (bus or rail) and transit staging activities that generate significant economic and travel opportunities. Located in urban centers, Multimodal Hubs are designed for the highest passenger volumes, with many of the passenger trips being long distance. In addition, they can become great locations for transit oriented development to further increase transit demand and reduce single-occupant vehicle use. It is critical that the Multimodal Hubs have adequate facilities so that they work effectively for the services and people that use them.

King Street Station

King Street Station is located in south downtown Seattle. Built in 1906, it is being rehabilitated as a major multimodal station linking together major statewide, regional, and local public transportation services.

The station already serves two-thirds of the Amtrak passengers as well as Sounder commuter rail passengers. In the future, it will continue to be an important facility for linking Amtrak and Sounder services. It can also be an important transfer facility for users of regional and local transit buses, the George Benson Waterfront Streetcar, Link light rail, Seattle monorail, roads, ferries, pedestrians, and cyclists.

The station will need the following changes to transform it into a successful Multimodal Hub:

- Improved physical and informational connections between the various transportation modes and expand the range facilities, e.g. extend the Weller Street pedestrian bridge to the monorail.
- Rehabilitated train station
- An intercity bus terminal
- New bus pullout transit waiting areas and layover plan
- Relocated streetcar service
- Better links to the International District transit station used by buses and future Link light rail
- Space made available for the Seattle Monorail
- Space for amenities, including food service, car rentals, automobile parking, and bicycle storage
- Major new signage and wayfinding elements
- Improved pedestrian and bicycle access to the rapidly developing South Downtown, Pioneer Square, and International District neighborhoods.
- Upgraded tracks to allow rail service expansion
- Better definition of the undefined area between Yesler and Jackson Streets.

Westlake Station

The Westlake Station in the downtown Seattle transit tunnel near Fifth Avenue and Westlake Avenue can be a key Multimodal Hub for Seattle connecting a variety of transportation modes with convenient, safe, and comfortable transfers between modes.

Westlake Station lies within ¼ mile of the some of the region's highest density neighborhoods. It will be the intersection of bus, monorail, light rail, and streetcar transit. To create a station that provides people a seamless transition between modes, the City will need to take action in the following areas:

- Manage on and off-street parking supplies
- Street design and traffic management – due to the high volumes of transit, pedestrian and bike traffic in the area special attention needs to be paid to how the street space will be designed and used. Pedestrians will need to have priority to maintain safety.
- Expand pedestrian and transit capacity in area around the station.
- Provide and maintain good security, especially at night.

Special attention needs to be given to the pedestrian connections between the transit tunnel and monorail station at Fifth and Stewart.

Colman Dock Ferry Terminal

The Colman Dock Ferry Terminal served over 9 million ferry riders in 2002. It is within walking distance of the Waterfront Streetcar, Elliott Bay water taxi, First Avenue bus service, and a monorail station at Second and Madison. It continues to be a favorite destination for tourists and visitors and will be a transportation focal point in the future.

Recommended TSP Strategy {TR12.4}

Improve Transit Connections for Walk-on Ferry Passengers.

Explore options for improving the transit choices available to walk-on ferry passengers using the Washington State Ferry system or other waterborne transit providers. Many ferry commuters drive onto the ferry and then through Seattle streets because there are no convenient transit connections to their ultimate destinations. The success of new passenger-only ferry service will be partially based on proximity to destinations and connecting transit services farther from the dock. Particular attention will be needed at Seattle's Central Waterfront to make sure needed transit services are coordinated between waterborne transit operators.

Recommended TSP Strategy {TR12.3}

Integrate Ferry Terminals with Surrounding Neighborhoods.

Work with Washington State Ferries, waterborne transit operators, and adjacent property owners to integrate ferry terminals with surrounding neighborhoods and their land use context. Ferry terminals can, and do, have significant impacts on street systems and communities adjacent to ferry terminals.

Northgate

The Northgate Transit Center serves as a focal point for bus routes serving north Seattle and north King County. It is a major transfer point and provides bus staging and layover capacity. Sound Transit plans to extend light rail from the University Community Urban Center to Northgate as soon

as it can choose an alignment and secure funding. This will make Northgate a more attractive location for Community Transit to transfer riders who are traveling to downtown Seattle.

King County is planning a transit-oriented development at the existing transit center and park and ride lot.

The City has initiated the development of a coordinated transportation improvement plan that will identify projects that will make Northgate an effective Multimodal Hub.

University District

The University District, home to the main University of Washington campus and a growing commercial and residential neighborhood, attracts high volumes of bus, bicycle, and pedestrian traffic. Buses are responsible for bringing many of the university students to and from campus. Transit use in the University District is second only to transit use in downtown Seattle. It is currently served by King County Metro, Community Transit, and Sound Transit.

In 2002, King County Metro operated approximately 32 regular transit routes to the University District area, connected to over 60 park-and-ride lots throughout King County. Twelve of Metro's routes provided service directly to the U.W. campus.

The Burke-Gilman Trail provides excellent bicycle access to transit stops located in the University District. It runs parallel to Northlake Way/Pacific Avenue and continues just west of Montlake Boulevard to the intersection of 25th Avenue NE and NE Blakely Street. The Trail then runs east-west along NE Blakely Street, just north of University Village, and continues roughly parallel to Sand Point Way NE.

Other Key Passenger Facilities

The UVTN service concept continues a reliance on transfers to provide efficient transit connections to varied markets. Improved service frequency reduces wait times, which is especially important for transferring riders. Improved on-time performance or service reliability can also reduce wait times. The Green Line and Link rail stations will provide both transit speed and reliability. Bus services that are part of the UVTN will also contribute towards an improved transfer environment because they will also be fast and reliable.

Recommended Strategy {TR12.2}

Use Station Area Planning to Maximize Ridership and Further Growth Management, Neighborhood Plan, Economic Development, and Revitalization Objectives.

Conduct station area planning around rapid rail stations to create substantial economic development and revitalization opportunities for the surrounding neighborhoods. Station Area Planning helps achieve the Comprehensive Plan's goal of concentrating Seattle's growth in walkable, transit-oriented, and mixed-use neighborhoods to maximize transit ridership and reduce reliance on single-occupant vehicles.

Improved transit facilities can make transfers more acceptable. Continuing to improve accessibility for riders with disabilities can also help reduce demand for paratransit services. They include shelter, seating, lighting, and customer information. Access to service can be improved by improvements to walkways, bicycle storage, and, in some cases, leased park-and-ride capacity.

Transportation Centers

The City will work with its public and private partners to develop Transportation Centers at the following four locations:

- Ballard
- North Rainier
- West Seattle Junction
- Husky Stadium

A Transportation Center is a facility where multiple transit lines converge, creating significant transfer activity. It is also a place where other transit services and transportation linkages or facilities exist, such as bike routes, carsharing station, bike stations, and taxis.

Unlike the Multimodal Hubs that are located in urban centers, the Transportation Centers are mostly located in hub urban villages; therefore, passenger traffic flows and facility integration issues may not be as difficult to resolve.

Transportation Centers represent significant transfer points in the UVTN yet are likely to less intense capital investment to create a seamless transfer environment. For instance, the Multimodal Hubs may require right-of-way acquisition off-street bus layover and new passenger facilities.

Recommended TSP Strategy {TR12.5}

Develop Designated Transportation Centers in Urban Villages.

Develop Transportation Center facilities in urban villages where multiple transit lines converge, creating significant transfer activity, but not like the high passenger activity of the Multimodal Hubs. They are also places where other transit services and transportation linkages or facilities exist, such as bike routes, car-sharing stations, bike stations, and taxis.

Major Transfer Points

The intersection of UVTN lines and when UVTN stops are in urban villages define major transfer points at the minimum. These locations require the following minimum passenger amenities:

- Shelter(s) and space to accommodate rider demand
- Trash receptacle
- Real time rider information
- Branding
- Pedestrian lighting
- Bench(es).

Recommended TSP Strategy {TR13}

Improve Transit Service Information to Make Transit Stops and Transfer Points More Visible and Comfortable.

Work with transit agencies to use kiosks, printed maps and schedules, telephone information, and real-time displays at transit stops to improve transit service information. Continue exploring the development of real-time information systems for transit riders at central stops/major transfer points and support the testing of available technology in demonstration projects.

Make waiting for transit a more attractive experience by developing transit stops that are enhanced with wider sidewalks, better lighting, more shelters, seating, telephones, and clocks. They can be paired with commercial services such as coffee stands, newspaper kiosks, dry cleaners, and other development.

Table 14 lists the Major Transfer Points shown on the UVTN map.

Table 14. UVTN Transfer Points

					2030 Role in Network						
					Land Use		Within UVTN			Other	
Area	Station or Community Name	Location	Existing Classifications: MH = Multimodal Hub TC = Transp. Center SA = Station Area	Recommended Classification: MH = Multimodal hub or "Rapid-Rapid" LR = Local-Rapid LL = Local-Local	Village Category (C=Center, H=Hub, R=Residential)	Major Destination	Rapid to Rapid	Local to Rapid	Local to Local	UVTN to Secondary	Peak Commuter
NE	Northgate	TBD	MH	MH	C	X	X	X	X	X	X
NE	Roosevelt	NE 65 St, 8 - 15 Av		LR	C	X	X	X	X	X	X
NE	U-District	NE Campus Dr - 45 St, 11-15 Av	MH	MH	C	X	X	X	X	X	X
NE	Montlake (Husky Stadium)	NE Pacific & Montlake, including Montlake/520 functions	TC	MH	CBD	X	X	X	X		X
NE		25 Av NE at 55 St / Ravenna Bl		LL	CBD	X	X	X	X		X
N		Aurora at 105 St		LL	CBD	X	X	X	X		X
N		Aurora at 85 St		LL	CBD	X	X	?		X	X
N		Aurora at 46 St		LL		X	X			X	
N	Fremont	Aurora and Fremont Av at 35-39 Sts.		LL			X			X	
N	Phinney Ridge	Greenwood at 85 St		LL	R			X	X	X	
N		Greenwood at 105 St		LL	C				X		
NW	Crown Hill Monorail	15 Av NW at 85 St	SA	LR	R			X	X	X	
NW		15 Av NW at 65 St	SA		R			X	X	X	
NW	Ballard Monorail	15 Av NW at Market	TC	LR	R			X	X	X	
W	Dravus Monorail	15 Av W at Dravus	SA	LR	H			X	X	X	
W	Upper Queen Anne	Queen Anne Av at Boston		LR	R				X		

					2030 Role in Network						
					Land Use		Within UVTN			Other	
Area	**Station or Community Name**	**Location**	**Existing Classifications: MH = Multimodal Hub TC = Transp. Center SA = Station Area**	**Recommended Classification: MH = Multimodal hub or "Rapid-Rapid" LR = Local-Rapid LL = Local-Local**	**Village Category (C=Center, H=Hub, R=Residential)**	**Major Destination**	**Rapid to Rapid**	**Local to Rapid**	**Local to Local**	**UVTN to Secondary**	**Peak Commuter**
W	Lower Queen Anne & Sea Ctr West	Queen Anne/1st Av at Mercer, plus Sea Ctr West Monorail.	SA	LR					X		
CBD		Queen Anne/1st Av at Denny		LR	R			X	X	X	
CBD	Sea Ctr East	5 Av N at Denny/Thomas	SA	LR	H			X			
CBD		Aurora/Dexter at Denny	SA	LR	H			X	X	X	
CBD		Fairview at Denny OR Westlake at Denny		LR				X		X	
CBD	Westlake Hub	3-5 Aves, Stewart-Pike Sts	MH	MH	R				X		
CBD	Univ St Stn	2-4 Aves, Univ St	SA	LR	C			X	X	X	
CBD		2-4 Aves, Madison-Marion	SA	LR	CBD				X	X	
CBD	Pioneer Sq Stn	2-4 Aves, James	SA	LR	CBD			X	X	X	
CBD	King St Station	3-5 Aves, Jackson-Weller	MH	MH	CBD			X	X	X	
CBD	Colman Dock	Alaskan & Madison	MH	MH	CBD				X	X	X
E	Capitol Hill	Broadway E & John	SA?	LR	CBD	X		X	X		X
E	SCCC	Broadway & Pine		LL	CBD	X		X	X		X
E	First Hill	9th-Broadway & Madison		LR	C	X		X	X	X	
E		Broadway & Jefferson		LL	C	X			X	X	
E		12th-24th & Yesler-Jackson		LL	C	X		X	X	X	X
E		15th & Madison & Pine-Union		LL	C				X	X	X
E		23rd & Thomas-Madison		LL	C				X	X	
E		23rd & Union		LL	C				X	X	
E		23rd & Jefferson-Cherry		LL	R				X	X	
E		23rd & Yesler-Jackson		LL	R				X	X	
SE	Rainier/I-90 Stn	Rainier at I-90		LR	R				X	X	

					2030 Role in Network						
					Land Use		Within UVTN			Other	
Area	**Station or Community Name**	**Location**	**Existing Classifications: MH = Multimodal Hub TC = Transp. Center SA = Station Area**	**Recommended Classification: MH = Multimodal hub or "Rapid-Rapid" LR = Local-Rapid LL = Local-Local**	**Village Category (C=Center, H=Hub, R=Residential)**	**Major Destination**	**Rapid to Rapid**	**Local to Rapid**	**Local to Local**	**UVTN to Secondary**	**Peak Commuter**
SE	Royal Brougham	LRT, Monorail at Royal Brougham	SA	LR	R				X	X	
SE	Lander LRT	E-3 transitway at Lander	SA	LR	H			X		X	X
SE	Lander Monorail	1 Av S at Lander		LR				X		X	
SE		1 Av S at Spokane		LL					X	X	
SE		4 Av S at Spokane		LL				X		X	
SE	McClellan LRT, "North Rainier"	Rainier-MLK at McClellan	TC	LR	H			X	X	X	
SE	Edmunds LRT	MLK & Alaska-Edmunds	SA	LR	R			X		X	
SE	Othello LRT	MLK at Othello	SA	LR	R			X		X	
SE		Rainier at Othello		LL					X	X	
SE		Rainier at Alaska		LL					X	X	
SE	Henderson LRT	MLK at Henderson	SA	LR	R			X		X	
SE	Beacon Hill LRT	14 Av S at Beacon	SA	LR	R	X		X	X	X	
SE		15 Av S at Columbian		LL					X		
SE	South Park	SR 99 at Cloverdale		LL	R			X	X	X	
SW	Admiral	California & Admiral		LL	R				X	X	
SW	Delridge Monorail	Delridge & Spokane	SA	LR				X	X	X	
SW	Alaska Jct	California at Alaska	SA	LR	H			X	X	X	
SW	White Center / Westwood Vlg.	Delridge-25th & Trenton-Roxbury		LL	H				X	X	

There are two categories of fixed passenger facilities that can be found on the UVTN: 1) facilities for bus stops and 2) connection points, which are the Multimodal Hubs, Transportation Centers and Station Areas for the Green Line and Link.

Bus stops on the UVTN should be given the highest priority for amenities. Bus stops need shelters, benches, and lighting to provide personal safety and comfort. They need real-time information to inform customers of their wait times. Consistent with Metro's service facilities guidelines, any bus stop that experiences more than 50 bus riders per day should have a shelter. Currently, there are about 270 bus stops with more than 50 riders per day waiting for a bus that do not have shelters[23].

Appendix 9 identifies the location of these bus stops and the average daily number of passengers who are waiting.

[23] Metro Transit 2004 bus stop data

CHAPTER 4: MAINTAINING THE NETWORK

Transit Classifications

The City will use a transit street classification system to identify where transit needs to operate, and for UVTN corridors, the quality of service that needs to be provided. It will help articulate the City's land use and transportation priorities and help it work with the different transit agencies that provide Seattle its service.

Recommended TSP Strategy [S3.2}

Define and Map the Following Transit Classifications:

- Transit Way: Provides frequent, high speed, high capacity and intermediate capacity service. They are a component of the Urban Village Transit Network (UVTN).
- Principal Transit Street: Provides for high-volume transit service, often for regional or citywide trips. Some Principal Transit Streets may be part of the UVTN
- Major Transit Street: Provides concentrated transit service to connect and reinforce major activity centers and residential areas. Some Major Transit Streets may be part of the UVTN.
- Minor Transit Street: Provides local and neighborhood transit service. Some Minor Transit Streets may be part of the UVTN.
- Local Transit Street: Provides local and neighborhood transit service – sometimes on non-arterial streets. Local Transit Streets are not part of the UVTN.

Recommended TSP Strategy [TR14}

Use Transit Street Classifications with Performance Measures to Manage a System That Guides Seattle Transit Investments.

Revise the Transit Street Classifications to reflect the UVTN (see Figure 15: Seattle Transit Classifications). Include the "Transit Way" classification, and transit terminal loops as part of a new "Local Transit Street" classification. The "Major Transit Street" and "Minor Transit Street" classifications will have their peak hour volume limits slightly increased. Streets that SDOT is committed to monitoring for UVTN performance will be identified.

The transit classifications and their characteristics are listed below. It should be noted that:

- The hourly bus volumes indicated by the individual Transit Classification Operational Considerations are based on fixed route service volumes and do not include dead-head (base) routing, school service, emergency service, or night owl service.

- Deadhead routing should be on Regional and Principal Arterials whenever possible and on Access Streets, only by exception and when approved by Seattle Department of Transportation (SDOT).

- Transit layover locations and turnarounds or loop ends shall be located on Arterial Streets whenever possible.

Transit Way

Functional Purpose

- Provides inter-Regional and inter-neighborhood district express bus or rail transit service. Serves transit trips which may bypass Transportation Districts or have only one trip end in the District.

- Provides frequent, high speed, high capacity and intermediate capacity service.

- A component of the City's UVTN.

Typical Adjacent Land Use

- Major private and public developments of regional significance.

- Discourage locations adjacent to residential areas; buffer such land uses from impacts when adjacent locations cannot be avoided.

- Should not bisect a community, neighborhood, shopping center or other homogenous area.

- Should not provide access to areas in which urban growth and development is to be discouraged as defined by Seattle's adopted land use policies.

Physical Design Features

- Transit Ways consist of exclusive rights-of-way.

- Transit Ways may connect to other Transit Ways, Principal Transit Streets or to Major Transit Streets. Connections to Minor Transit Streets are to be discouraged.

- Connections to other transit facilities are typically by at-grade intersections. Interchange connections can be used where warranted for capacity or safety.

- Stations should be located to provide service to regional and neighborhood commercial centers and major trip generators along the Transit Way.

- Station and stop areas should provide convenient access to the surrounding neighborhoods. Pedestrian and bicycle access should be provided. Park-and-ride facilities should be considered.

Operational Characteristics

- Transit speeds up to 55.
- Wide spacing between stations.
- Pedestrian crossings should be grade separated.
- Achieve UVTN performance levels. Regularly monitor performance levels.

Principal Transit Street

Functional Purpose

- To provide for high volume, fast and reliable transit service often for inter-Regional and inter-Neighborhood District trips. Serves transit trips which may bypass Transportation Districts or have only one trip ending in the District.
- Provides frequent, moderate speed, high capacity service. Some Principal Transit Streets may be part of the UVTN.

Typical Adjacent Land Use Patterns

- Major private and public developments of regional significance.
- Locations adjacent to residential areas should be discouraged; such land uses should be buffered from impacts when adjacent locations cannot be avoided.
- Should not bisect a community, neighborhood, shopping center, or other homogenous area.
- Should not provide access to areas in which urban growth and development is to be discouraged as defined by Seattle's adopted land use policies.

Physical Design Features

- Streets with exclusive transit lanes, lanes shared with other High Occupancy Vehicles (such as carpools) or streets with sufficient capacity to provide express transit service with buses mixed with general traffic. Express and local transit service share the same facilities.

- Principal Transit Streets may connect to Transit Ways, to other Principal Transit Streets, and to Major Transit Streets.

- Connections to other transit facilities and traffic streets are typically at grade. Interchange connections to other Principal or Major Transit Streets can be used where warranted for reasons of capacity or safety.

- Stations or bus stops should be located to provide service to regional and neighborhood commercial centers and to major trip generators along the route.

- Station and stop areas should provide convenient access to the surrounding neighborhoods. Pedestrian and bicycle access should be provided. Park-and-ride facilities should be considered.

Operational Characteristics

- Maximum bus speeds in conformance with the limits imposed by the street's traffic classification typically 30 to 45 mph. Fixed Route bus volumes of 51 or more vehicles per hour including local service (two-way, transit volumes).

- The minimum distance between express stops of 1/2 mile. Also can provide local transit service with stops approximately every two blocks.

- If a Principal Transit Street is part of the UVTN it should achieve performance thresholds. It is important to regularly monitor performance of Principal Transit streets on the UVTN.

Major Transit Street

Functional Purpose

- Provides transit services for those trips with one or both ends of a trip within a Neighborhood District.

- Provides concentrated transit, fast and reliable, service to connect and reinforce major activity centers and residential areas. Some Major Transit Streets may be part of the UVTN.

Typical Adjacent Land Use Patterns

- Major private and public developments, commercial land uses.

- High-density residential areas.

Physical Design Features

- Transit service mixed with general traffic.
- Transit improvements supportive of general traffic access.
- Connections to other transit facilities typically at grade.
- Possible HOV lanes.

Operational Characteristics

- Maximum bus speeds in conformance with the limits imposed by the street's traffic classification, typically 30 to 45 mph. Bus volumes of 16 to 50 vehicles per hour on fixed route transit service. 55 on approval by SDOT.
- Provides frequent intra-city and local transit service with stops approximately every two blocks and frequent limited transit service stopping at transfer points and activity centers approximately every 10 blocks.
- Exclusive transit HOV lanes may be provided by the removal of parking during the peak hours in the direction of the major traffic flow. Full-time transit priority improvements may be provided if compatible with adjacent land uses.
- If a Major Transit Street is part of the UVTN it should achieve performance thresholds. It is important to regularly monitor performance of Major Transit streets on the UVTN.

Minor Transit Street

Functional Purpose

- Generally provides transit service with both trip ends within a Transportation District.
- Intended to provide local and neighborhood transit service. Some Minor Transit Streets may be part of the UVTN.

Typical Adjacent Land Use Patterns

- Any land use as compatible with the street's traffic classification.
- Neighborhood activity centers such as schools, neighborhood businesses, and recreational facilities.

Physical Design Features

- Transit service mixed with general traffic on Arterial Streets.

- Transit service mixed with general traffic on Access Streets only when mutually agreed upon by Seattle Transportation and King County Metro. No additional routes shall be added to Access Streets unless approved by SDOT.

- Transit improvements supportive of general traffic access and on-street parking needs.

- Connections to other transit facilities at grade.

Operational Characteristics

- Maximum bus speeds in conformance with the limits imposed by the street's traffic classification, typically 25 to 30 mph. Bus volumes of 1 to 15 vehicles per hour can reach 20 vehicles per hour only upon approval by SDOT.

- Provides local transit service with stops approximately every two blocks.

- Transit movement is not the overriding function. Parking removal or other transit priority improvements should not be undertaken except at specific locations in order to provide for transit stops or to enhance safety.

- If a Minor Transit Street is part of the UVTN it should achieve performance thresholds. It is important to regularly monitor performance of Minor Transit streets on the UVTN.

Local Transit Street

Functional Purpose

- Intended to provide local and neighborhood transit service – sometimes on non-arterial streets because the preferred arterial route has physical constraints that preclude serving transit.

- May provide preferential or exclusive use of the street by other means of transportation such as automobiles, bicycles or pedestrians.

- Allows for special transit service as provided by smaller than standard sized buses.

- Allows for infrequent transit service such as school bus service.

- Allows for bus turnarounds, (no scheduled stops) or loop ends, at the end of a route upon Seattle Department of Transportation approval. Bus layovers should be placed only on streets wide enough to accommodate them and they should not be placed on Residential Access Streets unless approved by SDOT.

Typical Adjacent Land Use Patterns

- Residential neighborhoods, local activity centers.

- Any land use compatible with the street's traffic classification.

- Neighborhood activity centers.

Physical Design Features

- Transit service mixed with general traffic on Access Streets on a temporary basis only by approval of SDOT.
- Parking removal or other transit priority improvements should not be undertaken except at specific occasions if warranted for safety.
- Transit service mixed with general traffic on Access Streets, only when necessary with approval by SDOT.
- Parking removal or other transit priority improvements should not be undertaken except at specific locations if warranted for safety.
- Special street design and street maintenance levels may be required to support turnarounds, or loop end, operation by standard sized buses.

Operational Characteristics

- Maximum bus speeds in conformance with street's traffic classification, typically 25 mph.
- Transit volumes not to exceed 10 vehicles per hour.
- Maximum bus speeds in conformance with the street's traffic classification, typically 25 mph. Infrequent bus service.
- Typically informal bus stops as for school buses and special mini bus service.

This transit street classification system is based on the 1984 Seattle Comprehensive Transportation Program (SCTP) Street Classification Guidelines. There are several important differences between the 1984 guidelines and the transit classifications in this plan.

First, transit quality of service will be monitored for key Principal, Major, and Minor Transit streets that fall within the City's UVTN corridors. The next two sections describe the transit performance measures that will be used to define adequate quality of service and the types of actions that will be taken to maintain or exceed it.

Second, a single classification, "Local Transit", is used in place of the "Temporary" and "Transit Restricted" classifications from the 1984 guidelines. It applies to transit operations, such as, neighborhood circulator service, bus turnarounds, and layover access. These services can be needed on local streets and require special consideration to successfully integrate into neighborhood environment. While the City did not map "Temporary" and "Transit Restricted" streets on a regular basis, "Local Transit" streets are included in the updated Transit Classification Map.

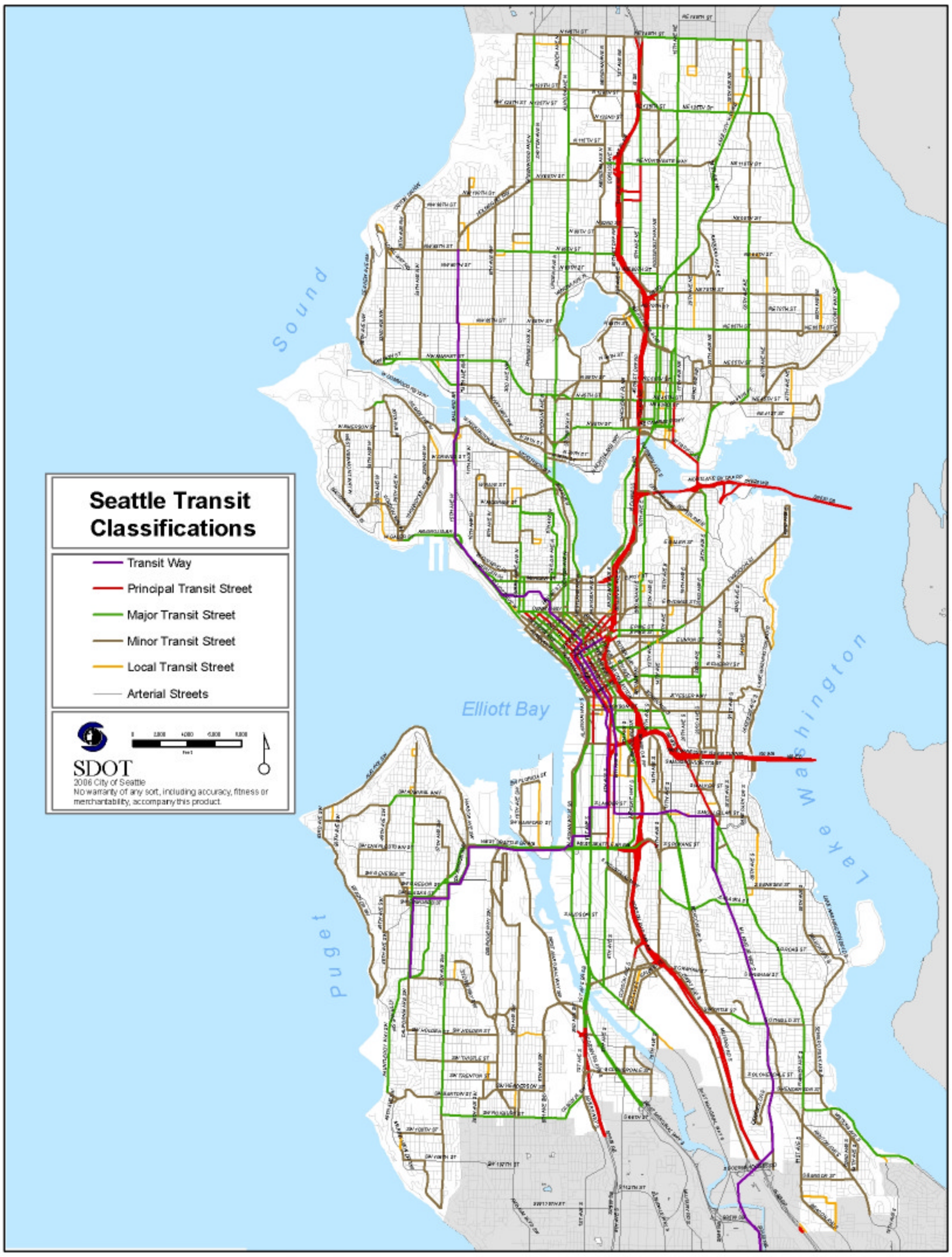
Third, the general maximum limits for fixed route bus volumes on Minor and Major Transit streets will be increased by 5 buses per hour with an additional 5 buses per hour with approval from SDOT. The general increase is needed because Seattle has experienced an overall increase in service since 1984. It supports the City's general desire for higher transit service levels. The City will continue to assign less than the maximum bus volume to a street classification if there are special circumstances. These cases will be specifically noted in the plan, e.g. NE 40th Street in Wallingford.

The "Regional Transit Way" or "Transit Way" classification has never been used on the City's Transit Classification Map. It was not needed until the mid 1990s when Sound Transit received this classification for their Link light rail alignment. The Seattle Monorail Project recently received this classification for the Green Line. It has significant legal meaning for both projects. The Transit Classification Map will include the "Transit Way" alignments.

The City's transit classification system will be administered through an annual transit classification change process. Transit street classification changes will be initiated by the City or transit agencies (King County Metro, Sound Transit, Community Transit and Pierce Transit). For instance, the City may want to stop classifying a street for transit because it is no longer being used for transit. Or, a transit agency may want a higher classification because it would like to consolidate routes onto a particular street.

The City's transit classification process is described in Appendix 10. In this process, the Seattle Department of Transportation reviews a transit classification proposal against the transit classification guidelines (described below) and the design and operating characteristics of the street, including the pavement condition that will be impacted. Based on this review, the department will identify any issues that are raised by the proposed transit classification and make its recommendation. The final action to change a transit street classification requires Council and Mayoral approval with adoption of the revised Transit Classification Map. The Transit Classification Map (assuming proposed revisions) is shown in Figure 15.

Figure 15: Seattle Transit Classifications



Transit Quality of Service Measures

The performance of the UVTN will be monitored with quality of service (QOS) measures based on recommendations from the TCQSM[24]. These measures are needed for transit planning purposes and must not be confused with, or, used in place of, the level-of-service standards the City uses to judge the performance of all locally-owned arterials and transit routes, as required by the state Growth Management Act.

The measures that best define the service characteristics that are most important to Seattle are: 1) frequency, 2) span of service, 3) reliability, 4) passenger loading, and 5) travel speed. By using these measures, Seattle will be better able to achieve its economic development, quality of life, and land use goals. The measures are both understandable to engineers, planners, and policymakers and require only a modest investment in data collection by the City and its transit agencies.

Recommended TSP Strategy {TR1.3}

Evaluate Transit Service Investments With Clear Performance Measures for Ridership and Cost-effectiveness and Progress Towards Completion of the Urban Village Transit Network.

Establish UVTN performance measures for service frequency, span of service, and transit speed. Performance measures for reliability and passenger loading will also be added. SDOT will report annually on UVTN corridor performance.

Specific thresholds are set for good and poor performance, or quality of service. In each case, we also set a "failure" threshold for each factor. A score in this category would automatically mean that remedial actions or strategies area necessary, even if a UVTN segment scores very well in all other measures.

The thresholds within each factor will require additional scrutiny and review from a variety of agencies and will likely be adjusted.

Framework for Assessing Transit Quality of Service

The process for measuring Transit Quality of Service is summarized as follows:

1. Select UVTN route segment to be measured. A UVTN segment refers to the portion of the UVTN corridor or transit route to be assessed. The transit route segment for assessment will be defined based on the planning needs of the planning process. For example, if a commercial street is being re-configured, the planners' focus will be one or two blocks. If a monorail is

[24] Transit Capacity and Quality of Service Manual, 2003

being designed, the planners' focus will be several miles. Regardless of the length of the site in question, however, a minimum UVTN route segment length of three miles should be used in the assessment process. This creates flexibility in how standards are addressed in a given area, while still assuring the aggregate results that the UVTN requires.

2. To the extent possible, UVTN route segments should begin and end at timepoint interchanges. This will provide consistency with King County Metro, allowing use of available data.

3. Undertake the measurements of individual QOS indicators (Frequency, Hours of Service, Reliability, Passenger Loading and Travel Time).

4. Incorporate into the Transit Service Measures Report Card (as described in the following subsection).

Frequency

Although the measure of frequency strictly refers to the number of services per hour, the measure of headway is often more useful and easier to use. The unit of headway also measures frequency, but measures it in terms of minutes between services.

The conditions for assessing the UVTN in terms of frequency are as follows:

- Select UVTN route segment to be measured.

- Service frequency quality-of-service (QOS) is determined by destination from a given transit stop, as several routes may serve a given stop, but not all may serve a particular destination. Some judgment must be applied to bus stops located near timed transfer centers. There is a considerable difference in service from a passenger's perspective between a bus arriving every 10 minutes and three buses arriving in a row from a nearby transfer center every 30 minutes, even though both scenarios result in six buses per hour serving the stop. In general, buses on separate routes serving the same destination that arrive at a stop within 3 minutes of each other should be counted as one bus for the purposes of determining service frequency QOS.

- The assessment of frequency should be based on the longest headways on the daily schedule.

Table 15: Proposed UVTN Service Frequency Measurement

UVTN Service Frequency Measurement			
	QOS	**Headway (minutes)**	**Comments**
Pass	+3	< 7	Passengers don't need schedules, headway based
	+2	7 – 10	Passengers don't need schedules, headway based
	+1	11 - 15	Frequent service, passengers start consulting schedules
Fail	-3	16 - 20	Undesirable time to wait if bus/train missed
	-6	21 – 30	Service unattractive to choice riders
	-9	> 31	Service unattractive to all riders

It should be emphasized that although headways are given as continuous ranges for the purposes of determining QOS, passengers find it easier to understand schedules when clock headways are used (headways that are evenly divisible into 60). When clock headways are used, transit vehicles arrive at the same times each hour. This is particularly important when headways approach the higher end of the acceptable range.

For late night owl services, headways should be 30 minutes or less. Figure 16 shows Seattle bus corridors that experience 15 minute or better service frequency.

Span of Service

Span of service (also known as hours of service) is relatively easy to measure. It is the number of hours in the day that a service runs at UVTN frequencies.

The conditions for assessing the UVTN in terms of span of service are as follows:

- Select UVTN route segment to be measured.
- Span of service QOS is determined by assessing the hours of service for the whole route. This is important, as the UVTN will be made up of services running at high frequencies throughout the required hours of service. If one element of the network shuts down early, the network is essentially flawed, and its usefulness severely compromised.

Table 16: Proposed UVTN Span of Service Measurement

UVTN Span of Service Measurement			
	QOS	**Service Span (hours)**	**Comments**
Pass	+3	20 – 24	Night service provided (e.g. 4:30 am – 12:30 am or better)
	+2	18 – 20	Late evening service provided (e.g. 5:00 am – 1 am)
	+1	16-18	Late evening service provided (e.g. 6:00 am – 12:00 pm)
Fail	-3	14 – 16	Early evening service provided (e.g. 6:00 am – 8:00 pm)
	-6	12 – 14	Minimal span not useful to many riders. (e.g. 6:00 am – 6:00 pm)
	-9	< 12	Service useful only for regular riders making rigidly scheduled commutes. (e.g. peak-only service)

If a route has sufficient ridership to justify UVTN-level frequencies for over 16 hours a day, it will generally have sufficient ridership to justify (or require) a night (or *owl*) service running at reduced frequencies.

Figure 16: Seattle Bus Corridors with Better than 15-Minute Service Frequency

Reliability

This measure assigns QOS ratings based on the probability of different degrees of headway variation (gaps) occurring.

The conditions for assessing the UVTN in terms of reliability are as follows:

- Select UVTN route segment to be measured.
- Service reliability QOS is determined by destination from a given transit stop, as several routes may serve a given stop, but not all may serve a particular destination.

Table 17: Proposed UVTN Reliability Measurement

UVTN Reliability Measurement			
	QOS	**Measure of degree of Variation**	**Comments**
Pass	+3	>90% services running <1 min late >95 % services running <3 mins late <1% of services running >5 mins late	Service running like clockwork
	+2	>75% services running <1 min late >95 % services running <3 mins late <2% of services running >5 mins late	Some vehicles a minute or two late
	+1	>60% services running <1 min late >90 % services running <3 mins late <3% of services running >5 mins late	Many vehicles off scheduled headway by several minutes
Fail	-3	>3% of services running >5 mins late	Headways irregular but bunching does not yet occur
	-6	>5% of services running >5 mins late	Occasional bunching
	-9	>10% of services running >5 mins late	Regular bunching

It is clear that a full bus running late will delay more passengers than a bus carrying very few passengers. There is some merit, therefore, in weighting measures of delay to reflect the number of people being affected by it (i.e. measuring person delay rather than vehicle delay). The precise process by which this will be done will depend on the method of measurement adopted.

Pass-ups. Based on an understanding of the effects of different degrees of delay and the number of passengers affected, the operators would likely develop protocols by which pass-ups are used to re-gain the required headway gaps. This is important because on particularly busy routes, even a slight delay produces a "snowball effect", because the number of passengers waiting for a bus is related to the length of the gap in front of the bus. This will happen even if a scheduled 5-minute service opens up a seemingly small 7-minute gap. If pass-ups are used, they will need to be incorporated into the system of measurement, to ensure that there recurrence (and negative impacts on transit users) is limited.

Passenger Loading

Passenger loading constitutes a potent measure as it provides a useful indication of a range of issues affecting transit. This was articulated in the TCRP (2003) report:

From the passenger's perspective, passenger loads reflect the comfort level of the on-board vehicle portion of a transit trip – both in terms of being able to find a seat and in overall crowding levels within the vehicle.

From a transit operator's perspective, a poor QOS may indicate the need to increase service frequency or vehicle size in order to reduce crowding and to provide a more comfortable ride for passengers.

A poor passenger load QOS indicates that dwell times will be longer for a given passenger boarding and alighting demand at a transit stop and, as a result, travel times an service reliability will be negatively affected.

The passenger loading measurement encourages tailoring vehicle specification to the passenger and system needs. The quality of service measures proposed by TCRP note that to achieve a QOS of A, there should be more than two seats for each carried passenger. This risks inadvertently promoting inefficiency, with transit services running at under half their capacity.

In addition, the TCRP approach assesses passenger load using the measures of square meter per passenger or passengers per seat. These measures could risk confusion if, for example, low floor buses with a metro-style side-bench seating replaced coach-style buses. The metro-style configuration could feasibly transport higher number of passengers over crowded, short-haul sections more comfortably and efficiently than coach-style configurations.

For this reason, a measure of percentage of vehicle capacity (% Capacity) has been chosen. This measure will provide a more 'level' means of comparison between different vehicles serving different needs. It will also encourage the use of vehicles better-suited to different roles in the transit network.

If measurements are taken at multiple points along a UVTN route segment, an average should be used.

Table 18: Proposed UVTN Passenger Loading Measurement

UVTN Passenger Loading Measurement			
	QOS	**% Capacity**	**Comments**
Pass	+3	55 – 70%	For low capacity vehicle configurations (i.e. high proportion of seats), most or all passengers would have seats. For high capacity vehicle configurations (i.e. low proportion of seats), limited availability of seating (depending on the precise configuration of the vehicle).
	+2	71 – 85% or <50%	Generally standing room only, but free passage for boarding and alighting.
	+1	86 – 100%	Approaching maximum capacity, density of passengers risks slowing boarding and alighting. Generally still comfortable for passengers, albeit standing.
Fail	-3	101 – 110%	Some level of overcrowding. Density of passengers causes some delays in boarding and alighting, potentially uncomfortable for passengers.
	-6	110 – 120%	Overcrowded, density of passengers causing some delays in boarding and alighting. Uncomfortable for passengers,
	-9	> 120%	Severe overcrowding. Approaching crush capacity, density of passengers causing significant delays in boarding and alighting. Uncomfortable for passengers, starting to bring safety risks.

The capacity of a transit vehicle describes the number of passengers (seated and standing) that can safely and comfortably travel on the vehicle. It generally also reflects the operational needs of the vehicle such as passenger circulation (within the vehicle and boarding and alighting).

In periods of peak demand, vehicles are sometimes loaded to levels above their capacity. Once a vehicle is loaded to a point where it becomes unrealistic for any more passengers to board it is said to be at crush capacity. As passenger loadings increase from capacity to crush capacity, the passenger circulation (within the vehicle and boarding and alighting) becomes less efficient, increasing the required dwell times at stops.

Note that the measure here refers to average loads, whereas variations in passenger loading can be the key issue from the passenger's perspective (for example, a crush load followed by an empty vehicle). These variations, however, tend to be caused by poor headway adherence, and for this reason this measure needs to be considered alongside the reliability measure. High average loads indicate a need for more capacity on a route, whereas high variations in loads tend to indicate that reliability problems need to be addressed.

Travel Speed

Despite the best efforts of the City and King County Metro, transit service in Seattle continues to be slow. On key downtown streets, average operating speeds for transit never top 10 mph, and in some cases – such as Pine and Pike streets in the PM peak – fall below 5 mph. This is due to a combination of rising patronage (which increases boarding times), and increased traffic congestion. This is not a factor unique to the Puget Sound region – many agencies across the country are losing 1% or more per year in average operating speed.

Although travel speed would generally be measured in MPH, the system of measurement to be used in this case is travel speed as a proportion of the posted speed limit. The unit will therefore be Percentage of Posted Speed Limit (%PSL).

The conditions for assessing the UVTN in terms of transit travel speed are as follows:

- Select UVTN route segment.
- The measurement of transit travel speed needs to incorporate all aspects of the trip, including dwell time at stops and traffic signals, delays caused by traffic congestion and mechanical faults.
- Travel time along a segment would then be divided by the speed limit.

Table 19: Proposed UVTN Travel Speed Measurement

UVTN Travel Speed Measurement			
	QOS	**% Posted Speed Limit**	**Comments**
Pass	+3	> 20% of services running > 0.7SL > 90% of services running > 0.5SL (or 10 MPH, whichever is greater) 100% of services running > 0.3SL (or 10 MPH, whichever is greater)	A very high proportion of transit services running at speeds that would make it attractive compared to driving.
	+2	> 10% of services running > 0.7SL > 80% of services running > 0.5SL (or 10 MPH, whichever is greater) 100% of services running > 0.3SL (or 10 MPH, whichever is greater)	A high proportion of transit services running at speeds that would make it attractive compared to driving.
	+1	> 5% of services running > 0.7SL > 70% of services running > 0.5SL (or 8 MPH, whichever is greater) 100% of services running > 0.3SL (or 8 MPH, whichever is greater)	An acceptable proportion of transit services running at speeds that would make it attractive compared to driving.
Fail	-3	< 70% of services running > 0.5SL > 5% of services running < 0.3SL (or 8 MPH, whichever is greater)	An unacceptable proportion of transit services running at speeds that would make it attractive compared to driving.
	-6	< 50% of services running > 0.5SL > 10% of services running < 0.3SL (or 8 MPH, whichever is greater)	An unacceptable proportion of transit services running at speeds that would make it attractive compared to driving.
	-9	< 30% of services running > 0.5SL > 20% of services running < 0.3SL (or 8 MPH, whichever is greater)	An unacceptable proportion of transit services running at speeds that would make it attractive compared to driving.

As mentioned earlier, posted speed limit has the potential to serve as a reasonably consistent term of reference (unlike auto or network speeds which tend to be prone to "creep"). One of the main reasons that the posted speed limit was selected is that it is very uncommon that it changes without significant effort and process. Posted speed limits should not be reduced as a way of improving the measured travel speed QOS.

Figures 17 through 19 show an estimate of current transit travel speeds on the UVTN.

Figure 17: Existing Travel Speed in Relation to UVTN Criteria – Peak Period

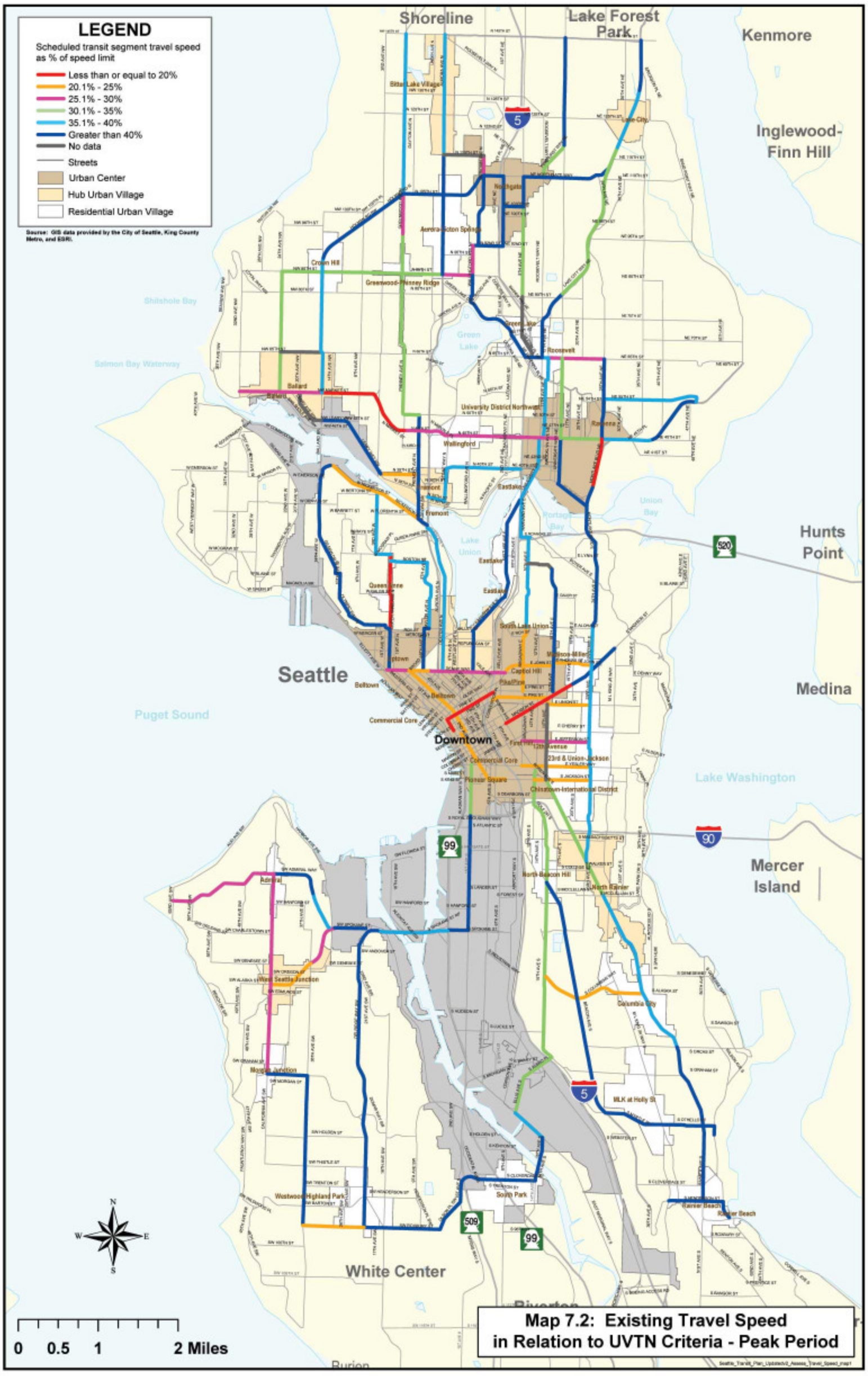


Figure 18: Existing Travel Speed in Relation to UVTN Criteria – Base Period

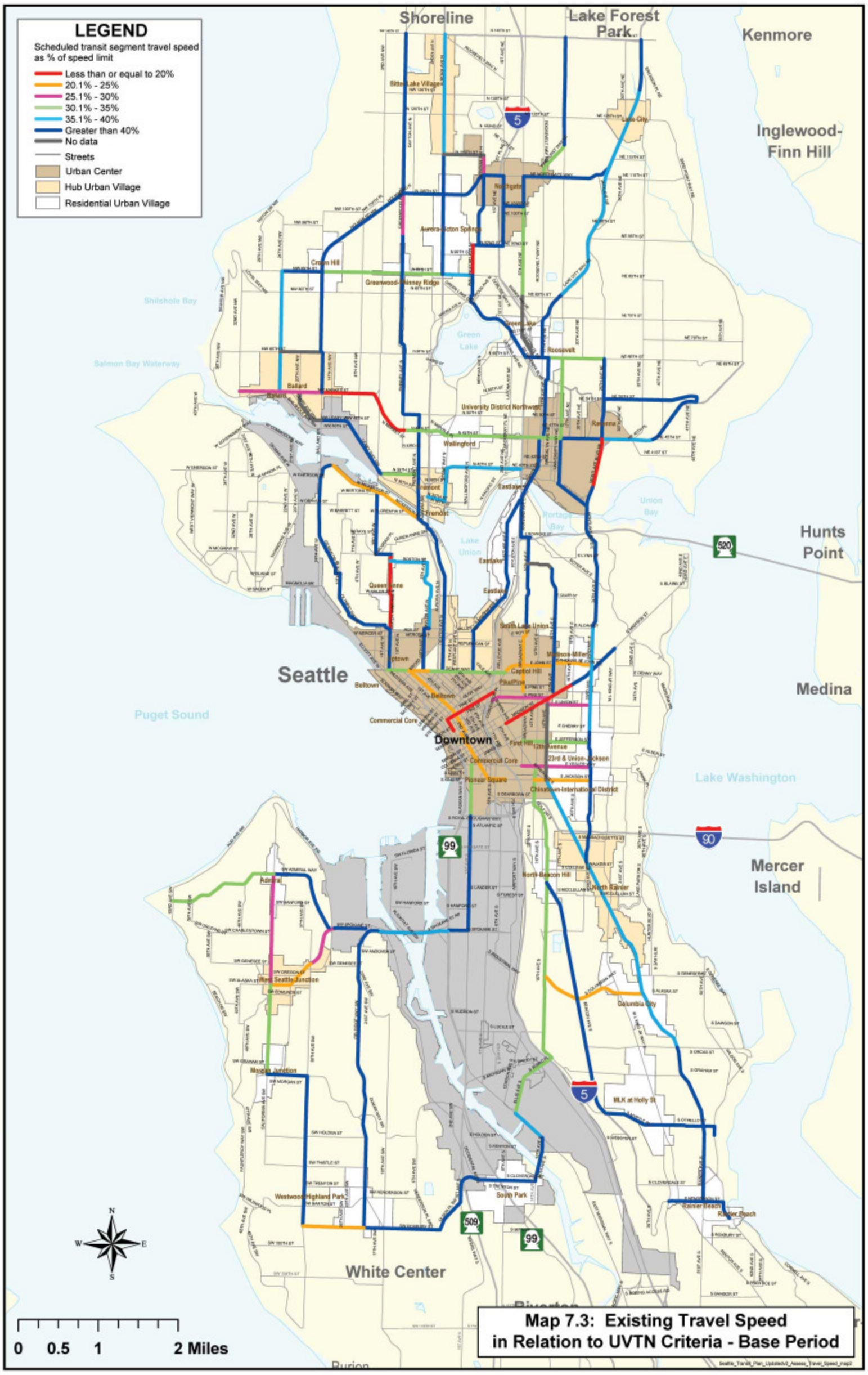
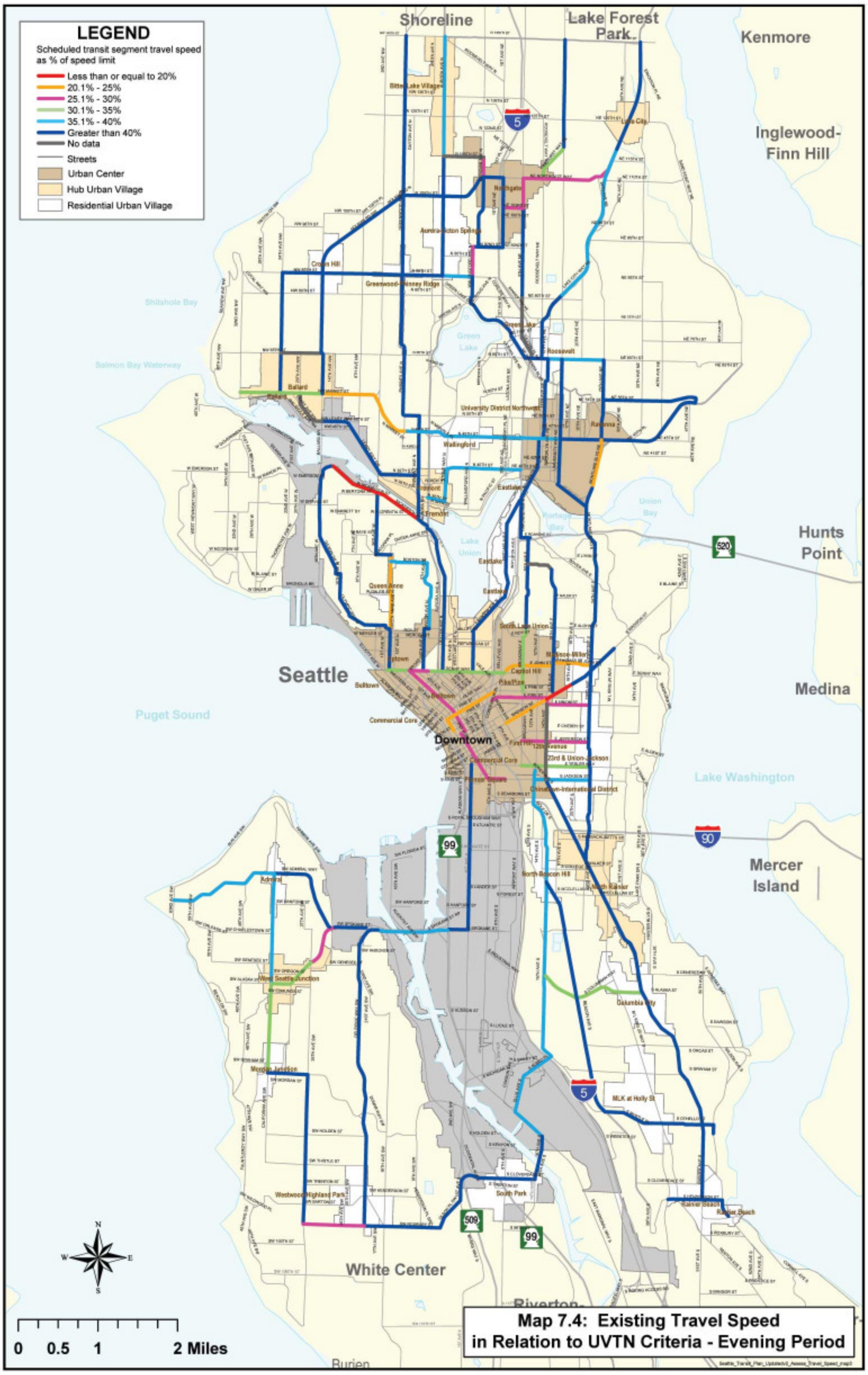


Figure 19: Existing Travel Speed in Relation to UVTN Criteria – Evening Period



Transit Service Measures Report Card

The use of Transit Service Measures is an effective and appropriate way of assessing the quality of service offered by a transit network. There is an advantage to maintaining the transparency of the measurement process and consider that the production of a "Report Card" for each UVTN route segment assessed. This will ensure that the relative performance of the route segment in all of the component service measures is taken into account in the planning process.

A sample report card is provided in the table below. Sample scores are inserted in gray.

Table 20: Sample Quality of Service Report Card

Location: _____									**Date of assessment:**
Service Measure	**Weight-ing**	**FAIL**			**PASS**			**Total**	**Comment**
		-9	-6	-3	+1	+2	+3		
Frequency	2					2		4	
Hours of Service	1						3	3	
Reliability	1				1			1	
Passenger Loading	1				1			1	
Travel Speed	2				1			2	
Total	7							11	Aggregated Quality of Service
					1.6				Average Score
QOS Descriptions		Fail – Very Poor	Fail - Poor	Fail	Acceptable	Good	Excellent		

It is recognized, however, that for design processes associated with short sections of transit segments (e.g. a few blocks), it is not necessary to undertake all the assessments associated with the Transit QOS measure. Rather, it is considered appropriate to use an aggregate of *two* key transit service measures (speed and reliability).

The resulting QOS can then be used in a "Balancing Process" that must inevitably occur when choices need to be made that affect the performance of other modes operating in the UVTN corridor. The "Balancing Process" is an area of transportation system management that will require additional work to make it more transparent and understandable to the public.

Table 21: Example of Balancing Process for Report Card

Location: _____								**Date of assessment:**
Service Measure	**FAIL**			**PASS**		**Total**		**Comment**
	-9	-6	-3	+1	+2	+3		
Reliability				1			1	
Travel Speed					1		2	
Total							3	Aggregated Quality of Service
							1.5	Average Score
QOS Descriptions	Fail – Very Poor	Fail - Poor	Fail	Acceptable	Good	Excellent		

Provide a Transit Priority Treatment Toolbox

Recurrent traffic congestion can create longer travel times for passengers and, over time, higher operating costs for transit agencies as they try to maintain headways. Non-recurrent traffic congestion can create problems for transit reliability as well as speed. The City will use a transit priority treatment toolbox to maintain and improve service quality in its transit corridors. Since many of Seattle's rail investments are being provided in exclusive right-of-way with limited at-grade crossing, the toolbox will be mainly applied to bus corridors. There will be special focus placed on UVTN corridors because of the City's commitment to achieve their transit performance standards.

Recommended TSP Strategy {TR1.4}

Develop a Transit Priority Treatment Toolbox for Improving Transit Speed and Reliability.

Continue to use a transit priority treatment toolbox to maintain service quality in Seattle's transit corridors. Since many of Seattle's rail investments are being provided in exclusive right-of-way with limited at-grade crossings, the toolbox will be mainly applied to bus corridors. There will be special focus placed on UVTN corridors because of the City's commitment to achieve good transit performance, e.g., transit speed and reliability.

Toolbox Items Include, but are not limited to: Exclusive Bus Lanes, Signal Priority, Queue Bypass, Curb Extensions, Boarding Islands, Parking Restrictions, Turn Restriction Exemption, Bus Stop Relocation, Bus Stop Consolidation, Skip-Stops, Platooning and Design Standards.

Improved speeds are important for two reasons. Firstly, the discretionary transit rider is very sensitive to speed. The faster the operating speed, the greater the ability of transit to capture new riders. Secondly, time is money – the longer it takes to complete the cycle of a line, the more it will cost to operate a given frequency. King County Metro has set aside one-third of new service hours, up to a maximum of 0.5% of total annual services, for schedule maintenance. This time is added to individual trips in a route's schedule, to ensure that each bus begins its next trip at the scheduled time. To the extent that speed and reliability improvements make these schedule maintenance hours unnecessary, the service hours can be reinvested in enhanced frequencies, yielding a larger and more robust UVTN.

According to the TCQSM, successful transit priority measures are characterized by:

- An intensely developed downtown area with limited street capacity and high all-day parking costs
- A long-term reliance on public transportation
- Highway capacity limitations on the approaches to downtown
- Major water barriers that limit road access to the downtown and channel bus flows
- Fast non-stop bus runs for considerable distances
- Special bus distribution with downtown (often off-street terminals)
- Active traffic management, maintenance, operations, and enforcement programs.

When implementing preferential treatments the total change in person-delay will be considered along with the measure's cost-effectiveness, and potential to change mode split and attract riders over the long-term.

Transit preferential treatments are a cost-effective option for improving transit service through a strategic, one-time capital investment rather than an on-going investment of service hours to achieve schedule maintenance. By delaying the need to add service to only to maintain current quality of service, service investment can be used to increase service quality.

Table 22 identifies transit preferential treatments with their advantages and disadvantages. Most of these improvements have a low-to-medium cost.

Table 22: Transit Preferential Treatments Comparison

Roadway and Traffic Signal Features		
Treatment	**Advantages**	**Disadvantages**
Exclusive Transit Lanes	▪ Increases transit speed by reducing sources of delay ▪ Improves reliability ▪ Increases transit visibility	▪ Traffic/parking effects of eliminating an existing travel or parking lane must be carefully considered ▪ Requires on-going enforcement
Signal Priority	▪ Reduces traffic signal delay ▪ Improves reliability	▪ Risks interrupting coordinated traffic signal operation ▪ Risks lowering intersection LOS, if intersection is close to capacity ▪ Requires inter-jurisdiction coordination ▪ Cross-street buses may experience more delay than time saved by the favored routes
Queue Bypass	▪ Reduces delay from queues at ramp meters or other locations	▪ Transit lane must be available and longer than the back of queue
Curb Extensions	▪ Eliminates re-entry delay ▪ Riding comfort increased when buses don't pull in and out of stops ▪ Increases on-street parking by eliminating need for taper associated with bus pullouts ▪ More room for transit stop amenities ▪ Reduces ped crossing distance	▪ Requires at least two travel lanes in bus's direction of travel to avoid blocking traffic while passengers board and alight ▪ Bicycle lanes require special consideration
Boarding Islands	▪ Increases transit speed by allowing transit to use faster-moving left lane	▪ Requires at least two travel lanes in bus's direction of travel and a significant speed difference between the two lanes ▪ Uses more right-of-way than other measures ▪ Pedestrian/ADA accessibility, comfort, and safety issues must be carefully considered
Parking Restrictions (see Parking Management section) parking restrictions).	▪ Increases bus speed by removing delays caused by automobile parking maneuvers ▪ Increases street capacity and reduces traffic delays	▪ May significantly impact adjacent land uses (both business and residential) ▪ Requires on-going enforcement

Table 22: Transit Preferential Treatments Comparison (continued)

Transit Operations Treatments		
Treatment	**Advantages**	**Disadvantages**
Turn Restriction Exemption	▪ Reduces travel time by eliminating detours to avoid turn restrictions	▪ Potentially lowers intersection level of service ▪ Safety issues must be carefully considered
Transit Stop Relocation	▪ Uses existing signal progression to bus's advantage	▪ May increase walking distance for passengers transferring to a cross-street bus
Transit Stop Consolidation	▪ Reduces number of stops, thereby improving average transit speeds	▪ Increases walking distances for some riders ▪ Pedestrian environment may not support walking to the next closet stop
Skip-Stops	▪ Substantially improves transit speed and capacity	▪ Unfamiliar riders may be unsure about where to board their bus ▪ Requires available adjacent lane
Platooning	▪ Reduces bus passing activity	▪ May be difficult to implement
Design Standards	▪ Service changes to improve operations more easily justified ▪ Supports consistent transit planning and design	▪ Too rigid an application of standards can be just as bad as not having any standards

Source: Transit Capacity and Quality of Service Manual, Transportation Research Board, 2003

In addition to the above treatments, there are other tools that transit agencies can employ to make transit more attractive.

- Fare Payment – Proof-of-payment system and prepaid fares can reduce boarding times considerably. The proof-of-payment (POP) system permits passengers to purchase fares prior to boarding, thus expediting passenger boarding and reducing dwell time. Passengers are required to have in their possession a ticket, transfer, or transit pass. Fare inspectors can request proof of payment, and passengers without it are subject to a fine.

  Also transit fares should be part of regional coordinated system, such as the Smart Card system.

  Should King County Metro decide to implement proof-of-payment fare collection systems on certain routes, the greatest benefits would be yielded on the UVTN. As Portland's unsuccessful 1980 experiment with proof-of-payment showed, it is neither practical nor necessary to use proof-of-payment on the less-frequent, lower-ridership routes of the STN. It is impossible to provide a credible threat of enforcement on these scattered services, and the time savings achieved by eliminating fare collection by drivers is much less. The UVTN, by contrast, can be covered more efficiently by fare inspectors and is also the network where the benefits of proof-of-payment are greatest.

- Rear Door Alighting – In the absence of proof-of-payment an aggressive campaign to encourage able-bodied passengers to alight through the rear door should focus on busy routes and stops where travel time savings can be achieved. As well as on-board signs, the campaign should include driver announcements.

- Low Floor Vehicles – These vehicles reduce dwell time at stops. They provide easier access so boarding is much faster. This is especially true for people who use wheelchairs and significant for many other patrons. The tradeoff of low-floor vehicles is reduced seating capacity, but this tradeoff should be made in favor of reducing delay, since the inconvenience of being a standee is itself related to the time the trip takes. The vertical-space in a low-floor vehicle also makes these vehicles feel less cramped, because there is literally "breathing room" even when crush loaded.

For bus stop consolidation the ideal stop spacing is close enough that everyone in the surrounding area can walk to a bus stop, but no closer. Increased stop spacing encourages passengers to gather in larger numbers at fewer stops. A bus stopping for two able-bodied passengers takes little longer than stopping for one, so stops with more passengers mean a faster operation for everyone. Stop spacing on the UVTN should be in the range of 800-1320 feet (1/4 mile).

On the Secondary Transit Network, where coverage rather than speed is the goal, spacing as close as 600 feet can be acceptable, or closer when the line is climbing a steep grade or where transit dependent uses are more than 200 but less than 600 feet apart.

The TCQSM's general planning guidelines for transit priority treatments on arterial street is provided in Table 23. It is recommended that person volumes on buses operating in mixed traffic with person volumes in other vehicles operating on the street be compared to help decide when to dedicate one or more lanes to exclusive transit use.

Table 23: General Planning Guidelines for Transit Preferential Treatments: Urban Streets

Treatment	Minimum One-Way Peak Hour Transit Volumes	Minimum One-Way Peak Hour Passenger Volumes	Related Land Use and Transportation Factors
Transit streets or malls	80 - 100	3,200 - 4,000	Commercially oriented frontage.
CBD curb bus lanes, main street	50 - 80	2,000 - 3,200	Commercially oriented frontage.
Curb transit lanes, normal flow	30 - 40	1,200 - 1,600	At least 2 lanes available for other traffic in same direction.
Median transit lanes	60 - 90	2,400 - 3,600	At least 2 lanes available for other traffic in same direction; ability to separate vehicular turn conflicts from buses.
Contaflow transit lanes, short segments	20 – 30	800 - 1,200	Allow buses to proceed on normal route, turnaround, or bypass congestion on bridge approach.
Contraflow transit lanes extended	40 - 60	1,600 - 2,400	At least 2 lanes available for other traffic in opposite direction. Signal spacing greater than 500-ft (150-m) intervals.

Source: Transit Capacity and Quality of Service Manual, Transportation Research Board, 2003

Implementation of transit preferential treatments at intersections may be necessary along UVTN corridors. Table 24 provides general planning guidelines for transit preferential treatments at intersections.

Table 24: General Planning Guidelines for Transit Preferential Treatments: Intersections

Application Considerations			
Treatment	**Primary**	**Secondary**	**Related Land Use and Transportation Factors**
Transit-activated signal phases	Low-volume movement	High transit delay on approach	At access points to transit lanes, busways, or terminals; or where transit turning movements experience significant delays.
Transit signal priority	Intersections with high transit delay, coordinated signal system	Preferable at intersections with far-side stops	Traffic signal controller software may need to be upgraded
Transit signal pre-emption	Intersections with high transit delay, uncoordinated signal system	Preferable at intersections without pedestrians	Pedestrian clearance or signal network constraints
Special transit turn provisions	Route deviations to avoid turn prohibitions		Wherever vehicular turn prohibitions are located along routes.
Queue Jump	Intersections with large amounts of control delay (HCM LOS D or worse)	Right turn lane existence, transit routes with sub-15 minute headways	Merge on opposite side of intersection should consider transit operations.
Curb extensions	Areas with high pedestrian traffic	Insufficient sidewalk space for shelter	Impacts to other road users and drainage users
Boarding Islands	Streets with four or more lanes	Locations where geometric conditions allow	Impacts to other road user, ped access to island may be a concern.
Parking Restrictions	Need for additional transit capacity	On-street parking exists	Local business and residence parking impacts.
Stop Consolidation (permanent or temporary)	Long routes with high ratio of dwell time to travel time	Pedestrian environment	May reduce access to transit routes if stops are too far apart.

Source: Transit Capacity and Quality of Service Manual, Transportation Research Board, 2003

A comparison of the different transit preferential treatments' impacts are provided in Table 25.

Table 25: General Planning Guidelines on the Effects of Transit Preferential Treatments: Intersections

Treatment	Transit Travel Time Improvements	Vehicle Delay Impacts	Additional Considerations
Transit-activated signal phases	Up to 10%	Minimal	Applications may include special bus detection technologies that distinguish buses from general traffic
Transit signal priority	3-15% of overall travel time, up to 75% of signal delay	Minimal to significant, highly dependent on the strategy and location	Travel time improvements are a function of the existing signal delay.
Transit signal pre-emption	Up to 20%, up to 90% of signal delay	Potentially significant	Potential disruptions to signal coordination and transportation capacity.
Special transit turn provisions	Depends on route	Minimal	Safety concerns may require changes to signalization for transit-only movement.
Queue Jump	5-25%	None, if using existing turn lane	Advance green at the intersection may facilitate exit from queue jump lane.
Curb extensions	Not enough data	Potentially significant	Potential impacts to general traffic.
Boarding Islands	Not enough data	Locations where geometric conditions allow	Potential impacts to general traffic.
Parking Restrictions	Not enough data	None	Auto access to local land uses is reduced.
Stop Consolidation (permanent or temporary)	3-20% of overall run time, up to 75% of dwell time	None	Accessibility to transit service is reduced.

Source: Transit Capacity and Quality of Service Manual, Transportation Research Board, 2003

Layover and Operations Facility Planning

Transit layover and operating and maintenance facilities are critical to the success of Seattle's transit system. In most cases, these facilities are very difficult to site because they have significant impacts on the surrounding neighborhoods and they remove land values and economic activity as revenue generators for public programs and service. For transit, it is important to have these facilities as close to revenue service to reduce transit operating costs.

Recommended TSP Strategy {TR15}

Work with Transit Partners on Bus Layover and Route Terminal Planning.

Provide layover space and route terminal planning for efficient transit system operations (e.g., reliable schedules and maintenance of cost-effective operating costs), so that layover space is provided as close as possible to the beginning and the end of the service portion of a route. Higher operating costs due to longer routes, possibly on congested streets, result in fewer hours for new service elsewhere in the system. It will become increasingly difficult to maintain existing and/or accommodate new, on-street layover space on an interim and/or long-term basis. There could be pressure to use neighborhood streets to address other community needs, such as open space, and bicycle, pedestrian, and freight mobility.

The City and King County Metro recently initiated a downtown Seattle bus layover project to determine the best approach for providing bus staging and layover facilities in north downtown Seattle to achieve cost-effective maintenance of regional and local bus service operating budgets, schedules and on-time performance of services. There a number of issues related to this project:

- Maintaining Transit Schedules and Operating Expenses – It is critical for efficient transit system operation, e.g. reliable schedules and maintenance of cost-effective operating costs, that layover space be provided as close as possible to the beginning and the end of the service portion of a route. Higher operating costs due to longer routes, possibly on congested streets, result in fewer hours for new service elsewhere in the system.

- Potential Growth in Transit Service – If service growth is expected, bus layover space should be planned and provided for.

- Growth and Development – As the city's urban villages develop with increased, employment and housing growth, it will becomes more difficult to maintain existing and/or accommodate new, on-street layover space on an interim and/or long-term basis. There is greater pressure to use neighborhood streets to address other community needs, such as open space, and bicycle, pedestrian, and freight mobility.

- Green Streets – More and more people are becoming interested in "Green Streets", which are typically the streets that are used for on-street bus layover because they have lower traffic volume. Green Street designs have been implemented on a few blocks in the Downtown Urban Center. They are created through a variety of treatments, such as sidewalk widening, landscaping, traffic calming, and pedestrian-oriented features, to enhance pedestrian circulation and encourage open space connections.

- Off-Street Layover Facility Development – In order to accommodate the city's growth and development needs and provide a high degree of stability for bus layovers, it is important to

study the feasibility of securing off-street space and/or facilities for staging buses in north Downtown over the long-term.

- Transit Oriented Development (TOD) – TOD construction at off-street layover facilities can create a temporary shortage of layover spaces. It is good to plan for possible TOD projects at off-street layover facilities as they are being developed.

- Parking Meter Revenue - The City uses parking meters to manage on-street parking and achieve the best use of limited curb space in Seattle's neighborhood business districts. Parking meters: 1) create short-term parking close to retail and other businesses 2) improve traffic circulation and economic viability of commercial areas by maximizing the number of patron visits by car, and 3) generate revenue for the City. There will be impact on revenue loss from curb space being dedicated to bus layover rather than parking.

Appendix 11 lists layover space in Seattle.

Parking Management

The City's Comprehensive Plan, the current Seattle Municipal Code, and experience with Seattle's major transit corridors has led to the development of an on-street parking management strategy for installing parking restrictions along a transit corridor or portions thereof.

The City has established policy factors for installing the following type of arterial parking restrictions:

1. Full-time, 24-hour removal of currently available parking,

2. New parking restrictions proposed for certain hour of the day or days of the week,

3. Extensions of either time or distance of existing restricted parking areas.

Recommended TSP Strategy {P7}

Install Additional Arterial Parking Restrictions to Improve Safety, Mobility and Access.

Use established evaluation factors to develop and implement new arterial parking restrictions to improve safety, mobility, and access along Seattle's arterial street network. The City Traffic Engineer has the authority to remove or restrict on-street parking when safety or operational problems are identified. The City is not required to replace on-street parking removed from the City's right-of-way. This strategy entails developing a list of potential arterial parking restrictions based on evaluation factors and the proposed Urban Village Transit Network.

The factors for consideration of arterial parking restrictions are summarized below (not in priority order) and spelled out in greater detail in Appendix 12.

- Transit – This factor is a determination of the degree to which transit speed and reliability are impacted by arterial congestion, how frequently transit uses the corridor, and whether the arterial is designated as a major transit route. Such measures as transit speed, on-time performance, delay, headways, and modeled potential time savings can all be used in assessing this factor.

- Traffic – This factor is used to determine whether the arterial in question is approaching its carrying capacity without use of the capacity provided by the curb lane. Useful measures here include the number of vehicles using the available travel lanes in the peak hour, the level of service in the corridor measured either at selected intersections or in roadway segments, and modeled potential travel time savings if parking restrictions were in place.

- Parking – The degree of utilization of the curb lane for parking is a factor when considering whether to install parking restrictions. High parking utilization by business customers or residents might indicate potential impacts. In addition, an inventory of nearby on- and off-street parking is useful to determine whether there is the capacity to accommodate any spillover.

- Pedestrian Environment – Restricting parking could mean eliminating a buffer between pedestrians and auto traffic, and consideration should be given to the presence of other available buffers such as landscaping, as well as to the presence of sidewalks and other pedestrian amenities.

- Business Environment – Consideration should be given to whether businesses adjacent to the arterial depend on access and loading of passengers and goods via the arterial curb lane, and whether there may be alternate locations for passenger loading and truck and freight delivery.

- Adjacent Land Use – Is the adjacent land use commercial or residential in nature? What is the level of current and future development capacity? These considerations help to determine the current and future market potential for transit along arterials, and what future traffic congestion may result from increased development.

Another parking management issue for Seattle is park-and-ride lots.

Recommended TSP Strategy {TR8.2}

Discourage the Development of Park-and-Ride Lots in Seattle.

Discourage the development of major, stand-along park-and-ride facilities because of their negative impacts to neighborhood business districts. Park-and-ride lots are a major investment designed to serve people who drive to the bus or rail. Because park-and-ride parking spaces are extremely expensive, they consume funds that could finance investments that encourage people to get to the bus or rail station other ways: improved transit shelters, better transfer points, enhanced feeder services, sidewalk and lighting improvements, and bicycle lockers. They also consume valuable land that could be more appropriately dedicated to other uses. Although the general intent is to minimize park-and-ride spaces in Seattle's neighborhood business districts, there are situations where park-and-ride lots can make sense. These include:

- "The end of the line" for a regional transit system
- Opportunities for shared parking (using the same spaces as another development, like a shopping center, movie theater, or church).
- Areas where the alternatives—feeder service, pedestrian and bicycle access—are particularly inadequate.

Fares

All of the public transportation agencies serving Seattle: King County Metro, Sound Transit, WSF, Community Transit, and the Seattle Monorail Project, have, or will have, their own fare collection systems and fare policies.

For Seattle, the most important fare goals have been, and continue to be, to: 1) maximize ridership, 2) minimize cost to those least able to pay, and 3) reflect cost of service. The goals of promoting operational efficiency and simplifying the fare structure are the City's second highest priority.

In 1993, the Metro Transit Task Force, prior to the Metro/King County merger the following year, adopted the following transit fare goals and fare structure policies for Metro Transit, as shown in Table 26:

Table 26: Transit Fare Goals and Fare Structure Policies

Fare Goals	Fare Structure Policies
Maximize Ridership	▪ Off-peak/peak fare differential – Off-peak riders are more price sensitive than peak riders ▪ One-zone/two-zone fare differential – short distance riders are more price sensitive than long distance riders ▪ Price incentives for employer pass subsidies ▪ No charge for transfers ▪ No separate fares for express service
Provide a Simple Fare Structure	▪ No charge for transfers ▪ No separate fares for express service
Minimize Cost to Least Able To Pay	▪ Off-peak/peak fare differential – higher peak fares to allow lower fares during the off-peak period. This allows low-income riders to take advantage of lower off-peak fares. ▪ Discounts/subsidies for special user groups – youths, seniors, persons with disabilities, subsidized human services tickets, family fares, weekend/holiday all day passes, children ride free ▪ No charges for Transfers – most transfers used by one-zone cash riders who are most likely to be low-income
Reflect Cost of Service	▪ Off-peak/peak fare differential – the cost/rider is greater for peak than off-peak service ▪ One-zone/two-zone fare differential- the cost is greater for two-zone trips than for one-zone trips
Promote Operational Efficiency ▪ Speed Operations ▪ Fleet Use Efficiency (lower priority) ▪ Reduce Cash Handling	▪ Fast fare collection methods ▪ Off-peak/peak fare differential – peak fares help spread ridership to off-peak periods, allowing a smaller peak fleet size ▪ Discounts for passes ▪ Price incentives for employer pass subsidies

Metro's fares used to be both based on off-peak/peak and one-zone/two-zone fare differentials. In 1999, the zone surcharge was eliminated for off-peak service primarily to simplify the fare structure. Unfortunately, it also had the effect of increasing fares over the long-run for one zone, off-peak riders who are generally the least able to pay. Furthermore, the policy change conflicted with goal that fares reflect cost of service, i.e. one-zone rides and two-zone rides pay the same price even though two-zone trips are, on average, twice as long and expensive.

Recommended TSP Strategy {TR16}

Support Equitable and Ridership-oriented Fare Policies.

The amount and structure of fares have major impacts on transit ridership and help determine transit affordability. The following strategies are designed to promote equitable and ridership-oriented transit fare policies.

Recommended TSP Strategy {T16.1}

Participate in Efforts to Reduce Fares, Especially for Those Least Able to Pay.

Explore options and test demonstration projects for reducing fares with King County Metro and the Puget Sound Regional Council, as well as strategies for generating revenues to cover the lost income. Target fare reductions to special populations (e.g., students, senior citizens, low wage workers) as a less costly option that could increase ridership while addressing other needs.

For transit riders, all of the different fare systems can create confusion and delay as they meet the requirements of each transit agency as they move between systems. This is why the region's transit agencies have decided to implement a "smart card" through the Central Puget Sound Regional Fare Coordination Project. This project will create a card the size of a bank or credit card that can be loaded with a cash value or any fixed period pass sold by participating transit agencies. The card will allow transit riders to move between buses, trains, and ferries with greater ease and quickness. It also provides transit agencies the flexibility to achieve their fare policy goals.

Recommended TSP Strategy {TR16.2}

Support Development of the Regional Fare Integration Project.

Ease customer payment and speed bus loading/unloading through the development of the regional Smart Card.

With some special equipment and procedures, transit agencies could use the smart card for a proof-of-payment fare collection system. Cardholders could validate their card for each trip and to allow fare inspectors to check the validity of the card.

CHAPTER 5: TRANSIT FUNDING

Funding is needed to implement the UVTN and provide other transit improvements that will meet Seattle's mobility needs.

The following is an estimate of the revenue hours required to operate the UVTN[25]. They are broken out to show the independent impact of achieving the speed standard of the UVTN, as distinct from the frequency/span standards. Achieving the speed standard, of course, reduces the operating hours, while frequency and span improvements increase them.[26]

The whole numbers in the first row refer only to service that either (a) already provides UVTN service, or (b) can be reallocated when other pieces of the UVTN (primarily rapid transit projects) are completed. Therefore, these will not directly match any existing service total from Metro, though they are calculated from a route-by-route analysis of that service.

Table 27: UVTN Service Costs

Scenario		Revenue Hours				Change in Annual Hours	Change in Annual Operating Cost*
Freq/Span	Speed	Weekday	Saturday	Sunday	Annual		
Existing	Existing	3,466	2,486	1,802	1,118,537		
Existing	Policy	3,091	2,217	1,607	997,454	-121,084	-$11,502,980 (-11%)
Policy	Existing	5,592	4,194	4,194	1,888,656	770,118	$73,161,210 (+69%)
Policy	Policy	5,079	3,809	3,809	1,715,299	596,761	$56,692,295 (+53%)

* The estimates assume a bus operating cost of $95/service hour.

Please note that the speed standard is greater than or equal to 30% of speed limit. The frequency/span standard is: service frequency of less than or equal to 15 minutes and a service span of greater than or equal to 18 hours a day.

It is estimated that additional service hours will be needed to achieve the UVTN's recommended service levels. The UVTN also has capital costs the magnitude of which will depend on the technology used and type of transit priority provided, i.e. transit operating environment.

A final funding plan to complete Seattle's future transit network will depend on both public and private funding opportunities as well as other factors such as fare revenue and resource allocation policies.

[25] The revenue hour estimates include layover costs. Actual cost will also reflect other factors, such as labor agreements, fuel prices, and the locations of operating bases. Revenue hours are a reasonable proxy for operating cost at this level of analysis.

[26] The estimates presume that all non-UVTN corridors continue to operate at current levels of service.

Recommended TSP Strategies {F1– F4 }

Seek investments, both public and private, for use in new transportation projects to get the best return on taxpayer transportation dollars by:

1. **Prioritizing Transportation Programs and Projects so as to Maximize Benefits from Limited Revenues**
2. **Maximizing Available Funding Resources**
3. **Continuing to Look for Means to Improve Efficiencies and Cost Effectiveness, and**
4. **Developing New Funding Resources.**

Recommended TSP Strategy {TR1.7}

Develop Funding Options for Implementation of the Urban Village Transit Network and the Secondary Transit Network.

Work with transit partners to develop funding options for the high capacity, intermediate capacity, and local transit elements of the UVTN. STN funding will also be needed.

SDOT has estimated an additional $57 million to $73 million of annual transit service will be needed (about a 32% to 40% increase over existing (2002) north King County subarea service resources) to fund the minimum service levels needed to fully implement the UVTN (in addition to Central Link and Green Line services). A major determinant of the service cost will be UVTN corridor transit travel speed performance.

This section reviews and recommends possible public and private funding opportunities for building the UVTN and completing other elements of Seattle's future transit network. Seattle's major funding sources are federal, state, and local (public and private). The City's partner transit agencies provide most of Seattle's transit investment. Their revenues come from the motor vehicle excise tax (MVET), sales tax, fares, other internal income, state income, borrowing, and federal grants.

City of Seattle

The City has four groupings of revenue to support the service and programs it provides to its citizens:

1. Taxes, license fees, and fines

2. Grant funds – federal, state, and private

3. Fees for services, regulatory fees, and dedicated property tax levies

4. City utility service charges

These revenue sources are allocated to a variety of City funds or sub-funds.

The General Subfund or "General Fund" is used to fund general government expenses and is funded primarily by taxes. Fifty-three percent (53%) of General Fund revenues are generated by the property tax (30%), sales tax, the Business and Occupation (B&O) Tax, and utility taxes. These taxes, hence the General Fund, will fluctuate significantly with changing Puget Sound region economic conditions.

The City can consider using more General Fund revenue to support its transit capital and operations needs. Of course, this would mean providing less General Fund revenue to other City programs and services.

The City's Transportation Capital Improvement Program (TCIP) is financed from a variety revenue sources that include the General and Cumulative Reserve Subfunds, state gas tax revenues, grants, Public Works Trust Fund loans, partnerships with private agencies, and bond proceeds. In 2004, about $47 million was budgeted for the TCIP. Between 2004 and 2009, the TCIP budgeted amount is about $486 million.

The City can consider dedicating more of the flexible funding that is used to finance the TCIP into projects, programs, or services that will help meeting city transit capital and service needs. While state gas tax revenues can only be used for road projects, the City can work to make these projects benefit the transit network too.

In 2003, the City formed a Citizen's Transportation Advisory Committee (CTAC) II to advise the Council and Mayor on transportation funding alternatives. Without additional transportation revenues, many local transportation projects and a transportation system maintenance backlog will not be funded. The CTAC was asked to undertake the following tasks:

1. An analysis of the funding gap for major maintenance for Seattle's transportation facilities.

2. A review of unfunded neighborhood transportation projects identified in neighborhood plans.

3. A review of available sources of funding for transportation, including voter approved resources and potential financing mechanisms not currently authorized by the State for local financing.

4. Consideration of the feasibility of submitting a ballot measure to the people to provide funding for transportation projects.

5. A recommendation on appropriate funding levels to adequately finance major maintenance of Seattle's transportation facilities and the completion of neighborhood transportation projects.

6. A recommendation on the most effective transportation financing plan for the City of Seattle.

The CTAC has reviewed the following potential transportation funding sources listed in Table 28.

Table 28: Potential City Transportation Funding Sources

Potential City Transportation Funding Sources	
Already Authorized	
1.	Local Improvement District (LID)
2.	One-year property Tax Excess Levy
3.	Property Tax Lid Lift
4.	Commercial Parking Tax
5.	Business License Fee Based on Employment
Not Currently Authorized	
1.	Sales Tax on Motor Fuel
2.	Vehicle Excise Tax Based on Fuel Efficiency
3.	Road Use (Street Utility) Fee based on Trip Generation
4.	Tolls/User Fees
5.	Excise Tax on Motor Oil and Tires
6.	Roadway Improvement Fee based on Curb Weight of Vehicle

The above funding sources that may have the greatest "nexus" with transit and could be used for both service and capital investment are the commercial parking tax, which the state already authorizes the City to collect, and tolls/user fees, which have not been authorized. The commercial parking tax would generate about $1.6 million per year per a one-percent tax on parking transactions. This tax would generate an annual revenue stream, which makes it attractive for both transit capital and operations funding. Operations funding typically use an annual revenue stream; unlike capital projects, which are financed through both lump sum and annual (bonded) revenue streams.

The LID and property tax levy lid lift could be potential transit funding sources. They are more appropriate for funding transit capital projects than they are transit service.

King County

King County's Public Transportation Fund is used to fund Metro Transit. The revenues for this fund are generated by a local, voter-approved retail sales and use tax of .8%, fares, grants, Sound Transit service contributions, and other King County funds. As a Metropolitan Municipality, King County has state authority to collect an additional .1% retail sales and use tax if voter approved.

In 2003, the Public Transportation Fund operating costs net of contributions from Sound Transit and other King County funds was $365.8 million in 2003. Capital expenditures were $113.4 million mostly for transit fleet procurement (100 new low floor buses) and park-and-ride expansions and operating base updates in east and south King County (this was 93 percent of planned expenditures).[27]

[27] General Manager's Quarterly Management Report, Year-end 2003

King County has several key transit financial policies that affect transit revenues. First, Metro's sales tax revenue is divided three-fourths to fund operations and one-fourth to fund debt service requirements, revenue fleet replacement and other capital projects. This reflects a King County emphasis on service. It should be noted, however, King County does have the flexibility to shift operations funds to capital and vice versa.

A second key financial policy pertains to the balance between Metro's operating revenues (OR) and operating expenses (OE). Metro is directed to maintain a target of a minimum OR/OE ratio of 25% for bus services. This policy helps determine when King County needs to raise bus fares. Finally, the most important transit financial policy affecting Seattle transit funding potential with current resources is the service resource allocation policy adopted in the King County Six-Year Transit Development Plan for 2002-2007, Strategy IM-3. It gives the following framework for transit service allocation:

1. With the implementation of each 200,000 annual hours of service investments described in Strategy IM-1, each King County Metro planning subarea would receive a share of actual service hours implemented as follows: East 40%, South 40%, and Seattle/North King County 20%.

2. Any systemwide reduction in service investment shall be distributed among the subareas in proportion to each subarea's share of total service.

The above service allocation policy replaced an earlier policy that allocated new Metro service subsidy – excluding fare revenue – proportionate to each subarea's share of forecasted King County population. This policy change was a political decision that ignored basic growth management planning principles. It severely limits Seattle's ability to receive new transit investment, which is key component to the city's urban village strategy.

The new service resource allocation policy not only limits Seattle's share of Metro's current operating revenue stream, it affects other transit service resource opportunities. First, King County has an additional .1% sales tax authority for transit, which would raise about $40 million annually. Seattle voters are unlikely to support a proposal to allow King County to collect the additional tax if they are only going to receive a 20% share of the generated revenues. Second, under a 1972 agreement between Metro and the City of Seattle, Metro "shall at the request of the City legislative body furnish additional or supplemental local transit service within the City provided that the City shall pay the amount of any additional operating deficit resulting from such additional or supplemental service". The City is unlikely to pursue such a request if it believes that it will receive an unfair distribution of existing and/or new resources. Seattle voters who would be asked to fund the supplemental service may oppose this request too. Other local or regional funding proposals that generate service resources through King County may also be unattractive to Seattle voters.

The City needs to change King County's service resource allocation policy so that it reflects growth management planning principles and is not solely based on the principle of "subarea equity". Furthermore, there needs to be a firm commitment from King County that if the City purchases supplemental service, its base service levels and expected shares of new service from King County's operating revenues will not be reduced.

In 2000, King County lost approximately $100 million per year in transit service funding due to passage of Initiative 695. During this time, King County considered a number of strategies for increasing revenue or reducing expenses. They considered:

- Increasing Fares – By increasing cash fares by $0.25 or $0.50, King County estimated it could generate an additional $9 million or $16.4 million annually. They also considered charging a higher fare for "premium" service, once it was defined, and increasing paratransit fares since this type of service is so expensive to provide.

- Increasing the Local Option Gas Tax – It was estimated that a .2% increase in the King County sales tax would generate approximately $80 million annually.

- Establish Park and Ride Lot User Fees – A private proposal estimated that a $.75 user fee with $.25 increases every three years would cover lot operation and maintenance.

- Community Shuttles – Allow cities to assume the responsibility of community bus services that are heavily subsidized.

- School Services – Achieve higher, e.g. 100% cost recovery for school and custom bus service.

- Reduce Operating Costs – Reduce inefficient and ineffective services or make changes in the operating environment that make service more cost-effective. Another cost saving measure is to limit Metro's ACCESS program, which has extremely high costs, e.g. $30 per rider.

In 2000, King County did receive state authorization to get voter approval of up to an additional .3% increase in the sales tax for local transit. King County voters approved a .2% sales tax increase that year. King County also raised cash fares by $.25 and made some service cuts, mostly in routes that had poor productivity.

More recently, King County has been seeking revenues through participation in the Regional Transportation Improvement District (RTID), which was created by the state in 2002. They have the authority to ask voters in Pierce, Snohomish and King County for revenue from the following sources:

- Regional sales and use tax of up to 0.5%

- Local option vehicle license fee of up to $100 per year

- Sound Transit sales tax authority transferred to the RTID

- Parking tax

- Local MVET

- Employer excise tax

- Vehicle tolls on new or reconstructed roads.

The Sound Transit funds are the only funds dedicated to transit. King County and others have tried unsuccessfully to get the legislature to allow transit projects to be eligible for the other funds.

Recommended TSP Strategy {R4}

Coordinate with County Government to Implement Transportation Policy and Projects.

King County provides transit services and also plays a major role in developing agreements on changes in transportation policies. The King County Regional Transit Committee is the major forum for making policy recommendations to the King County Council on transit issues. Two City Councilmembers serve on this committee. SDOT staff support these two members with background information and policy alternatives and maintain working relationships with King County staff supporting the committee. The City also participates in the SeaShore Transportation Forum, which discusses transportation policy issues affecting the North King County area.

King County Department of Transportation is underway with a Waterborne Transit Study, Strategy S-14 of the Six-Year Transit Development Plan. This study will review and analyze funding options for King County waterborne transit service including,

- King County Metro Subsidy
- County Ferry District – this authority was created by the 2003 state legislature. A County ferry district can levy an ad valorem tax on all taxable property located in the district not to exceed 75-cents per 1,000 dollars of assessed value and/or with approval by voters an excess levy for a one-year period for operating or capital purposes.
- Fare Based
- Local Improvement District
- All of the Above.

Sound Transit

Sound Transit is funded through a combination of voter approved taxes, federal grants, farebox revenues, borrowed funds (bonds), and interest revenues. It has state authority to collect up to a .9% retail sales and use tax, up to a .8% MVET, and an employer tax of $2 per employee. When voters passed Sound Move in November 1996, they approved a .4% sales tax and a .3% MVET to finance construction and operation of Phase 1 of the regional high capacity transit plan. Following passage of Initiative 776 in 2002, Sound Transit loss its ability to increase its collection of MVET. It will be

able to collect its .3% MVET until 2028 when it expects to complete payments to its bondholders. There is still significant unused taxing authority: .6% sales tax and the employer tax.

The RTID Executive Board recently asked the Sound Transit Board if they would consider transferring .1% of the agency's unused sales tax authority to the RTID to help fund construction of Link light rail to Northgate. In addition, Sound Transit has started to develop its Phase 2 plan, which will include in a new revenue proposal and a list of projects.

Sound Transit's financial plan is based on a subarea equity principle. It assures each of five subareas: Snohomish County, North King County, South King County, East King County, and Pierce County, that Sound Transit taxes raised within an area are used for capital projects and operations that directly benefit that area. Each subarea has its own budget based on the anticipated local revenues for that area plus any grants and partnership funds.

Sound Transit recently began their Phase II planning. A successful Phase II vote is necessary for Sound Transit to consider adding new projects and spending funds collected beyond 2006 on new projects. There are some key capacity financial capacity issues that the Sound Transit Board will need to address before they go to voters with a proposal:

- Should Sound Transit's tax rates (sales and MVET) remain the same?
- Should the financial policies remain the same for net coverage ratios and subarea equity?
- Should Phase II be a 10-year time frame like Phase I?
- What should be assumed for federal, state, and local funding?

In 2001, Sound Transit estimated that the financial capacity of the North King subarea (Seattle, Shoreline, and Lake Forest Park) between 2007 and 2016 would be approximately $148.6 million. This assumes:

- The same taxing rate
- Same financial policies
- 10-year timeframe
- Extension of the Phase I capital program for the North and South King subareas,
- On-going operating and maintenance expenditures for Phase I, including scheduled vehicle replacements
- A 50% bonding capacity for each subarea through 2016

The East King and South King subareas financial capacities would be about $1.725 billion and $257.8 million, respectively. In 2002, the Phase II capacity estimate for the Sound Transit's three

King County subareas was: North King - $232 million, South King - $147 million, and East King - $1.048 billion.

Sound Transit could be ready with a Phase II ballot measure as early as fall 2006. If Sound Transit transfers .1% sales tax authority to the RTID, it would have .4% sales tax authority remaining. It would also have left an employer tax of $2 per employee.

Recommended TSP Strategy {R3}

Coordinate with Regional Government to Implement Transportation Policy and Projects.

Regional agencies serve several purposes: developing regional plans that set the context for transportation policies, allocating federal funding, implementing taxes and allocating funds; and providing transit, light rail, and commuter rail services. Regional agencies can also be important in developing and advocating for transportation policy initiatives at both the Federal and State levels. The Puget Sound Regional Council is the pivotal regional organization with the authority to adopt regional transportation plans and provide the framework for making decisions on how federal transportation funds are allocated. The Mayor and City Councilmembers influence regional transportation policies through their membership on the Puget Sound Regional Council Executive Committee and Transportation Policy Board.

SDOT staff help shape policy implementation through service on special committees, such as the Regional Policy Evaluation Committee and the Seattle-Tacoma-Everett Federal Transit Administration (FTA) Caucus. Sound Transit is also an important agency in shaping and implementing regional transportation facilities and service. The Mayor and one City Councilmember serve on the Sound Transit board. SDOT staff work directly with Sound Transit staff on special working groups to shape policy implementation.

Efforts have been underway for the last three years to create a regional structure to select and finance major transportation projects. City elected officials, SDOT executives and staff are actively engaged at the policy and staff levels helping shape this structure in a way that will support City transportation objectives.

Seattle Popular Monorail Authority

The Seattle Popular Monorail Authority has state authority to collect up to a 2.5% MVET, a rental car sales tax, up to a $100 vehicle license fee, up to a $1.50 per $1,000 assessed value property tax, and form a local improvement district to levy special assessments on property. It can use these resources to: “acquire by purchase, condemnation, gift, or grant and to lease, construct, add to,

improve, replace, repair, maintain, operate, and regulate the use of public monorail transportation facilities, including passenger terminal and parking facilities and properties, and other facilities and properties as may be necessary for passenger and vehicular access to and from public monorail transportation facilities, together with all lands, rights of way, and property within or outside the authority area, and together with equipment and accessories necessary or appropriate for these facilities, except that property, including but not limited to other types of public transportation facilities, that is owned by any city, county, county transportation authority, public transportation benefit area, metropolitan municipal corporation, or regional transit authority may be acquired or used by an authority only with the consent of the public entity owning the property."(RCW 35.95A.050). It can also acquire any existing public transportation facility by conveyance, sale or lease.

In 2002, Seattle voters approved a MVET of up to 1.4% on most vehicles registered within the city to plan and build the Green Line and plan for a second line consistent with the monorail plan. In June 2003, the SMP began collecting a .85% MVET. Beginning in June 2004, it will begin collecting the full 1.4% rate. The Green Line is estimated to cost approximately $1.29 billion (in 2002 dollars) with all project costs to total to $1.749 billion (in year of expenditure dollars).

Recommended TSP Strategy {R5}

Coordinate with Other Organizations to Implement Transportation Policy and Projects.

City objectives may also be pursued with the support from other organizations. The City actively works with many non-governmental organizations to help cultivate support for various transportation policy objectives. These organizations include such groups as the Greater Seattle Chamber of Commerce, Downtown Seattle Association, and the Discovery Institute. Special ad-hoc groups, such as the Transportation Partnership, are often formed to bring together business, labor, environmental and government representatives to support transportation improvement objectives. City elected officials, executives, and staffs attend meetings, make presentations and develop working relationships through these organizations.

State Funding

The State of Washington has historically provided very little direct transit investment other than when there was a direct state match for MVET revenues collected locally by transit agencies. In part, this is due to funding sources that are inflexible and unresponsive to changing conditions. One such source is the state gas tax, which at 28 cents per gallon, is the state's major source of transportation funding. The 18th Amendment of the State Constitution restricts the use of gas tax funds to highways, ferries, and local streets and roads. Each cent of the gas tax generates over $33 million in revenues annually.

Some projects funded by the state's gas tax can provide right-of-way for future transit investments, however.

The State can provide taxing and financing authority to local jurisdictions. The Legislature recently passed legislation that changes the rules on the provision of passenger-only ferry services, making it more attractive for private operator participation.

Recommended TSP Strategy {R2}

Coordinate with State Government to Implement Transportation Policy and Projects.

SDOT works through several different channels to coordinate policy and project issues with the State. The Mayor and SDOT Director work directly with the Governor, state legislative leaders, Washington State Secretary of Transportation and the Washington State Transportation Commission on high level policy and project issues.

SDOT staff actively serves on special statewide committees and task forces to help coordinate policies and projects. These include the Commute Trip Reduction Board, State Bridge Replacement Advisory Committee, and the Fast Partnership. SDOT staff also work directly with the staff of key state agencies, such as the Transportation Improvement Board, Freight Mobility Strategic Investment Board and the Public Works Trust Fund. SDOT staff also works through the Association of Washington Cities (AWC) to influence state transportation policies having broad impact on cities across the state.

Much of this activity is conducted through the working groups convened to coordinate specific projects, such as the Alaskan Way Viaduct, SR 520 Bridge Replacement and transit service improvements on SR 99 and SR 522 (Lake City Way). SDOT staff works with WSDOT to help assure that state highway projects built within the City are consistent with the TSP and Comprehensive Plan.

State ferries are an important element of the state transportation system serving Seattle. SDOT staff works closely with Washington State Ferries on their ferry system plan and terminal improvement plans to assure that these projects and services are consistent with the TSP and Comprehensive Plan. State funding will also be a major part of the financing plan for major regional transportation projects and ferry services. Changes to TDM policies and implementation of specific TDM projects will require State legislative action.

Federal Funding

Every six years, Congress passes a surface transportation funding bill, which will make provisions for specific transit studies and projects. Some transit funding is distributed through competitive grant programs and apportionment. The major funding programs that transit projects are eligible for are:

- Federal Highway Administration (FHWA) Surface Transportation Program (STP) funds
- FHWA Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Federal Transit Administration (FTA) Urban Formula Funds.

The FHWA funds can be used for transit improvements such as new fixed guideway projects, bus purchases, construction and rehabilitation of rail stations, maintenance facility construction and renovations, alternatively-fueled bus purchases, bus transfer facilities, multimodal hub and transportation centers, and advanced technology fare collection systems.

The Puget Sound Regional Council is responsible for distributing FTA funding and selecting projects for the competitive grant programs. A policy framework is established to help make these project selections.

Another way the federal government funds transit projects is through Congressional earmarks during the budget process.

To be eligible for federal funding sources, transit projects needs to complete National Environmental Protection Act (NEPA) environmental process, in addition, to a State (SEPA) environmental process.

Recommended TSP Strategy {R1}

Coordinate with Federal Government to Implement Transportation Policy and Projects.

Implementation of major regional transportation projects will depend on significant federal funding. Federal transportation policy will also set the direction on how available funding may be used. The SDOT Director, working through the Mayor's Office, establishes a federal agenda that includes key policy objectives and project priorities to be implemented through the federal transportation reauthorization bill and annual appropriations. The City's Federal Liaison in the Office of Intergovernmental Relations works with the members of Congress from Washington State to advocate for these objectives. The Mayor and SDOT Department Director meet with congressional members and key federal Department of Transportation officials to advocate for these objectives. Other channels are used, such as the US Conference of Mayors, AWC, and the Puget Sound Regional Council Executive Committee.

Impact/Mitigation Fees

There are a number of State statutes that authorize local governments to impose fees on developers to mitigate the impacts of their projects. Impact or mitigation fees must establish a "nexus" between the developer's project and the condition that is being addressed with the fee that is being charged. In addition, there must be a "rough proportionality" between the required fee and the nature and extent of the contribution the development to the impact.

The City is developing a fee-based mitigation system for area-wide or subarea-wide transportation mitigation. It will most likely be based on state Environmental Protection Act (SEPA) authority. Under the current proposal, a developer would have the option of following a SEPA-style mitigation process or contribute to an "impact fee" account based on the use and square footage of the new development. This account would be used to make needed transportation improvements for the entire subarea that would be identified through a subarea study; which would substitute for the transportation analysis and mitigation otherwise required of a development through the SEPA process.

CHAPTER 6: TRANSIT INVESTMENT PLAN

The City's transit investment plan is based on the current spending programs of the City and its transit partners and future investments that will be used to develop the UVTN, Multimodal Hubs, Transportation Centers and other key services and passenger facilities.

Transit Investment Plan 2004 – 2009

Tables 29 and 30 summarize a Seattle's planned transit investments for 2004 to 2009. They are funded.

Table 29: Annual Transit Service Investment, 2004-2009[28]

Investment	Lead/ Sponsor	Annual Revenue Service Hours[29]	Annual Cost[30]
UVTN Service	Metro	1,118,537 (58%)	$106,261,015
STN Service	Metro	796,289 (42%)	$75,647,455
	Total	1,914,826	$181,908,470

Table 30: 2004 – 2009 Transit Capital Investments

Investment	Lead/ Sponsor	Cost
5th Avenue NE Improvements	Seattle[31]	$2,168,000
Aurora Transit, Pedestrian and Safety Improvements	Seattle	$6,297,000
Denny Triangle Improvements	Seattle	$1,141,000
Downtown Seattle Bus Layover	Seattle	$582,000
Downtown Seattle Transit Tunnel Closure Mitigation Project	Seattle	$5,346,000
Elliott Ave W/15th Ave W and NW Signal Improvements	Seattle	$3,874,000
Intelligent Transportation Systems (ITS) Plan Implementation	Seattle	$910,000
Lake City Way NE Multimodal	Seattle	$10,702,000
Leary Way N Signal Improvements	Seattle	$3,021,000
Non-arterial Asphalt Street Resurfacing	Seattle	$2,132,000
Non-arterial Concrete Rehabilitation	Seattle	$684,000
S Henderson Street Improvements	Seattle	$1,500,000
Ride Free Area	Seattle	$2,100,000[32]
S Holgate Railroad Crossing	Seattle	$250,000
S Jackson Street Improvements	Seattle	$1,546,000
	Subtotal	$42,253,000

[28] Excludes Link and Green Line corridor service investments.

[29] Annual service hours estimate uses 2003 West subarea platform service hour data, assuming that revenue service hours are almost equal to platform hours in Seattle. It is assumed that the West subarea will not have significant increases in service levels until after 2009.

[30] This assumes a service hours cost of $95/hr.

[31] Seattle expenditures as shown in the SDOT 2004-2009 CIP. SDOT's Capital Improvement Program (CIP) reflects the Department's plan for repairing, improving, and adding to Seattle's transportation infrastructure. The City tries to balance three goals: 1) Rehabilitation of existing facilities to avoid the higher costs of deferred maintenance, 2) Increase in the capacity of existing facilities to meet growing demand, and 3) Development of new facilities to provide additional service.

[32] 6 years multiplied by $350,000 per year.

Table 30: 2004 – 2009 Transit Capital Investments (continued)

Investment	Lead/ Sponsor	Cost
Seattle Monorail Project	Seattle	$464,000
Sound Transit Construction Services	Seattle	$8,851,000
South Lake Union Streetcar	Seattle	$44, 833,000
Urban Center Wayfinding	Seattle	$321,000
University Way Multimodal	Seattle	$7,130,000
Water Taxi Dock	Seattle	$5,000
West Lake Union – Trail	Seattle	$3,281
40-ft Diesel Buses	King County[33]	$857,917
Vanpool Fleet	King County	$19,671,436
Trolley Overhead Modifications	King County	$2,441,949
Operating Facility Improvements	King County	$14,462,164
SR 99 N Transit Corridor Improvements	King County	$1,996,011
Transit Asset Maintenance	King County	$44,113,317
ADA Paratransit Fleet	King County	$7,525,447
Bus Safety and Access	King County	$17,898,668
Operating Facility Expansion	King County	$18,395,235
Rider Information Systems	King County	$172,000
Regional Fare Coordination	King County	$6,748,934
Regional Signal Priority	King County	$4,874,541
SeaShore Transit Corridor Improvements ▪ Lake City Way NE Multimodal ▪ University Way ▪ Ballard Hub ▪ Transit signal priority ▪ 5th Avenue NE ▪ 15th Avenue NW ▪ 12th and Jackson ▪ 38th and Bridgeway ▪ Route 48 zone consolidation ▪ Route 36 zone consolidation ▪ Aurora Avenue BAT lane ▪ Delridge/Ambaum corridor ▪ 1st Avenue S transit signal priority ▪ 9th and James for Routes 3 and 4 ▪ Transit queue jump at 145th NE and I-5 ▪ Route 5 zone consolidation ▪ Eastlake and Fairview ▪ N 45th Street ▪ NE 65th Street ▪ Route 73 ▪ Innis Arden and transit access in an around Shoreline Community College	King County	$4,683,841
	Subtotal	$196,133,741

[33] King County expenditures as shown in the King County Transit CIP Projects, 2004-2009.

Table 30: 2004 – 2009 Transit Capital Investments (continued)

Investment	Lead/ Sponsor	Cost
SeaShore Transit Corridor Improvements ▪ Holman Road ▪ NE 125th Street ▪ Route 9 ▪ Broadway Madison Phase 2 ▪ Dexter Avenue ▪ Pike/Pine		
EZ Rider I and II Pass Thru	King County	$668,808
Duct Relocation	King County	$3,046,642
Radio and AVL System Replacement	King County	$67,407,550
Replace Lake Union Fuel Facility	King County	$150,000
Transit Oriented Development	King County	$11,971,904
Breda Conversion to Trolley	King County	$5,355,237
Northgate TOD P&R	King County	$759,091
Transit Security Enhancements	King County	$1,659,495
Elliott Bay Water Taxi	King County	$1,040,194
TOD Convention Place Station	King County	$492,064
Tunnel Closure Speed and Reliability	King County	$4,584,752
Tunnel Modifications, Enhance, Retrofit	King County	$13,516,777
Pine Street Trolley Relocation	King County	$1,259,753
Accessible Taxis	King County	$670,000
Green Lake Park and Ride Improvement	King County	$250,000
Waterfront Streetcar Barn Relocation	King County	$150,000
Central Link Light Rail ▪ Initial segment track and signals (downtown Seattle to Boeing Access Road) ▪ Initial segment stations – Westlake (existing) – University Street (existing) – Pioneer Square (existing) – International District (existing) – Royal Brougham (deferred) – Lander – Beacon Hill – McClellan – Edmund/Columbia City – Othello – Henderson ▪ Operations and Maintenance Facility ▪ North Link segment – planning and environmental review only	Sound Transit[34]	$2,135,000,000
	Subtotal	$2,247,982,267

[34] Sound Transit's expenditures for the Seattle/North King subarea are $2.135 billion for 1997 to 2009.

Table 30: 2004 – 2009 Transit Capital Investments (continued)

Investment	Lead/ Sponsor	Cost
Green Line ▪ Initial segment track and signals (Crown Hill to West Seattle) ▪ Initial segment stations ▪ Operations and Maintenance Facility	Seattle Monorail Project	$1,749,000,000
	Total	$4,244,684,008

Transit Investment Plan 2010 – 2020

Tables 31 and 32 summarize Seattle's transit investments for 2010 to 2020 assuming that the City wants to achieve full implementation of the UVTN by 2030. Many of these investments would need funding. It is estimated, for instance, that Seattle needs a 38% increase in its overall revenue service hours by 2030.

Table 31: Annual Transit Service Investment, 2010-2020[35]

Investment	Lead/ Sponsor	Annual Revenue Service Hours[36]	Annual Cost[37]
UVTN Service	Metro	1,460,257 (61%)[38]	$138,724,415
STN Service	Metro	859,956 (39%) [39]	$81,695,820
	Total	2,320,213	$220,420,235

[35] Excludes Link and Green Line corridor service investments.
[36] This assumes that the UVTN and STN by 2020 will achieve service levels that are midway between current service levels on the UVTN and the average of the 2030 UVTN planned service levels using an average of existing and policy transit speed.
[37] This assumes a service hours cost of $95/hr. Therefore, the annual cost is in 2003 dollars.
[38] The estimated UVTN service hour target is the mid point between existing and policy speed performance for UVTN corridors at the policy recommended frequency and span performances.
[39] The STN service hour estimate is the average of current and 2030 STN service levels.

Table 32: 2010 – 2020 Transit Capital Investments[40]

Investment	Lead/ Sponsor	Cost
UVTN Corridors		$900,000,000
1. **Fairview, Stewart/Virginia OR Westlake, Fairview, Eastlake**	Seattle, King County, Sound Transit, Seattle Monorail Project, State	
2. 1st, Cedar		
3. **3rd**		
4. James OR Yesler, 9th		
5. **Olive OR Stewart OR Virginia**		
6. **Pike/Pine**		
7. Yesler OR Jackson		
8. 14-15 Av, Boston, 10th Av E, Roanoke, Harvard		
9. Broadway, 10th Av E, Roanoke, Harvard		
10. **Jefferson, Cherry**		
11. Madison		
12. Madison, Marion		
13. Olive, John, Thomas		
14. **Pine, Union**		
15. **23-24th Av**		
16. 92nd St, 1st Av NE		
17. **Aurora LIMITED STOP**		
18. Green Lake, 65th. (Options for Aurora to Wallingford Ave: Either Green Lake OR 85th, Wallingford)		
19. **Greenwood, Phinney, 43 St, Fremont**		
20. **N 45 St OR N 50 St.**		
21. Wallingford, Meridian (NSCC)		
22. N 115 St, Meridian Av		
23. **N/NE 40 St OR N/NE Pacific St.**		
24. Holman, NE 105 St, Northgate Way		
25. **5 Av NE**		
26. 15 Av NE		
27. **15 Av NE, Pinehurst**		
28. 25 Av NE		
29. **Lake City Way**		
30. Montlake Av		
31. NE 45 St, Sand Point		
32. NE 65 St		
33. **Pacific St**		
34. 24 Av NW		
35. Leary, 20 Av NW		
36. Leary, NW 39 St		
37. **Market, N 46 St**		
38. **NW 85 St**		
39. **1 Av S**		
40. 15 Av S, Albro, through Georgetown and South Park to White Ctr		
	Subtotal	$900,000,000

[40] Phase 1 UVTN corridors are in bold font.

Table 32: 2010 – 2020 Transit Capital Investments

Investment	Lead/ Sponsor	Cost
41. 4 Av S, Michigan, 1 Av S Br, SR 99 LIMITED STOP		
42. **Beacon, Myrtle, Othello**		
43. **E3 Transitway, LIMITED STOP**		
44. **Rainier, Rainier Beach**		
45. Columbia, Alaska, Spokane, Admiral		
46. California		
47. **Delridge**		
48. Morgan, 35 Av SW, Roxbury		
49. **5 Av N, Taylor Av N, Boston**		
50. **Dexter, Nickerson**		
51. Nickerson, 15 Av W		
52. Olympic, 10 Av W, Gilman Dr W		
53. Queen Anne Ave., McGraw, 3rd Av W		
Multimodal Hubs	Seattle, King County, Sound Transit, Seattle Monorail Project, State	$35,000,000
▪ Colman Dock		
▪ King Street Station		
▪ Northgate		
▪ University District		
▪ Westlake		
Transportation Centers	Seattle, King County, Sound Transit, Seattle Monorail Project, State	15,000,000
▪ Ballard		
▪ Husky Stadium		
▪ North Rainier		
▪ West Seattle Junction		
Other Transit Capital	Seattle, King County, Sound Transit, Seattle Monorail Project, State	$75,000,000
▪ UVTN Major Transfer Points		
▪ STN Corridors and Stops		
Sound Transit ▪ North Link – CPS to Brooklyn ▪ Stations	Sound Transit	$1,850,000,000
Green Line Extensions	Seattle Monorail Project	$1,500,000,000
	Subtotal	$3,400,000,000
	Total	$4,375,000,000

Transit Investment Plan 2021 – 2030

Tables 33 and 34 summarize Seattle's transit investments for 2021 to 2030 assuming that the City wants to achieve full implementation of the UVTN by 2030. Many of these investments would need

funding. It is estimated, for instance, that Seattle needs a 38% increase from its current overall revenue service hours by 2030.

Table 33: Annual Transit Service Investment, 2021-2030[41]

Investment	Lead/ Sponsor	Annual Revenue Service Hours[42]	Annual Cost[43]
UVTN Service	Metro	1,715, 299 (65%)	$162,953,405
STN Service	Metro	923,623 (35%)	$87,744,185
	Total	2,638,922	$250,697,590

Table 34: 2021 – 2030 Transit Capital Investments[44]

Investment	Lead/ Sponsor	Cost
UVTN Corridors		$1,200,000,000
1. **Fairview, Stewart/Virginia OR Westlake, Fairview, Eastlake**	Seattle, King County, Sound Transit, Seattle Monorail Project, State	
2. 1st, Cedar		
3. **3rd**		
4. James OR Yesler, 9th		
5. **Olive OR Stewart OR Virginia**		
6. **Pike/Pine**		
7. Yesler OR Jackson		
8. 14-15 Av, Boston, 10th Av E, Roanoke, Harvard		
9. Broadway, 10th Av E, Roanoke, Harvard		
10. **Jefferson, Cherry**		
11. Madison		
12. Madison, Marion		
13. Olive, John, Thomas		
14. **Pine, Union**		
15. **23-24th Av**		
16. 92nd St, 1st Av NE		
17. **Aurora LIMITED STOP**		
18. Green Lake, 65th. (Options for Aurora to Wallingford Ave: Either Green Lake OR 85th, Wallingford)		
19. **Greenwood, Phinney, 43 St, Fremont**		
20. **N 45 St OR N 50 St.**		
21. Wallingford, Meridian (NSCC)		
22. N 115 St, Meridian Av		
23. **N/NE 40 St OR N/NE Pacific St.**		
24. Holman, NE 105 St, Northgate Way		
25. **5 Av NE**		
	Subtotal	$1,200,000,000

[41] Excludes Link and Green Line corridor service investments.
[42] This assumes that UVTN will be operating at the policy transit speeds, frequency and span. It also assumes a 65/35 split between UVTN and STN revenue hours.
[43] This assumes a service hours cost of $95/hr. Therefore, the annual cost is in 2003 dollars.
[44] Phase 1 UVTN corridors are in bold font.

Table 34: 2021 – 2030 Transit Capital Investments[45]

Investment	Lead/ Sponsor	Cost
26. 15 Av NE		
27. **15 Av NE, Pinehurst**		
28. 25 Av NE		
29. **Lake City Way**		
30. Montlake Av		
31. NE 45 St, Sand Point		
32. NE 65 St		
33. **Pacific St**		
34. 24 Av NW		
35. Leary, 20 Av NW		
36. Leary, NW 39 St		
37. **Market, N 46 St**		
38. **NW 85 St**		
39. **1 Av S**		
40. 15 Av S, Albro, through Georgetown and South Park to White Ctr		
41. 4 Av S, Michigan, 1 Av S Br, SR 99 LIMITED STOP		
42. **Beacon, Myrtle, Othello**		
43. **E3 Transitway, LIMITED STOP**		
44. **Rainier, Rainier Beach**		
45. Columbia, Alaska, Spokane, Admiral		
46. California		
47. **Delridge**		
48. Morgan, 35 Av SW, Roxbury		
49. **5 Av N, Taylor Av N, Boston**		
50. **Dexter, Nickerson**		
51. Nickerson, 15 Av W		
52. Olympic, 10 Av W, Gilman Dr W		
53. Queen Anne Ave., McGraw, 3rd Av W		
Multimodal Hubs	Seattle, King County, Sound Transit, Seattle Monorail Project, State	$25,000,000
▪ Colman Dock		
▪ King Street Station		
▪ Northgate		
▪ University District		
▪ Westlake		
Transportation Centers	Seattle, King County, Sound Transit, Seattle Monorail Project, State	$30,000,000
▪ Ballard		
▪ Husky Stadium		
▪ North Rainier		
▪ West Seattle Junction		
	Subtotal	$1,255,000,000

[45] Phase 1 UVTN corridors are in bold font.

Table 34: 2021 – 2030 Transit Capital Investments

Investment	Lead/ Sponsor	Cost
Other Transit Capital		$90,000,000
▪ UVTN Major Transfer Points		
▪ STN Corridors and Stops		
▪ Other		
Sound Transit ▪ Link Extensions ▪ Stations	Sound Transit	$2,200,000,000
Green Line Extensions	Seattle Monorail Project	$1,800,000,000
	Subtotal	$4,090,000,000
	Total	$5,345,000,000