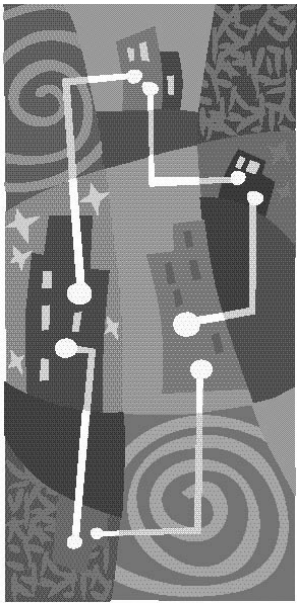
SEATTLE DEPARTMENT OF TRANSPORTATION

Seattle Transit Network Development Plan

FINAL DRAFT



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nelson\nygaard consulting associates
833 Market Street, Suite 900, San Francisco, CA 94103
415-284-1544 Phone 415-284-1554 FAX

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Chapter 1. Introduction and Overview

How can the City of Seattle 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 *when* land use and street design take and use good transit-oriented forms. This report is the beginning of a proposed policy tool that does exactly that.

Dense, transit-oriented development is already the rule in Seattle's planning, as expressed in the "Urban Village" concept. This study proposes a corresponding "Urban Village Transit Network" (UVTN) that will be is the backbone of the City's transit system and carry its highest concentrations of transit trips.

The UVTN consists of all transit lines – regardless of mode or operating agency -- that operate every 15 minutes or better all day for at least 18 hours every day. A 15-minute headway represents the point at which a transit rider no longer needs 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 the point at which the benefits of transit tend to grow exponentially.

Portions of the UVTN exist today, and the Green Line Monorail and Central Link Light Rail Transit will, of course, be part of it. The main purpose of the UVTN, however, is as a policy tool defining corridors where this level of service can be expected in the future, as build out of planned or zoned development occurs. The UVTN policy is a commitment that:

- IF development along a corridor achieves the minimum density required to support UVTN service, *and*
- IF street design and management permits the operation of service at a given minimum speed and reliability, and maximizes the pedestrian access to each transit stop on the corridor, *and*
- IF funding sources for high-ridership transit grow at an adequate rate to permit transit growth,
- THEN the corridor will be permanently upgraded to UVTN service levels, along with a corresponding higher priority for passenger amenities, fleet improvements, and other elements of transit quality.

Who makes this commitment? Both the City and the transit agencies that provide UVTN levels of service. The Central Link light rail and the Green Line monorail investments already represent this commitment, but is in the area of bus service that the UVTN policy will have the greatest impact on land use and transportation. What developers seek is a

commitment that quality transit service is permanent, and they tend to find this assurance in fixed facilities such as rail lines or ferry terminals. Bus service looks more ephemeral, and the role of the UVTN is to reinforce, on the level of policy, that certain bus service corridors are as permanent as any rail corridor, and can therefore also be the foundations of dense, transit-reliant communities.

The UVTN has performance criteria for the four key dimensions of transit quality:

- **Frequency.** The UVTN runs every 15 minutes
- **Span.** The UVTN runs at the above frequency for at least 18 hours a day, 7 days a week.
- **Speed.** UVTN services have an average operating speed, including stops, of no less than 30% of the speed limit.
- **Reliability.** Actual headways between consecutive buses will exceed scheduled headways by a coefficient of variation not to exceed 0.30.[1]
- **Loading.** Standing loads but not crush loads are acceptable.

The UVTN would become 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 most important product of this study will be a set of standards for defining and updating the UVTN. These principles are based on known relationships between transit and land use, and realities of transit economics. They will include:

- **Necessary land use intensity along the length of a 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. The current understanding of these issues, and preliminary policies based on them, are the work of Chapters 2 and 3 of this report.
- **Walking distance standards.** An area is considered served if it is within a quarter mile of a UVTN route, which in general means that parallel UVTN routes should be at least a half mile apart outside of the CBD. Exceptions may be made where **barriers** to access exist -- cliffs, water bodies, freeways, etc. -- but the ongoing operating cost of the exception must be weighed against the one-time capital cost of surmounting the barrier (with a bridge, elevator, etc.). Features that discourage

[1] See the accompanying report, *Comprehensive Street Classification, Performance and Design Standard System*, Chapter 4, for detail on this measure, as well as for the others.

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. Practically speaking, if the operating speed cannot be protected, the corridor should not 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. Direct connectivity brings simplicity for the rider, which in turn increases transit's attractiveness.
- **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 secondary bus service does. It should not be necessary, for example, to ride 10 miles 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 half mile band on either side of the line.
- **Permanence.** To achieve the degree of permanence that developers often perceive in rail lines, it is important that UVTN corridors reflect a shared confidence in what can be achieved, so that they are not likely to be deleted. For this reason, the network should be the minimum necessary network, i.e. all thresholds defining what qualifies as a UVTN corridor should err on the side of excluding a corridor.
- **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 the City's infrastructure. For the high-density portions of the city, it is as essential as power lines. Because it is designed to serve a large share of the city's population with a minimum of line miles, it can offer not just 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.

Finally, a regional UVTN should provide not just for 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. Chapter 4 lays out the steps of this element in detail.

The Scope of this Report

This report defines the criteria to be used in creating and updating the Urban Village Transit Network. Chapters 5 and following go on to define a specific network, and a recommended first phase for implementation in 2007. The entire 2030 network is recommended for adoption as policy, while the 2007 network – where high frequency already exists – would be identified for near-term speed and reliability improvements, so as to fully meet the UVTN definition.

Chapter 2. Background Documents

To identify the interrelationship between transportation and land use in Seattle and elsewhere, this section summarizes key Seattle planning documents as well as national literature.

Seattle Planning Documents

There are three primary documents that guide Seattle's land use and transportation future:

- The Seattle Comprehensive Plan
- The City's Transportation Strategic Plan, and
- King County Metro's Six Year Transit Development Plan

Together, these documents form the policy basis for this study. They have strong common themes. Most important among these themes is that future growth will be channeled into mixed-use "Urban Villages" that will be connected with each other through high-frequency, high-productivity transit. Each document is reviewed briefly below.

TITLE:	Seattle's Comprehensive Plan *Toward a Sustainable Seattle* A Plan for managing growth 1994 - 2014
PUBLISHER:	City of Seattle, Department of Planning and Development (DPD)
DATE:	Adopted July 1994, last amended December 2002

Key Points	**Reference or page number**
Land use	
Defined vision. Core values: Community, environmental stewardship, economic opportunity and security and social equity. Within the environmental stewardship vision: "*the urban village concept promotes compact, more pedestrian-oriented development and alternative (non-auto_ transportation choices such as transit, as well as incentive and disincentive programs to encourage getting around without a car".*	Introduction
Outline of urban village concept: *"Mixed-use neighborhoods .... where conditions can best support increased density"*. Categories of Urban Villages Map of urban villages and neighborhood anchors	LU-5 LU-9 Land Use Fig 1
Outline and maps of *Urban Centers* • Minimum of 15,000 jobs located within ½ mile of future high capacity transit station • Overall employment density of 50 jobs/acre • Overall residential density of 15 households per acre	LU-12 – LU-19
Outline of *Manufacturing/Industrial Centers* Outline of *Hub Urban Villages* Outline of *Residential Urban Villages*	LU-20 LU-21 LU-22
20 year growth goals and general distribution of growth Informative table, shows the distribution of 50,000 – 60,000 households and 131,400 – 146,600 jobs. Details of residential (household) and employment (jobs) growth in each urban center.	Land Use Fig 7 LU – 28 LU 29
Transportation	
Mode split targets for 2010.	T – 5
Transit service within ¼ mile of at least 90% of residents and businesses Transit connects urban centers and urban villages with at least 10 minute frequency most of the day and 15-30 minute frequency during the evening and one hour frequency at night.	T – 38

Land use – Appendices	
Figures associated with Urban Villages: areas and existing and future populations and densities (residential and employment)	Appendix B
Land use split by districts	Appendix D
Growth projections by year	Appendix E
Transport – Appendices	
Map showing: Arterial and state routes Traffic signal locations Transit/ HOV lanes Traffic growth P& R lots	Appendix A
LOS / V/C ratios (predicted)	Appendix C

TITLE:	Transportation Strategic Plan
PUBLISHER:	City of Seattle, Seattle Department of Transportation (SDOT)
DATE:	Adopted October 1998, currently being updated

Key Points	**Reference or page number**
The Transportation Strategic Plan (TSP) is the detailed implementation document for the Comprehensive Plan. It sets out detailed strategies and actions to achieve Comprehensive Plan goals.	Introduction
Many specific TSP strategies are explicitly in line with the objectives of this study, particularly the concept of focusing resources to increase frequencies and operating speeds on the Urban Village Transit Network (UVTN). Indeed, the present study will largely serve to implement many of the strategies and action items identified in the TSP. For this reason, it is worth mentioning many of the TSP strategies in full:	
• "Improve transit speed and reliability," through spot improvements at problem locations (e.g. bus only lanes), signal preemption, bus bulbs, and bus stop consolidation. The TSP recognizes that this involves tradeoffs with automobile capacity and travel time.	Strategy T-2
• The TSP calls for route-based improvements. For example, transit routes chosen for bus stop consolidation should receive accompanying service and stop improvements. The TSP calls for the City to work with King County Metro to develop a prioritized list of target routes and corridors where stop consolidations will create substantial gains in operating efficiency, without causing undue burdens to riders.	p. 37

• "Establish and implement transit service priorities." The TSP suggests that good urban transit is defined less by coverage, and more by frequency and speed. It also recognizes that speed and reliability strategies can yield major savings in service hours, which can be reinvested elsewhere in the City. It calls for the City to establish route-level priorities for new transit service hours, allocated according to five criteria (listed in priority order):	Strategy T-4 Strategy T4.1
o Maintain a basic level of service on routes connecting the city's urban villages and major activity areas	
o Improve peak-period frequencies on the city's highest-performing routes	
o Improve mid-day frequencies on the city's highest performing routes	
o Improve evening and night frequencies on routes that have the highest ridership during these periods	
o Some funds should be reserved for investments in developing new transit markets, as well as testing new, innovative services and technologies	Strategy T4.2
• "Evaluate transit service investments against clear performance standards for ridership and cost-effectiveness."	Strategy T4.3
• "Update and integrate city transit street classifications to establish a system that guides transit investments." The TSP proposes to update the Transit Priority Network (roughly synonymous with the UVTN), so that it provides a more useful guide for establishing service priorities. This strategy also calls for:	
o Basic service goals of 15 minutes or better during the day, 30 minutes or better during the evening, and hourly or better during the night.	
o Half-mile spacing for radial routes, and 1-mile spacing for crosstown routes.	
o Working with King County Metro to focus service and capital improvements onto the Transit Priority Network, and using the network as a guide to help determine pedestrian investments.	Strategy T6
• "Discourage the development of park-and-ride lots in Seattle." This provides further justification for focusing service improvements on the most dense corridors, with good pedestrian access, rather than serving less-dense areas with potential for park-and-ride lots.	Strategy A3
o "Optimize the people-moving capacity of existing streets."	Strategy N4.2
o "Make streets with substantial transit service pedestrian-friendly."	Strategy N.4.4
o "Support transit ridership goals with appropriate development densities."	

TITLE:	Six-Year Transit Development Plan for 2002 to 2007
PUBLISHER:	King County Metro
DATE:	Adopted September 2002

Key Points	**Reference or page number**
The Six-Year Transit Development Plan sets out objectives and strategies for transit service in King County, including both operating and capital plans. The direction of the Plan is entirely consistent with the development of the UVTN. It calls for providing higher bus service levels to established urban and activity centers, and enhancing service to and within jurisdictions that aggressively implement transit-friendly land use strategies. One of the Plan's overall themes is to reward high ridership and supportive local policies with increased service and capital investment, to improve frequencies, service spans and reliability.	Objectives 2 and 3 Objective 6 Strategy S-3
The Six-Year Plan sets out a range of criteria to qualify for additional service, such as strong ridership demand, meeting or exceeding housing and population targets, and promoting higher-density development. By meeting multiple criteria through defining the UVTN and using it to determine target areas for increased densities and priorities for street enhancements, the City of Seattle can therefore increase its productivity.	Strategy S-4
Capital as well as service improvements are also to be directed to high-ridership corridors under the Six-Year Plan. Speed and reliability improvements are to be directed to the corridors with the highest bus and passenger volumes, where low cost solutions can be effective. Bus stops with the highest level of usage are to be prioritized for new amenities.	Strategies C-2 and C-3
The Plan identifies a network of Core Service Priority Investment Corridor (to determine frequency enhancements) and target corridors for Route and Passenger Facility Improvements. This study will help refine these corridors, by providing a more consistent, technical basis for corridor selection.	

National Literature Review

To inform this and future tasks, a brief literature review was undertaken of existing research and work that illustrated a connection between land use/development factors and transit ridership.

Although there is no single, simple correlation, appropriate findings are outlined below.

Please note that for the purpose of comparison, the following conversions and assumptions are used:

- 1 dwelling unit /acre = 640 dwelling units/square mile
- 1 dwelling unit/acre = 2.5 persons/acre = 1600 persons/square mile

Density

Several studies point to a strong connection between density and transit ridership. In *Transit Metropolis*, Robert Cervero states, "It is widely agreed that higher urban densities will do more than any single change to our cityscapes in attracting people to trains and buses."

Some key sources, and their conclusions, are as follows:

- Every 10 percent increase in population and employment densities yields anywhere between a 5 and 8 percent increase in transit ridership, controlling for other factors (such as lower incomes, restricted parking, and better transit services generally associated with more compact settings). Note that this is an aggregate of studies of many densities, and is refined by other studies listed below.
- In a 1984 study in New York City, results showed that neighborhoods with densities of 8000 people/sq mile (5 dwelling units/acre) averaged 0.2 daily transit trips per resident, while otherwise comparable neighborhoods (in income) with 24,000 people/sq mile (15 dwelling units/acre) averaged 0.7 daily transit trips per capita.[2]

Two studies cited a level of residential density at which point transit ridership per person or household levels out (at about 1.5 transit trips per household per day):

- A study by Spillar and Rutherford (1998) states, "Transit use per person grows with increasing density up to a ceiling at somewhere between 20 and 30 people per acre (about 19,000 people per square mile or 12 dwelling units/acre). In terms of income, in higher income neighborhoods (those with less than 18 percent low-

[2] Cervero, Robert. 1998. *Transit Metropolis*, Island Press, 1998. p. 72-74

income families) density has less of an effect on transit use than in low-income areas, but this could be due to the relatively small number of samples available."[3]

- Similarly, the San Francisco Bay Area region's Metropolitan Transportation Commission surveyed over 10,000 households throughout the metropolitan region in its 1990 Household Travel Survey, and showed that transit trip ridership per household flattens out at a density of about 30 households per acre, or roughly 48,000 people per square mile. (See Figure 2-1, below). The study also shows that transit need a base of at least 5 households per acre (8,000 people/sq mile) before ridership will grow, increasing noticeably at about 10 households per acre (16,000 people per sq. mile) and up.

Figure 2-1 Average Daily Trips per Household vs. Density

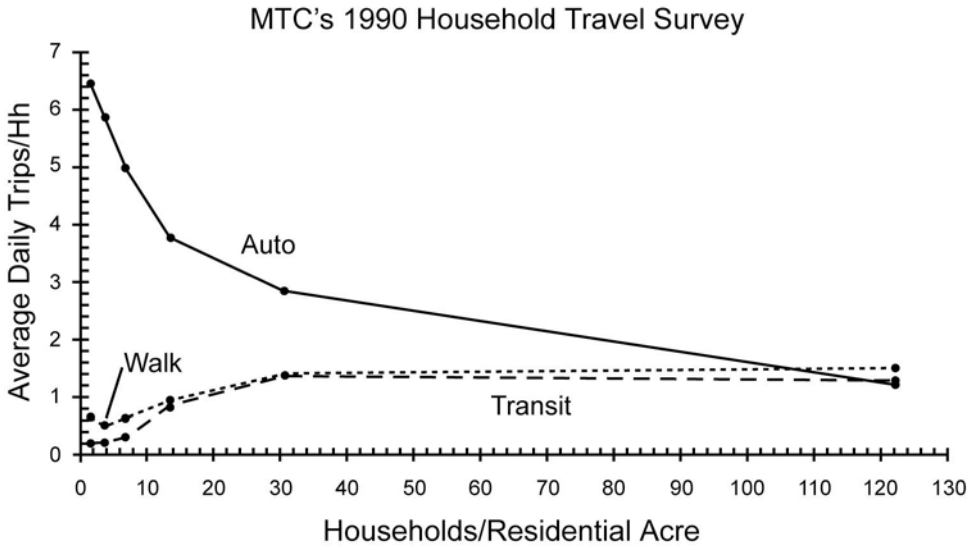


Figure 2-1 shows that when neighborhoods are more compact, trip lengths are shorter. Many destinations are close at hand. As a result, auto trips fall sharply, while more trips are taken by walking and transit.

A crucial point from Figure 2-1 is that up to about 12 households/acre, the relationship between density and transit use is parabolic -- transit ridership/household rises faster than density. Transit ridership/acre (the real determinant of the market for a given transit service) thus rises extremely steeply against density up to this threshold, then gradually falls back to a linear relationship in which every new increment in population (and hence density) added to a fixed area generates new ridership at the same rate.

[3] Spillar, Robert J., and G. Scott Rutherford. 1998. "The Effects of Population Density and Income on Per Capita Transit Ridership in Western American Cities." *Institute of Transportation Engineers' Compendium of Technical Papers*: 60th Annual Meeting. August 5-8, 1998. Pp. 327-331.

- Newman and Kenworthy (1989) found that that at densities below 12 persons per acre (7,500 persons per square mile) the bus service becomes poor. They therefore recommend densities above 5 to 6.5 dwelling units/ acre (7,500 to 10,000 persons per square mile) for public transit-oriented urban areas.[4]
- Levinson and Kumar (1994) conclude that relationships between density and mode choice "are found only in densities greater than 10,000 persons per square mile," (6 dwelling units/acre) using data from the 1990/91 Nationwide Personal Transportation Survey (NPTS). The lower limit of 7,500 persons per square mile (4.5 dwelling units/acre) is also used in other sections of the paper.[5]
- For employment density, a study of travel behavior in the Seattle metropolitan area, Frank and Pivo (1994) concluded that a threshold exists at which transit work trips showed a significant increase, of 50 to 75 employees per acre, and nine to 13 persons per gross acre (5500 to 8500 persons per square mile). They found that there are thresholds of 75 employees per acre and over 18 persons per gross acre (11,500 persons per square mile) for the same phenomenon to occur for shopping trips.[6] Note: a more in-depth account of the Frank and Pivo study will be provided in the final report.

The 1996 TCRP paper, *Transit and Urban Form*, reviewed several studies that all pointed to a correlation between density and transit trip generation.[7] The paper's findings are listed below:

- Part II of the same TCRP study evaluating relationships between transit and urban form found that, for a 25-mile light rail line surrounded by low-density residences, increasing downtown employment from 50,000 to 300,000 for a 3-square mile CBD (to a density of 100,000 people per square mile) could increase ridership along that corridor from 18,000 to 85,000 daily boardings. This translates to slightly more than 1 daily boarding per 4 new downtown employees.[8]
- In an analysis of transit demand in Portland, Oregon, Nelson\Nygaard (1995) found that "of 40 land use and demographic variables studied, the most significant for determining transit demand are the overall housing density per acre and the overall employment density per acre. These two variables alone predict 93 percent of the variance in transit demand among different parts of the region."[9]

[4] Newman, P. and J. Kenworthy. Cities and Automobile Dependence: An International Sourcebook. Aldershot, Avebury Technical (1989).
[5] Levinson, D. and A. Kumar. "The Rational Locator: Why Travel Times Have Remained Stable." *Journal of the American Planning Association*, 60, 3 (1994) pp. 319–332.
[6] Frank, L. D. and Gary Pivo. *Relationship Between Land Use And Travel Behavior in the Puget Sound Region*. Olympia, WA: Washington State Department of Transportation, WA-RD 351.1 (1994).
[7] Source: (http://transweb.sjsu.edu/publications/transitridership2/TransitRidership_7_16.pdf), The Mineta Transportation Institute College of Business, 2002
[8] Transit Cooperative Research Program. 1996. *Transit and Urban Form*. Washington, D.C.: National Academy Press. TCRP Report 16(2): 1-25.
[9] Nelson/Nygaard Consulting Associates. "Land use and Transit Demand: The Transit Orientation Index," Chapter 3 of *Primary Transit Network Study* (Draft). Portland, OR: Tri-Met (1995).

- An unpublished TCRP analysis of travel behavior in 11 metropolitan areas surveyed in the 1985 Housing Survey suggests that both land use mix and residential densities contribute to transit mode choice decisions. It determines that the probability of choosing transit is better explained by the overall levels of density rather than by measures of land use.[10]

Research conducted to establish the Location Efficient Mortgage program shows an indirect correlation between density and transit ridership, by illustrating an inverse impact on vehicle trips and miles traveled. The research included every neighborhood in the Los Angeles, San Francisco and Chicago metropolitan areas, and controlled for other potential explanatory variables such as household income and household size. As shown in Figure 2, in each of the three metropolitan areas, the compactness of the neighborhood was found to be the most important explanatory variable. As residential density in a neighborhood rises, the number of nearby destinations (such as shops, restaurants and other services) increases, and as a result, driving rapidly decreases.

Figure 2-2 Driving vs. Residential Density

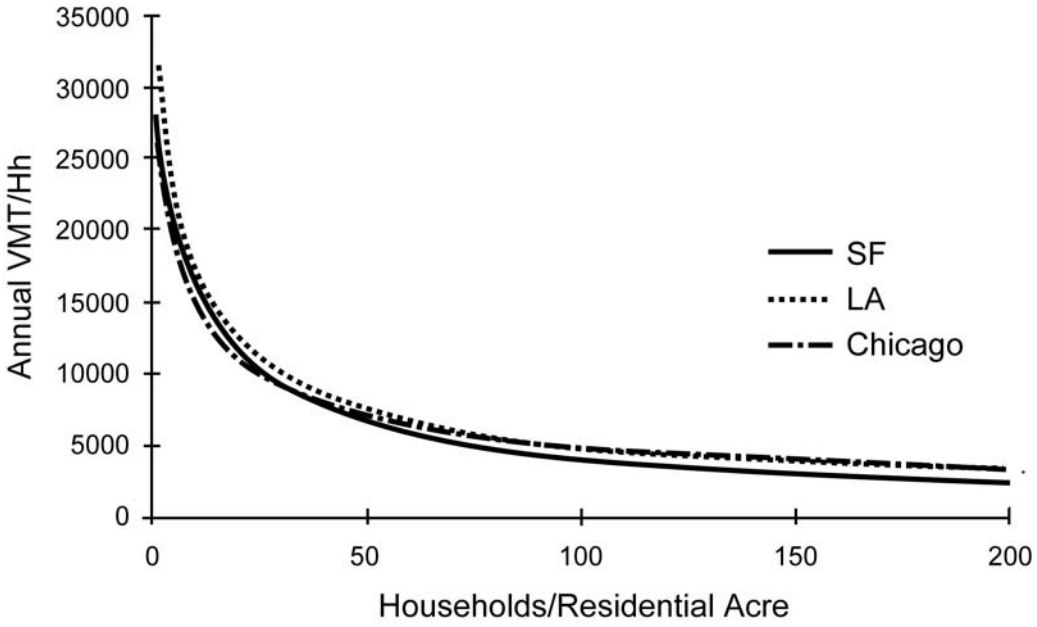


Figure 2-2 shows the reduction in vehicle miles traveled per household as residential density increases. In Los Angeles neighborhoods with a density of two households per acre, the average household drives nearly 25,000 miles per year. At 40 households per acre (the density of the Mission Meridian Station project), the average Los Angeles

[10] Transit Cooperative Research Program. 1996. Transit and Urban Form. Washington, D.C.: National Academy Press. TCRP Report 16(1): 1-25. Unpublished paper entitled, *Influence of Land Use Mix and Neighborhood Design on Transit Demand.*

household drives approximately 8,000 miles per year. Note that the parabolic part of the transit ridership curve in Figure 2-1 corresponds to the steepest part of the curve in this figure, beginning to flatten at about 12 du/acre.

Proximity to Transit (Transit Oriented Development)

Another angle on the relationship between development patterns and transit is the idea of proximity to transit. This is really the same issue as density, but viewed from the passenger's point of view.

Cervero's findings in his paper "Ridership Impacts of Transit Focused Development" (1993) are summarized below. Essentially, he finds that:

- Residents living near rail stations are 5 times more likely to commute by rail
- Employees working near rail stations are 2.7 times more likely to commute by rail.

Figure 2-3 below shows the average mode split for the Bay Area's rapid transit system, BART, and its busiest commuter rail line, Caltrain. It also shows Caltrain and BART shares of mode splits for people who live and work in the station area. For all resident trips, transit shares of mode splits were high – between 10% and 33%. Compared with 3% of residents, county-wide, who took transit to work, 26% of residents living in station areas (TODs) used transit for their work commute.

While this analysis is focused exclusively on rail, other analyses show similar results from rubber-tired transit services with comparable frequency, travel time and amenities as rail.[11]

Figure 2-3 Average Mode Splits for residential and employment areas served by Bay Area Transit

	TOD Residents		Station Area Employees	
	All Trips	Work Trips	Work Trips	Transit Mode Split
Average	15%	19%	9%	13%
Caltrain	10%	17%	4%	5%
BART	27%	33%	17%	25%
San Mateo City Average		3%		
Station Area Residents in San Mateo County		26%		

[11] Nelson\Nygaard Consulting Associates with Fehr & Peers Associates. *BART I-580 Corridor Study.* 2003. The analysis found that transit frequency and travel time were the primary determinants of ridership and mode split, regardless of technology.

Chapter 3. Land Use and Ridership in Seattle

This chapter examines the relationships between land use patterns and ridership that can be observed in Seattle today. Together with Chapter 2, the purpose is to develop a sense of the relationship between land use and transit potential, which would form the basis for principles on how to develop the UVTN.

Analysis Process

To undertake this task, the Nelson\Nygaard team developed a range of maps to assist in the analysis of interfaces between land use and transit. These maps are included at the end of this chapter.

In basic terms, the process incorporated the following:

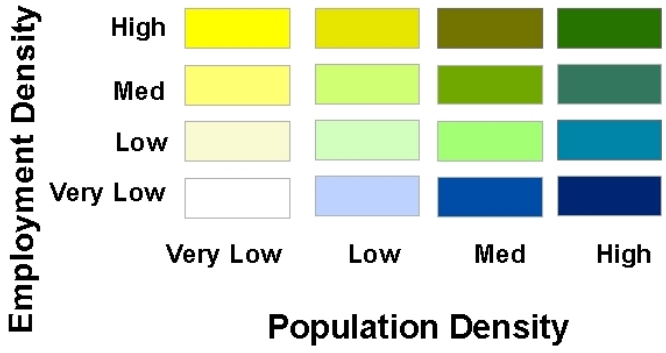
1. First, key base data was plotted in GIS, including the local street network, the local transit infrastructure, transit boardings, population and employment density in 2000 and projected population and employment density in 2030.
2. Next, we overlaid density with transit boardings to assess the relationship between the two in Seattle today (Map 3-1).
3. By comparing the two, we were able to identify key density thresholds necessary to support a UVTN-level of transit service.

More detail about the process and its results are described below.

The 4 x 4 density matrix of Population and Employment

By combining measures of employment density and population density into one matrix, the degree of 'mixed use' (that is, employment and residential land uses) in a particular area can be assessed.

The matrix looks like this:



Map 3-1 (at the end of this chapter) is a sample of this 4x4 matrix in use.

These maps use four different intensities of color to show the density levels in population, and four intensities of a different color to show densities of employment. Increasing population density is indicated by progressively more intense shades of blue, while increasing employment density is indicated by more intense shades of yellow. Mixed use, then, is indicated by various shades of green (blue + yellow). Dark green, combining the highest level of population density with the highest level of employment density, produces the highest level of transit ridership.

Each map uses the same four levels of population density, combined with four levels of employment density, to produce 16 (4x4) possible permutations.

The density ranges used are shown in the following table.

Range	Residential densities		Employment densities	
	Persons/sq mile	Persons/acre	Persons/sq mile	Persons/acre
High	≥ 20,000	≥ 30	≥ 20,000	≥ 30
Medium	12,000 – 20,000	20 - 30	12,000 – 20,000	20 – 30
Low	6,000 – 12,000	10 - 20	6,000 – 12,000	10 – 20
Very low	0 – 6,000	0 - 10	0 – 6,000	0 – 10

Existing Relationship between Ridership and Land Use

This sub-section provides a brief summary of the key findings arising from the GIS mapping process. The key maps referenced in this subsection are included in the following pages and a fuller collection of the maps produced over the course of this study is provided in Appendix A of this report.

Details of the mapping process and its limitations are provided in Appendix B of this report.

Mapping reference	**Map 3-1 (end of this chapter)**
Base mapping	2000 Residential and employment density
Overlay mapping	Total daily transit segment boardings per mile – combined on and off
Base Mapping inputs Residential and employment densities were thematically mapped by TAZ (data provided by SDOT) using a 4x4 matrix incorporating a range of employment densities and a range of residential densities.	
Overlay mapping inputs Daily boarding data (passengers on and off) and transit segment shape files were provided by KCM. Nelson\Nygaard combined these boarding data and divided by the segment length to calculate total boardings per segment mile. We then thematically mapped segments to show the different daily combined boardings per mile as a range of different line thicknesses and intensities.	
What the mapping shows The mapping indicates a relatively strong correlation between land use densities (residential and employment) and boardings on transit segments. From the perspective of transit boardings: • Transit segments with over 6,000 boardings per mile (i.e. a brown or black line on Figure C1) are only found in areas with *high* employment or residential densities (or a combination of these). • Transit segments with between 3,000 and 6,000 boardings per mile (i.e. a red line on Figure C1) are generally found in areas with *high* density of one use (i.e. either employment *or* residential). However in some instances, these segments abut TAZs with *medium* or *low* densities of mixed use (i.e. both employment *and* residential) on one side. No segments with this level of boarding are found in areas with very low employment and residential densities. • Transit segments with between 1,000 and 3,000 boardings per mile (i.e. a dark purple line on Figure C1) are more difficult to classify. While the segments often run through residential areas classified as having a *low* population density, they are generally are found on routes that run through an area of high density, often mixed land use. They are also are generally in close proximity (within 2 or 3 miles) of these areas.	

- It is very rare to find a transit segments with between 1,000 and 3,000 boardings per mile (i.e. a dark purple line on Figure C1) in areas with very low population or employment densities.

From the perspective of land use densities:

- Somewhere between 10 and 20 persons/acre, residential land uses reach a threshold where they sustain levels of transit ridership commensurate with the UVTN.
- Above 20 persons/acre, residential land uses provide levels of transit ridership that would easily sustain UVTN levels of ridership and could, in some cases, viably support higher capacity modes than bus.
- It would appear that employment land uses make a more potent contribution to transit ridership than residential land uses.
- A higher proportion of employment land uses with densities between 10 and 20 persons/acre, appear to sustain good levels of transit ridership than similar residential densities (for example, the University District and Northgate).
- Similarly, a higher proportion of employment land uses with densities between 20 and 30 persons/acre, appear to sustain good levels of transit ridership than similar residential densities
- Areas were there is a mix of residential and employment land uses generate significant levels of boardings, which appear to be sustained along segments even when they extend beyond these dense, mixed-used areas into areas with lower densities. Looking at this in another way, high ridership segments through low-density areas tend to end in a high-density anchor.

Conclusion: Adequate Density for the UVTN

The sub-sections below should not be viewed as fixed 'formulas' for planning the UVTN. Rather, they are a 'function' that can be drawn on during the planning process, and used in association with the other measures and information outlined within this document.

Similarly, it should be noted that while land use densities constitute one of the key influences of transit use, there are a range of other factors that must be present to optimize the beneficial effects of integrated land use and transportation. These include:

- improved levels of service
- improved integration of the network
- future 'push' factors (e.g. reduced parking provision, increased traffic congestion)

Outcomes from analysis of the interrelationship between land use intensity and transit ridership

Over the course of this section a range of analyses of the interrelationship between land use intensity and transit ridership has been presented.

A key output was an understanding of the densities at which the operation of high frequency transit becomes viable.

The table below compares the findings of the analysis of available land use and transit data for Seattle undertaken by Nelson\Nygaard with research undertaken by others.

This comparison indicates that Nelson\Nygaard's findings are broadly consistent with the findings of other research.

In general, it indicates that when residential densities surpass a threshold of approximately 12 – 16 persons per acre (7,500 – 10,000 persons per square mile), transit ridership approaches a level that would support the levels of service proposed for the UVTN.

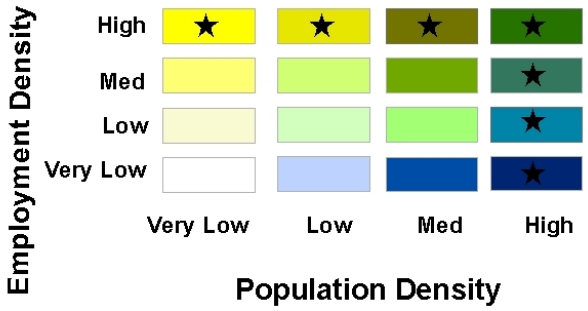
While there are fewer pieces of research to confirm it, it would appear that the employment densities required to support the levels of service proposed for the UVTN are slightly lower than the residential densities required. It is considered that the levels of 9 to 13 employees per gross acre proposed by Frank and Pivo reflect the findings of our analysis.

Density	Source
Residential land uses: Somewhere between 10 and 20 persons/acre - good levels of transit ridership. Above 20 persons/acre - very good levels of transit ridership	Nelson\Nygaard
Employment land uses make a more potent contribution to transit ridership than residential land uses, thus employment densities required would be slightly lower than residential densities.	Nelson\Nygaard
Transit ridership increases noticeably at about 10 households per acre	San Francisco Bay Area's Metropolitan Transportation Commission
12 – 16 persons/acre recommended to support good levels of transit.	Newman and Kenworthy (1998)
9 to 13 employees per gross acre support good levels of transit.	Frank and Pivo (1994) in Seattle.

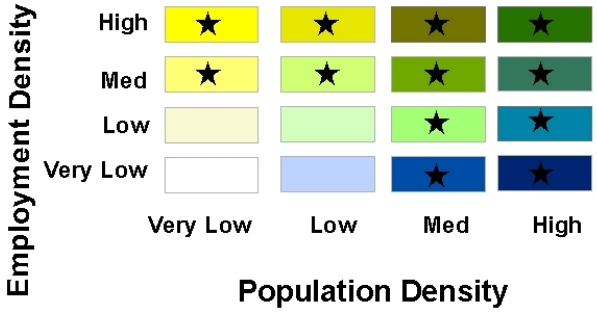
Graphical Function to Assess Transit Orientation of Different Density Mixes

Based on the information reviewed in this chapter, we estimate that the transit ridership potential of different densities can be approximated as follows. A star in a box indicates that this density is sufficient to generate the ridership indicated. Route segment miles are presumed to be non-overlapping. .

Land use densities that could be expected to generate more than 6,000 daily boardings per segment mile



Land use densities that could be expected to generate more than 3,000 boardings per segment mile



Densities below this level may occur along the UVTN, but never justify the network. That is, the UVTN would never extend into an area solely for the purpose of covering densities not "starred" in the diagram above.

Chapter 4. Guidelines for the Definition of UVTN corridors

This chapter outlines the following:

- The tools that we have developed using our analysis of the available data pertaining to the interrelationships between land use and transportation planning
- The application of transportation planning best-practice and experience in the areas of integrated land use and transit planning, network planning and network operations to the case of Seattle 2030 UVTN.
- Recommendations of ways in which the planning, refinement, analysis and implementation of the UVTN can be more efficient, more accurate or more effective in the future.

Definitions

Urban Village Transit Network (UVTN)

The UVTN consists **of transit lines that will have all-day headways of 15 minutes or better over a span of at least 18 hours** (equivalent to 5 AM to 11 PM; typically UVTN routes should also run all night at lesser headways).

Explanation

Routes with this level of service differ profoundly from the rest of the network in a number of respects:

- **Ridership and Productivity Potential.** The threshold of 15 minutes marks the point at which transit begins to attract a large number of riders with a choice of modes, rather than just transit dependent individuals. If transit runs every 15 minutes or better, wait times are short enough that the system can be used spontaneously throughout the day and evening for a variety of trips. Passengers can simply wait at a stop without having to consult the schedule.
- **Connectivity.** The ability to catch a bus soon without worrying about the schedule also means that UVTN lines interconnect as a network. Passengers can make connections at any intersection of UVTN lines without worrying about whether timed transfers are provided or the bus is on time.
- **Magnified Effect of Small Changes.** The UVTN represents an extremely concentrated investment of service hours. It will also carry the majority of the system's riders. Any changes that affect transit operations or attractiveness -- for better or worse -- will therefore have a magnified impact on both ridership and

service cost. Investments in bus stop amenities on the UVTN will be used by more people and will therefore have a greater positive impact than similar investments elsewhere. Measures to improve speed and reliability have the potential to save the greatest number of service hours, and reduce travel times and schedule variability for the greatest number of riders. Conversely, anything that happens to undermine transit performance, such as a loss of speed or reliability due to congestion or street design changes, will have a magnified negative impact on both ridership and service costs.

- **Synergy with Land Use.** The level of service offered by the UVTN makes it possible, even convenient, to live without a car, or to have fewer cars than adults in a household, or for a business to require fewer parking spaces. It provides a two-way synergy with land use – the UVTN requires density, and but it also encourages livable densification by reducing parking needs, generating pedestrian activity in village cores, etc.

Note that 15-minute headways are a basic minimum on the UVTN. In most cases, these will be significantly better during the day, particularly at the peak. However, determining these headways is a shorter-range planning decision that will be based primarily on passenger loads and overall budget constraints.

Secondary Transit Network (STN)

All routes that are not part of the UVTN will form the Secondary Transit Network (STN). The function of Secondary service is:

- to supplement the UVTN by meeting additional needs that involve high ridership, but not necessarily full UVTN levels of service. These can include specialized service for predictable peak demands, as well as circulator services within Urban Villages and downtown.
- to provide coverage to all neighborhoods, so that some transit access is possible.

Over time, the first category will diminish, as new rapid transit replaces many of the existing express markets. Circulator demands will increase, but some of these (such as the downtown streetcars) may be upgraded into the UVTN in the future, while others will remain Secondary, depending on the performance of the service and the demand patterns of the area served.

The second category of STN is more lasting, because most of Seattle's land area will not be on the UVTN, and will still need local transit access. The Secondary network's main value is as a service for the transit-dependent and as a transportation alternative for a limited range of trips. It does have an indirect value to citywide transportation goals, because car ownership can be reduced ("voluntary transit dependence") only if there is a viable transit option for reaching all parts of the city. However, reduced car ownership will continue to be most viable on the UVTN, which will have the most attractive service. The secondary

network contributes by insuring that destinations of interest can be reached by transit if desired.[12]

The STN will typically have the levels of service and amenities that are common in lower-density parts of Seattle today. Typically, Secondary lines will:

- Operate every 30 minutes all day, with some skeletal weekend and evening service. Secondary lines may be more frequent during high-demand times.
- Connect to the nearest point on the rapid transit system, but not run through to downtown.
- Extend far enough so that well over 95% of city residents, jobs, and activity centers are within ¼ mile walk of service.

While Seattle neighborhoods may have an interest in specific Secondary services, the City interest as a whole is to operate the minimum possible Secondary network. Secondary network resources come at the expense of the UVTN, and the UVTN is central to citywide transportation and land use goals. For this reason, the secondary network should eventually be streamlined so that it is the minimum network necessary to achieve these goals.

Relationship to Urban Villages

The definition of the UVTN is based primarily on the residential and employment density of surrounding land uses, since this is by far the most important factor determining ridership. In many – but not necessarily all – cases, the UVTN will link the City's existing and proposed Urban Villages, where these high densities are to be found and/or where redevelopment can result in intensification of land use. In other cases, UVTN lines may be motivated by development intensities that are not classified as Urban Villages, but nevertheless support the UVTN level of service.

The fundamental definition, however, is based on frequency and span of service, because these are the essential features of transit systems that effectively compete with the private automobile for all kinds of trips. In other words, very frequent transit with long service spans provides the basic freedoms that people associate with driving, such as the ability to make trips spontaneously, or to make multiple stops in the course of a trip.

[12] 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.

Key Features and Uses of the UVTN

The UVTN will be the backbone of the Seattle transit network, carrying the vast majority of its passengers with the highest productivity and levels of service. As such, it should be a common focus for transit-oriented planning, including both roadway and land use plans:

- Roadway planning (SDOT, WSDOT) is a key component in the process of protecting transit speed and reliability. Transit amenity must also be planned within the right-of-way of public roadways.

- Land use planning at the Urban Village level has guided the UVTN design. The UVTN reflects the most efficient network that serves the Urban Village pattern. Subsequent detailed land use planning, at every level through development review, should be done with the UVTN corridors in mind. Integration with land use planning is discussed in the next section.

Finally, the UVTN has a value to the private sector, and to other levels of government, in locational decision-making. Because the UVTN makes the high-frequency, high-quality network visible, it should be a useful point of reference for businesses, realtors, homebuyers, renters, and government agencies regarding where to locate if intensive service is important to you, and where to locate if you prefer not to have intensive transit nearby.

Land Use Integration Principles

The UVTN has a two-fold connection with land use. Firstly, the UVTN serves areas with the highest transit ridership, densities and mix of uses. In this way, higher ridership is rewarded with increased service. The success of land use policies to promote densification and reduce auto dependency in Urban Villages will depend on the ability of the UVTN to deliver the speed, frequency, reliability and amenity improvements necessary to attract riders.

Secondly, the UVTN should be an important factor determining land use policies and zoning in the City of Seattle. New ridership on the UVTN is much easier to accommodate than new demands for service in low-density areas. The following policies are recommended:

- **Transit-supportive land uses should be encouraged *only* on UVTN corridors.** Increased densities, reduced parking requirements, curb cut restrictions and other transit-oriented land use policies should be encouraged only where there will be a sufficiently high level of transit service. In many cases, this has already been planned, through the designation of Urban Villages. However, there are likely to be

significant opportunities for infill on lower density segments between the Urban Villages. This approach will also help balance ridership over the length of a route.

- **All new transit-dependent land uses should be on the UVTN.** Examples include social service agencies, which frequently locate on the cheapest available land, which usually has poor access. While this may optimize costs for the agency in question, it forces the transit agency to run an inefficient service to reach a poorly sited facility. In effect, one agency is simply transferring its costs to another. Other examples of developments that should be on the UVTN include affordable and senior housing developments, community colleges and high schools.
- **Auto-dependent land uses should *not* be encouraged on the UVTN.** Big box retail development, auto malls, low-density industrial uses and similar developments should be directed elsewhere, to the extent that the City wishes to accommodate them at all.

It should be noted that much research has found employment density to be more important than residential density in determining transit ridership. However, both are important, as is a mix of uses. As well as reducing overall travel demand by internalizing trips, mixed-use development helps to balance loadings in both directions over the course of the day.

Structural Principles

The UVTN should be the defining element of the broader transit network. It will provide the levels of service, coverage and attractiveness to act as a focus of local elements of the transit system.

The UVTN should provide 'line haul' services where comfortable, easily identifiable, high frequency vehicles travel reliably on a legible transit network.

Different UVTN routes and supportive secondary transit services should integrate at a discrete number of transfer nodes. These transfer nodes should be logically located (for example at locations of key land use concentrations) and provide safe, amenable and user-friendly transfer facilities.

Moving people within a constrained transportation network

Seattle's unique character and spectacular setting are inseparable from the fact that the city is a lattice of obstacles formed by hills and bodies of water, leaving many narrow chokepoints through which all transportation modes must operate, and where the cost of adding road capacity is prohibitive.

The focus, therefore, needs to be on moving *people* rather than automobiles. By providing a transportation network that facilitates the efficient flow of people into and out of the City,

it will be possible to achieve the cities economic, social and environmental aims while meeting its goals for development.

'Anchoring' the UVTN

A transit line serves two different functions. It covers an area, and it also connects points. In planning transit lines, especially those on the UVTN, the ends of the lines are especially critical.

Along the middle of a line, people from many origins are on the transit service, heading to the many different destinations that the line serves. As the service approaches the end of the line, however, it is useful to reach fewer and fewer destinations. Ridership tends to drop off towards the ends of lines accordingly. If a line were placed on a uniformly developed area without any special nodes of intense activity, the number of people on a bus as it traveled along the line could be expected to follow a bell curve distribution, with ridership highest in the middle of the route and lower towards the ends.

The amount of service that must be apportioned at to a line is determined by the height of the curve at its highest point, called the *peak load point*. The rest of the area above the curve represents capacity on the bus that has gone to waste.

Transit lines are therefore much more efficient if they run between *anchors*. An anchor is anything that gives many people a reason to use a line all the way to its endpoint. Good anchors generally comprise an area of intense land use but could also incorporate (and benefit from) a transfer node, where other elements of the transit network can feed the line.

A network that provides proximity and links Urban Villages

The UVTN and the secondary transit network (STN) that supports it will need to provide an appropriate level of proximity to the land uses it serves. It should also link the urban villages designated in Seattle's Comprehensive Plan.

A general 'rule of thumb' in transportation planning indicates that people are prepared to walk around a quarter mile to access a bus service. As the quality, level of service and network integration of a transit system improve, however, people will tend to walk considerably farther. For example, the pedestrian catchment of a suburban railway station remains strong up to one mile away. When safe and attractive environment is provided for cyclists, the use of bicycles can significantly increase the catchment area of a transit route.

The quarter-mile walking distance means that in the absence of barriers, parallel UVTN lines should be at least 1/2 mile apart, so that their markets do not overlap. Exceptions should be made if there is a substantial grade change or other pedestrian barrier that strongly discourages or prevents pedestrian access to the UVTN corridors. Exceptions may also be made within the downtown core where the magnitude of demand is greatest and

trips tend to be shorter. Very short trips generally tolerate a lower walking distance to transit, because they offer the alternative of walking all the way to the destination.

In most of Seattle, it is impossible to locate transit lines *exactly* every half mile, so the UVTN may have some coverage gaps even in high density areas. The role of the Secondary Transit Network is to fill these gaps with less frequent service that connects to the UVTN. The STN also provides a good geographical coverage of the entire city even where densities are low.

Finally, "proximity to transit" must be understood as a two-way relationship between transit and land use planning. Proximity does *not* mean that UVTN lines deviate to serve dense destinations that are inaccessible from a straight-line route, as is common today, because to do so undermines transit's speed (both real and perceived) which is a much higher value to the entire network. While the UVTN must be responsive to existing land use, some access problems will be better solved by redesign than by distorting the UVTN. UVTN lines must be straight and fast, while land uses and street design must encourage the maximum possible range of pedestrian access to the UVTN from dense areas and major attractors served.

The UVTN as Infrastructure

The Permanence of Fixed-Infrastructure Transit

Station area plans are already promoting transit oriented development around future light rail stations. However, it is impossible to build rail to *all* the places that will need transit-oriented intensification. In the next few decades at least, most of the Urban Villages will rely on bus services for their transit access.

One of the main features hindering the success of bus-based Transit Oriented Development has been the perceived lack of permanence compared to rail infrastructure. In reality, many of the City's bus corridors are as permanent as light rail and Monorail, particularly in denser areas. However, their permanence is not visually obvious, as it needs to be. Nor is there a defined process by which future densification will be rewarded with increased service. Developers, lenders and tenants are therefore understandably reluctant to commit to real transit oriented land use design – and reduced parking provision in particular – in the absence of guarantees that a high level of transit service will continue for the life of the development.

The feature of permanence is therefore critical if the UVTN is to guide land use investments. In other words, significant capital investments by the City and King County Metro will give developers and land use planners the certainty that a high level of service will continue to be provided, and that the UVTN will be as permanent a feature of the City's transportation infrastructure as future light rail and Monorail services. These capital investments fall into two broad categories: speed and reliability improvements, and

passenger amenities. They have the twin goals of improving service, while demonstrating the commitment of the City and King County Metro to making that service permanent.

UVTN legibility

To ensure that the UVTN is easily recognizable and understandable as the key transit system, services should have a different "look and feel" to the rest of the transit system. At least within the bus system, the different elements and modes should be unified with a common identity.

In addition, many physical features of the stops can help make the UVTN stand out and advertise its exceptional usefulness. These can include the stop improvements outlined in the King County Metro Six-Year Transit Development Plan, such as pedestrian and bicycle access; shelters and benches; lighting; and signage and customer information. Real-time information, telephones and newsracks are also important to provide. Bus stops on the UVTN should be given the look and feel of light rail stations.

Rather than making provision at each stop dependent on ridership (as proposed in the Six-Year Plan), the aim should be to achieve a minimum level of consistency and realize the benefits of uniform branding. While high-ridership stops may warrant additional investments above this minimum, the overall "look and feel" should remain the same.

There is a link between stop consolidation (discussed in the previous section) and improved amenities. A higher level of amenities is financially feasible if they need to be installed at fewer stops, and they represent the tangible enhancements that can make stop consolidation politically viable.

The UVTN will carry the heaviest passenger loads at the greatest level of convenience. This convenience should be marketed and emphasized. For example, King County Metro's system map should distinguish the UVTN from the Secondary Transit Network – for example, through marking it in a different color. (Transit maps that make no effort to distinguish frequent services from infrequent ones are no more useful than a roadmap that doesn't distinguish a freeway and a dirt road.)

Productivity versus coverage

Due to the current limitations in funding for the establishment and operation of the transit network, it will be necessary to resolve a key issue when defining the future transit network, this being the generally competing needs of productivity versus coverage.

A system based on *productivity* would focus service provision along key corridors such as the UVTN or areas that are already densely developed or under redevelopment at higher densities. Depending on the extent and level of this service provision, trade-offs with service levels in other parts of the network might be necessary.

A system based on *coverage*, on the other hand, would spread services throughout the network to ensure that over 90% of the City would be served by a 'minimum level of service'. This approach is likely to reduce frequencies on the currently busiest corridors and the corridors slated for redevelopment and intensification.

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 King County Metro to establish policies on the minimum level of service to be provided outside the UVTN. This would establish a "set-aside" ensuring minimal *coverage* for lifeline access -- that is, for the Secondary Transit Network (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-level 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.

Relationship to Other Transit Plans

The following sub-section outlines issues relating to the UVTN to consider as part of the planning process.

Existing planning work by King County Metro, Sound Transit and the City of Seattle has recognized various categories of transit routes. Many of these, such as the "Transit Priority Network" identified in the Comprehensive Plan, and the "Core Service Priority Investment Corridors" in King County Metro's Six-Year Transit Development Plan, may to a great extent be synonymous with the UVTN.

We recommend that the UVTN supersede the "Transit Priority Network" of the Comprehensive Plan. In working with King County Metro on its periodic revisions of the Six Year Plan, the City's goal should be to ensure that the King County Metro "Core Service Priority Corridors" are UVTN lines and represent the logical next priorities for investment.[13] This will ensure that investments by the City and King County Metro are coordinated to the maximum extent possible, and that improvements to streets, bus stops and frequencies go hand in hand. This will also aid legibility, by removing the multiple layers of overlapping typologies

[13] In some cases, Metro may have other priorities that reflect regional transit access needs, but Metro services for intra-Seattle markets should evolve toward being identical with the UVTN.

Rapid Transit

Rapid transit services – Link light rail, Monorail and any Bus Rapid Transit – form a subset of the UVTN, providing higher speed service on selected corridors. The UVTN should contain within it a logical network of rapid transit services such that trips of more than about seven miles can be routed via a rapid transit service for most of the distance. To this end, Bus Rapid Transit may be recommended in corridors where no rail service is planned, or pending the completion of a long-term rail project.

In many cases, local services will need to operate in parallel on the same corridors to serve areas between widely spaced stations. Providing density (and thus demand) warrants, both local and rapid services will form part of the UVTN. The UVTN will also provide an important feeder role for rapid transit, and many light rail and Monorail stations will serve as "anchors" for UVTN routes.

While Bus Rapid Transit looks much like limited-stop service, the distinction is important. Bus Rapid Transit lines are separate lines that satisfy the frequency and span requirements of the UVTN by themselves. At certain times of day, supplemental limited stop service may also be warranted on many UVTN corridors, especially where there is no rapid transit. This will be a shorter range planning decision, however, and will not affect the definition of the UVTN. It is therefore not considered in this report.

Technology

The UVTN is defined by level of service, not by mode. For long-range planning purposes, it makes little difference if a transit connection is provided by light rail, streetcar, trolley, diesel bus or some different technology entirely. The attributes of a service – legibility, permanence, amenity, frequency, speed and reliability – should not be confused with the technologies that are often associated with these attributes.

Operating Agency

Just as it is not defined by mode, the UVTN is not defined by operating agency. It includes all services in city that meet the UVTN definition regardless of whether these are operated by King County Metro, Sound Transit, a new monorail authority, and/or some other administrative unit yet to be conceived.

Recommendation on Barrier Mapping

Seattle is characterized by particularly steep topography and geography dominated by watercourses. These, and the transportation infrastructure responses to them, combine to provide significant challenges to access, both on a local and a regional scale.

A good understanding of the level of access (or lack thereof) is a crucial input into integrated transit and land use planning. It is therefore proposed to establish a GIS database of barriers to access.

A barrier to access would be defined as **any area at least 1/4 mile wide that pedestrians cannot cross.** This 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.

This mapping / 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.

Implementation

The key aim of the UVTN is to provide an integrated network of regular, reliable and rapid transit services.

The City of Seattle has limited control over the integration of the land use and transit provision process. Their influence extends to:

- Control of the land use process, which can locate density and transit-supportive design along transit corridors, dictating future transit ridership.
- Control over most of the streets on which the UVTN services will run (though several of the key transit routes are on facilities controlled by the State). On streets it manages, the City controls many major factors governing transit operating speeds and reliability. The city should use these powers in its partnership with Metro to achieve the goals of the UVTN.

More detail on the City's and other agencies role in implementation is provided below.

Key Implementation Objectives within the City's Control

The objectives under City control that should be pursued are outlined below.

Provide the Necessary Levels of Priority to Protect and Enhance Transit Speed and Reliability

The City needs to make a strong commitment to provide the necessary levels of priority to ensure transit speed and reliability. Among the factors within this City's control, this one is by far the most important.

Despite many efforts by the City and King County Metro, transit service in Seattle can be very slow. On key downtown streets, average operating speeds 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.

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.

Improved reliability is also critical to the UVTN. Transit riders are generally more sensitive to variations in travel time than to travel time itself. Variation in travel time actually impacts on scheduled travel times, as operators need to load contingency into their timetables to take account of such variations. This has the effect of unnecessarily lengthening trip times and bringing the associated impacts on patronage, operating cost etc. Variability of trip time also affects the potential to integrate transit services. The UVTN will generally be running at sufficiently high frequencies to avoid lengthy waits at transfer points, but good reliability will be essential when integrating with less-frequent local and regional services.

Policy speeds and reliability measures for the UVTN are proposed in a companion document to this report,[14] which will address the City's street classifications and performance standards. They will almost certainly vary by context – policy speeds will be significantly lower in a neighborhood commercial district, for example.

[14] City of Seattle, *Comprehensive Street Classification, Performance, and Design Standard System*, Nelson\Nygaard, 2004

The concern over transit speed should not raise fears of buses speeding. Speed improvements refer to reducing sources of delay, such as boardings and waiting to pull out from a stop. Buses do not have to travel at faster *maximum* speeds than they do now. Typical improvements the City can implement include:[15]

- **Curb Lane Improvements.** These might include bus bulbs, parking restrictions or extended bus stops to reduce delays encountered when entering and leaving bus stops.
- **Transit Signal Priority.** These measures can consist of corridor-wide transit signal priority or preemption, or more limited treatments at specific intersections.
- **Right-of-Way Reallocation.** These treatments allow buses to bypass congestion, by providing dedicated or semi-dedicated right of way. Specific measures include transit-only, high occupancy vehicle (HOV) or business access and transit (BAT) lanes, and queue jumps at intersections.

Preserve Easements and Rights-of-way Required for the UVTN

Based on the planned UVTN, the City should (in the cases where streets fall within their jurisdiction) make the necessary arrangements to ensure that UVTN corridors can be developed with the necessary levels of transit priority and travel time.

Actions could include:

- Incorporation of UVTN streets into planning tools such as the comprehensive plan, parking policies, street hierarchy, urban design, pedestrian and bicycle plans, etc.
- Zoning and urban design controls at key stations, stops or transfer points.
- Establishment of setbacks or easements along rights of way that might need future expansion to accommodate the UVTN.

Parking controls

Parking controls are one of the most potent tools that the City has to bring about a mode shift towards transit, as well as to create additional movement space in a constrained right of way through peak-hour or 24-hour parking restrictions.

Pedestrian and cyclist access

The amenity and safety of access to transit lines has a strong influence on mode choice. By providing pedestrian- and cyclist-friendly urban environments, the City will better achieve their transportation goals.

[15] Many of these techniques are described in King County Metro, Six-Year Transit Development Plan, pp 5-4 to 5-9.

Key Implementation Objectives Shared with Other Agencies.

Objectives that the City should promote when dealing with other agencies such as King County Metro or the State are outlined below.

Proactive rather than reactive transit provision

While the UVTN network does not need to be established all at once, its usefulness and developer confidence will depend on its ability to stay 'one step ahead' of land use and travel demand.

In locations where large-scale redevelopment is planned, service quality, reliability and speed should ideally be in place before significant redevelopment commences.

The following table provides an indication of the ideal relationship between land use development / redevelopment, degree of UVTN infrastructure implementation and UVTN level of service delivery.

Figure 4-1 Relationship between Land use, UVTN implementation and UVTN service delivery

Stage of UVTN Development	Stage of land use development/ redevelopment to level required by UVTN	UVTN infrastructure - Degree of implementation/ level of commitment	UVTN - level 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 levels, 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 secondary transit facilities provided.	None, other secondary transit service provided.

Explore *benefit sharing* between transit operators and land developers

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.

Key Implementation Objectives Led by King County Metro

Metro is largely or solely responsible for the following actions:

Ensure adequate transit speed and reliability

While the City controls the streets that Metro operates on, Metro also has considerable responsibility in ensuring adequate travel speed and reliability. In fact, Metro, unlike many agencies, has a separate department dedicated solely to this purpose. Influential factors it controls include:

- **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. King County Metro and the City of Seattle already have policies to increase stop spacing on core routes, focusing on a prioritized network, and Metro is leading the implementation of this policy. 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.

- **Low Floor Vehicles.** Boarding is much faster on low floor vehicles. The difference is huge for wheelchairs but 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 even when crush-loaded.

- **Fare Collection Changes.** Proof-of-payment and prepaid fares can reduce boarding times considerably. 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.

Service Provision

The UVTN concept is utterly dependent upon transit service that is fast, frequent and reliable. In the case of bus service, which is the most vulnerable to disruption, King County Metro is responsible for the actual delivery of service, though the City determines its operating environment. (The operator for future mixed-flow streetcar services, potentially also part of the UVTN, remains to be determined.) King County is also responsible for the allocation of its service hours and its routing structure. Changes must be approved by the Metro King County Council, and the Council must have clear justification for taking service away from lower performing routes to add it to the UVTN. King County should be working actively with the city to increase its services honoring the constraints of its policies. Ultimately, the relationship between the City and King County Metro may need to be revised to give the City more control over services that do not extend beyond the city or affect transit in the rest of the county.

Branding

Metro controls its stops, vehicles, maps, and overall marketing strategy, while Sound Transit also has its own overlaid "brand." Coordinating these factors together into an overall "branding" strategy is critical to the success of the UVTN.

Key Implementation Objectives Led by WSDOT

WSDOT controls the state highways and the HOV lanes that offer huge advantages to many of Metro's express bus routes. WSDOT will need to manage its HOV facilities so that they offer high reliability and low travel time to the express routes that will likely comprise portions of the UVTN. Major projects such as the Alaskan Way Viaduct and Aurora BRT line will also have major influence on the success of the UVTN.

Key Implementation Objectives that are the Responsibility of Others

The Monorail Authority, Sound Transit and other agencies must continue to be strong partners with the City. Sound Transit and the Monorail Authority (or a successor to the latter) will be operators of rail portions of the UVTN. Sound Transit may also operate some bus portions as part of its ST Express program, particularly in corridors such as Lake

City Way that are both intra-Seattle and regional, though the main ST role for mobility within the city is expected to be Central Link LRT.

Summary of UVTN Criteria

King County Metro already has detailed criteria to screen and prioritize potential transit improvements. Those for speed and reliability investments, for example, consist of bus volumes; passenger volumes; congestion/delay; cost; schedule; operations and maintenance support from the local jurisdiction; feasibility; and consistency with Six-Year Plan. These would not be affected; rather, an additional criterion would be added: whether the improvements are on the UVTN. This should not make any difference to the outcome of the prioritization exercise, since the UVTN will carry the highest volumes of passengers and buses, and (as noted above) the King County Metro Six-Year Plan will have been reconciled with the UVTN process. All other things being equal, though, the proposed "UVTN factor" would tilt the balance in favor of the corridors to which the City has made a long-term commitment in land use policy, as opposed to those where a short-term need may exist but no long-term commitment has been made.

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

- 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.
- 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.
- Anchors for each UVTN line – the start point and end point – should be either an Urban Village or a logical transfer point such as a rail or monorail station. Two areas that are not technically Urban Villages are considered acceptable anchors due to existing levels of development: Alki Beach (SW Admiral Way at 63rd Ave) and the Children's Hospital area (Sand Point Blvd to approximately 55th Street.)

Note that all of these factors will change over time. The relationship between land use and ridership will also be the subject of more research that may cause refinements in the UVTN thresholds. While change is inevitable, an overriding goal of the UVTN is permanence -- the same permanence that developers currently recognize as represented only by rail. Once a corridor is built and served to UVTN levels, it should not drop below those levels. For this reason, the City should err on the side of setting high thresholds for the UVTN, while maintaining a broad category of Candidate corridors (as defined in Section 4.5.2 above) and conducting more detailed research that could lead to additional UVTN service at lower density thresholds.

In the case of Urban Villages where a new development plan will allow the area to cross a key density threshold, the UVTN should be expanded at the same time – or just in advance of – the density increase.

In addition, the UVTN should be adjusted to account for a variety of influential factors, including:

- **Barriers**. Bridges, steep slopes, water bodies, freeways and other barriers will strongly influence the shape of the UVTN, forcing service in some corridors over others and overriding the standard of 1/2 mile line spacing.
- **Line Spacing**. In general, parallel UVTN routes should be a minimum of a half mile apart from one another, but exceptions should be made where barriers prevent a given line from serving a key area near it.
- **High Ridership Areas.** Locations with atypically high transit ridership, such as places with high concentrations of students or transit-dependent residents may merit UVTN-level service even if they miss the appropriate density threshold.
- **Achievability of Quality of Service Standards.** An effort to refine Seattle's transportation performance measures and street typologies in order to implement the UVTN being undertaken simultaneously to the development of this document. A set of quality of service measures including frequency, speed, reliability, loading and hours of service has been developed. If these standards cannot be met in aggregate over a route segment, then the line does not qualify for UVTN service regardless of density.

Summary of UVTN Features

The UVTN, then, will have the following features:

- **Policy Frequency and Span.** The UVTN by definition operates at least every 15 minutes for at least 18 hours a day every day.
- **Wide Route Spacing.** Parallel UVTN lines are no less than 1/2 mile apart, except (a) where physical or topographical barriers reduce the catchment area of a given line (b) in the CBD or other areas of comparable density.
- **Easy Connections between Lines.** Transferring in a transit network is an unavoidable as turning a corner when driving. The convenience of transfers will be maximized on the UVTN, through the high frequency of service and also through special attention to the physical facilities at transfer points.
- **Good legibility and usability.** The UVTN system will be easy to comprehend (at a macro / system level) and easy to navigate (at a micro / user level).

Chapter 5. The Proposed Network

Building on the previous chapters of this report, this chapter presents a proposed Urban Village Transit Network. This network was created by applying the principles outlined in the previous chapter to the projected development pattern for the year 2030. Once this network was developed, corridors were selected from it for 2007 implementation. The 2007 network is described in Chapter 7.

Process

The development of the network proceeded as follows. Chapter 4 provided some of the theory behind each of these steps.

- A rapid transit network was assumed as the core of the UVTN. This network, selected in consultation with the sponsoring agencies, consists of:
    - Sound Transit LRT Phase I and II extending north at least to Northgate. The alignment recently selected by Sound Transit (via First Hill, Capitol Hill and Montlake) is assumed.
    - Sound Transit cross-lake services, either bus or rail, providing express service between downtown and the existing bus stations at I-90/Rainier and SR 520/Montlake.
    - Monorail Green Line Phase I, and Phase II Northgate extension.
- The Urban Villages and Urban Centers (shown in Map 5-1) in the Comprehensive Plan were identified, and the following rules were applied:
    - The UVTN must serve all Urban Villages.
    - The UVTN offers no-transfer service between all Urban Centers and downtown.
    - The UVTN is sufficiently complete that travel between any two points may be completed along the network along a logical route.
- The maps of population and employment by TAZ were used to identify other areas deserving of UVTN-level coverage, with emphasis on 2030.
- Parcel-level zoning was also reviewed to identify areas with zoned density (built or otherwise) that may not have been classified as Urban Villages. Two nodes that are not Urban Villages were identified as equivalent to an Urban Village in built density, and therefore treated as Urban Villages. These are Alki Beach (SW Admiral & 63 Avenue) and the Children's Hospital area (NE Sand Point Road to Princeton Avenue/NE 55 St).

- The transit analysis maps were used to identify key transit routes that have already demonstrated their success. This was used as a confirming factor. Of particular use are the daily transit segment boardings per mile.
- Every segment in the contemplated network was driven by the Project Manager, so that geographical issues, especially topography, could be explored in detail. The intention was to create a system that would make sense "on the ground," not just in planning. Segments that differ from current Metro operations[16] were confirmed as operable and logical thorugh this review, while others were found to be inoperable and discarded.
- The 2030 Network was reviewed with key planning staff at King County Metro. It was also reviewed within the city, including relevant staff at SDOT and the Department of Planning and Development. These agencies offered further insights that led to refinements to the network.

Network Description

Map 5-5 at the end of this chapter shows the recommended UVTN. Local corridors are presented as either Definite (red) or Candidate (blue). This section presents the same networks in tabular form, including notes on each corridor. Figure 5-1 shows all the bus corridors in the Definite UVTN network. Figure 5-2 shows the bus corridors identified as Candidate.

[16] For example, the use of 14th Avenue between Madison and Yesler as a new crosstown corridor.

Figure 5-1 2030 Definite UVTN Corridors

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
1	C (SLU)	Fairview, Stewart/Virginia OR Westlake, Fairview, Eastlake	Stewart	University Dist.	x	x		x	x	x	x	This is the current Line 70 along Fairview/Eastlake. Alternative routing via Westlake (south of Valley) accommodates the possibility that the South Lake Union streetcar could achieve UVTN standards, and could be extended to the University District, thereby replacing the bus service. In all other streetcar scenarios, this bus service remains as UVTN.
2	CBD	1st, Cedar	Denny & QA Ave	3rd & Cedar	x	x	x	x	x	x	x	This short link connects the Queen Anne Ave corridor to downtown's 3rd Avenue Transit Spine
3	CBD	3rd	Cedar	Jackson	x	x	x	x	x	x	x	The Transit Spine, designed to accommodate the local UVTN corridors that flow north-south through downtown.
4	CBD	James OR Yesler, 9th	3rd	9th & Jefferson	x	x		x	x	x	x	Current service between downtown and First Hill is via James. Yesler/9th is a possible alternative that would avoid interaction with freeway traffic.
5	CBD	Olive OR Stewart OR Virginia	1st	I-5	x	x	x	x	x	x	x	These streets are included because they have significant all-day bus volumes, primarily due to major express bus corridors. They also handle high volumes of peak hour buses.
6	CBD	Pike/Pine	1st & Pike/Pine	Pine & Summit	x	x	x	x	x	x	x	The downtown "couplet" portion of Pike/Pine. This couplet will gradually be detached from north-south operations in the downtown, so that all services from Capitol Hill flow through to the vicinity of 1st Avenue.
7	CBD E	Yesler OR Jackson	1st	MLK	x	x		x	x		x	Jackson is a possible streetcar corridor, and streetcar could be the UVTN service if it extended to 23rd. Otherwise, Jackson or Yesler is needed as a bus corridor. Jackson is more intensely developed; Yesler is faster and more reliable because it avoids freeway traffic.

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
8	E	14-15 Av, Boston, 10th Av E, Roanoke, Harvard	Jackson	University Dist.	x		x	x		x	x	A proposed new north-south corridor across Capitol Hill, designed to provide a complete grid of UVTN services connecting this area to both downtown and the University district, and also permitting easy local travel within the area. While Seattle U. fronts on 12th, it is readily accessible from Broadway. 14th is recommended to optimize spacing between Broadway and 23rd.
9	E	Broadway, 10th Av E, Roanoke, Harvard	Jackson	University Dist.	x		x	x	x	x	x	The LRT extension to Northgate is expected to serve Capitol Hill directly. At that time, Broadway service can be oriented north-south in order to function as part of a grid system, maximizing the range of possible trips.
10	E	Jefferson, Cherry	9th & Jefferson	MLK & Cherry	x	x		x	x	x	x	The existing Line 3/4 routing.
11	E	Madison	6th Av	23rd Ave	x	x	x	x	x	x	x	The two-way segment of Madison would be part of the UVTN out to 23rd, the last UVTN transfer point. Beyond that it becomes "candidate."
12	E	Madison, Marion	Western Av	6th Av	x	x	x	x	x	x	x	The downtown "couplet" portion of the Madison corridor. Service would be revised to run east-west across downtown to Western, ending with a direct connection to the Colman Dock pedestrian bridges.
13	E	Olive, John, Thomas	Pine & Summit	23rd & Thomas	x	x		x	x	x	x	Current alignment of Lines 8 and 43 east-west across Capitol Hill.
14	E	Pine, Union	Pine & Summit	MLK & Union	x		x	x	x	x	x	Pine, rather than Pike, is recommended from Summit to 14th, due to proximity to SCCC and more pedestrian-oriented uses. To complete a grid pattern, this segment would flow through to Union east of 14th.
15	E SE	23-24th Av	Montlake Stn	McClellan LRT	x	x			x	x	x	The major crosstown corridor now served by Lines 43 and 48. Future planning for I-90/Rainier station area should emphasize pedestrian connection from 23rd as well as Rainier for intra-UVTN connectivity.

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
16	N	92nd St, 1st Av NE	92th & Meridian (NSCC)	Northgate LRT	x	x	x	x			x	This routing around the south side of NSCC and along 1st Avenue NE is important intra-Northgate circulation, although a pedestrian bridge between Northgate TC and NSCC is also recommended.
17	N	Aurora LIMITED STOP	Denny	145 St	x			x	x	x	x	"Rapid Bus" service, as identified in the Intermediate Capacity Transit (ICT) study, presumably continuing at least to Aurora Village. One possible configuration is to have fewer stops, but add an overlay local north of 85th, possible connected via Green Lake into Roosevelt LRT. Could be part of an ultimate Seattle-Everett BRT via Hwy 99.
18	N	Green Lake, 65th. (Options for Aurora to Wallingford Ave: Either Green Lake OR 85th, Wallingford)	85th & Aurora	Roosevelt LRT	x			x	x	x	x	Recommended as primary connection from NW 85 St corridor to LRT, but could also be used by a local service covering Aurora north of here. RECOMMENDED PROJECT to accommodate bus movements from 85th to Green Lake across Aurora, eliminating the need to operate the slow and constrained Wallingford Avenue segment used today.
19	N	Greenwood, Phinney, 43 St, Fremont	Fremont Br & Nickerson	NW 145 St (City limits)	x			x	x	x	x	The existing Line 5 corridor. Intended to continue north to Shoreline Community College.
20	N	N 45 St OR N 50 St.	Stone Way	University Dist.	x	x	x	x	x	x		The main east-west corridor through Wallingford, linking University District and Ballard. 45th is central to the demand but necessarily very slow. 50th may be the long-term alternative for through-service, leaving 45th for circulator service. To be studied.
21	N	Wallingford, Meridian (NSCC)	85th & Aurora	Northgate LRT		x	x	x		x	x	Another possible way to connect from NW 85 St to LRT. Important as access to NSCC and dense areas SW of there.

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
22	N	N 115 St, Meridian Av	115 & Aurora	105 & Meridian			x	x		x		Necessary to serve Northwest Hospital and the dense development on 115th east of Aurora.
23	N	N/NE 40 St OR N/NE Pacific St.	Stone Way	University Dist.				x	x	x		Two options for the link between University District and Fremont. 40th is slower but is the historic bus route. Pacific is faster and has considerable recent development.
24	N NW	Holden, NE 105 St, Northgate Way	Crown Hill	Northgate LRT		x		x		x		The local link between the end of the monorail Green Line and Northgate TC.
25	NE	5 Av NE	Roosevelt LRT	Northgate LRT	x	x		x			x	A dense corridor mostly now served by Lines 66-67. Service is recommended to continue south to serve a portion of the Green Lake district.
26	NE	15 Av NE	University Dist.	Roosevelt LRT	x	x		x	x	x	x	Important circulation within and between the University District Urban Center and the Roosevelt Urban Village.
27	NE	15 Av NE, Pinehurst	Northgate LRT	145 St	x			x	x			Densest corridor extending north from Northgate, presumably continuing into Shoreline.
28	NE	25 Av NE	University Dist.	NE 65 St	x			x	x		x	Serves University Village and locally dense areas with heavy student housing. At 65th, service could turn west, unless Candidate corridor extending further north is developed.
29	NE	Lake City Way	Roosevelt LRT	145 St	x			x	x	x		A possible candidate for future limited-stop or Rapid Bus service flowing on into the county, but also a priority for intra-Seattle UVTN service due to the Lake City Urban Village.
30	NE	Montlake Av	Montlake Stn	NE 45 St	x		x	x	x		x	Circulation within the Urban Center of the University District

					Justification							
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31	NE	NE 45 St, Sand Point	University Dist.	Princeton/Sand Pt (NE 50 St)	x		x	x	x			Children's Hospital is a must-serve destination, supported by high densities in this segment. After Princeton, density is lower (though very high in spots) and no strong anchor is available. Defined as a Candidate corridor beyond Princeton (NE 55 St) to NE 74 St.
32	NE	NE 65 St	Roosevelt LRT	25 Av NE	x			x	x			Existing density supports this east-west corridor from Roosevelt LRT to 25 Avenue NE. Corridor could flow through to 25 Ave NE corridor extending south to University District.
33	NE	Pacific St	Montlake Stn	University Dist.	x		x	x	x	x		Internal circulation within University District Urban Center, and likely routing of 23rd Avenue crosstown service. Connects to proposed Montlake LRT station.
34	NW	24 Av NW	NW 65 St	NW 85 St					x		x	Recommended by KC Metro staff as the strongest north-south corridor in the NW area, once 15th Avenue demand is partly shifted to monorail.
35	NW	Leary, 20 Av NW	20 Av & Market	14 Av NW & Leary	x	x		x	x	x	x	Approach route to Ballard for service to/from the east, recommended by KC Metro staff. Also important as internal circulation for Ballard.
36	NW	Leary, NW 39 St	14 Av NW & Leary	Stone Way				x		x		Ballard-Fremont link, flowing through to University District.
37	NW	Market, N 46 St	32 Av NW & Market	Stone Way	x			x	x	x	x	The main Ballard-Wallingford link, continuing to the University District. Identical to existing Line 45.
38	NW	NW 85 St	24 Av NW	Aurora	x			x	x	x	x	Very high-demand east-west corridor. Would continue to LRT (either Northgate or Roosevelt).
39	SE	1 Av S	Yesler	Spokane	x		x		x			Recommended as a local service segment even after most through-service is replaced by Monorail. Will require further review to determine operability in the light of stadium traffic.

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
40	SE	15 Av S, Albro, through Georgetown and South Park to White Ctr	Jackson	Westwood/ White Center		x		x		x	x	The current Line 60 alignment, providing circulation in Georgetown and South Park, then connecting these areas west to White Center. Density is intermittent, but the connection provided is important if South Park is to be an Urban Village. (Note: South Park Bridge is essential for this alignment.)
41	SE	4 Av S, Michigan, 1 Av S Br, SR 99 LIMITED STOP	Spokane	South Park is last Seattle stop. Could continue to Burien.				x	x	x		Direct service between South Park and downtown, reflecting South Park's role as an Urban Village. Designated as limited-stop because there is no significant local market between Michigan and Spokane, which in turn raises the possibility that this could be a future Rapid Bus project linking Seattle and Burien. Requires new connection from 4th & Michigan to 1st Av S bridge. Alternative: Continue 1st Av S local corridor to South Park.
42	SE	Beacon, Myrtle, Othello	12th & Jackson	East end of Othello	x		x		x	x	x	Beacon to Myrtle is a strong corridor despite some permanent gaps in development. Corridor would turn east at Myrtle and flow through into Othello, serving Othello LRT and ending at Seward Park Avenue. Beacon south of Myrtle lacks the density for UVTN service.
43	SE	E3 Transitway, LIMITED STOP	King St LRT	Spokane					x			Important for regional rapid transit, both bus and rail, for the foreseeable future.
44	SE	Rainier, Rainier Beach	Jackson	Henderson LRT	x	x		x	x	x	x	One of the city's densest transit markets, with a nearly continuous Urban Village designation. LRT on parallel ML King Blvd will remove some of the demand for long-distance trips along this corridor, but UVTN service will continue to be needed to handle local demand, especially as further growth occurs.

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
45	SE SW	Columbia, Alaska, Spokane, Admiral	Rainier & Alaska	63 Av SW & Admiral		x		x		x		East-west crosstown corridors are hard to draw on the south side of Seattle, because of significant bottlenecks, the lack of through streets, and the gap in demand in the industrial area. One corridor, however, is justified, using Spokane Street (surface lanes, permitting direct connections to both monorail and other buses). East end flows into Columbian Way to connect with Rainier at Alaska. West end flows into the Admiral corridor to Alki Beach. Connects to Delridge monorail station and Columbia City LRT station.
46	SW	California	Admiral	Morgan Jct	x			x			x	Given the monorail stations at Alaska Junction and Morgan Junction, this becomes an entirely local corridor, already developed densely enough to support UVTN service.
47	SW	Delridge	Spokane	Westwood/ White Center	x	x		x	x	x	x	A strong corridor with substantial density built or zoned, and Seattle's direct link to the Westwood and White Center area. Connections to the monorail at Delridge station are assumed.
48	SW	Morgan, 35 Av SW, Roxbury	Morgan Jct	Westwood/ White Center		x		x		x		A link from the monorail terminus at Morgan Junction to Westwood and White Center. Probably flows through to the California Avenue service. Serves most of the denser development along 35 Ave SW, the rest of which is considered a Candidate corridor.
49	**W**	5 Av N, Taylor Av N, Boston	Denny & 5 Av N	3 Av W & McGraw	x			x	x	x		The current Line 3/4 corridor serving the east slope of Queen Anne Hill and the east side of Seattle Center.

					Justification							
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Existing Linear Density**	**Existing Anchor Density**	**Existing Institution**	**Zoned Density**	**Existing Ridership**	**Connects UV with UC**	**Mobility within UV, UC**	**Considerations in Recommendation**
50	W	Dexter, Nickerson	Denny & Dexter	Fremont Br & Nickerson	x	x	x	x	x	x	x	An important transit resource for CBD-Fremont travel, and part of the larger South Lake Union area.
51	W	Nickerson, 15 Av W	Dravus & 15 Av NW	Fremont Br & Nickerson	x	x	x		x			Nickerson service logically connects to the Dravus monorail station once it is complete. Important not just for monorail connections but also for local connections within Queen Anne/Magnolia area.
52	W	Olympic, 10 Av W, Gilman Dr W	Denny & QA Ave	Dravus & 15 Av NW	x					x		Existing Line 1 from downtown to 10th Av W & Howe. From here, existing line continues north but density pattern is stronger via Gilman, which also provides the only operable connection to Dravus monorail station.
53	**W**	Queen Anne Ave., McGraw, 3rd Av W	Denny & QA Ave	Nickerson & 3rd Av NW	x			x	x	x	x	Existing Line 13, the main link between downtown, Upper Queen Anne, and Seattle Pacific University.

* Areas (used to assist in locating corridor on map)

- C(SLU) S of Ship Canal, north of Denny, between Aurora and I-5 (South Lake Union)
- CBD S of Denny, N of Jackson, W of I-5 (Downtown Seattle)
- E E of I-5, S of Ship Canal, N of Jackson
- N N of Lake Union and Ship Canal, between Aurora and I-5
- NE N of Ship Canal, E of I-5
- NW N of Ship Canal, W of Aurora
- SE East of 1st Av South, S of Jackson
- SW West of 1st Av South

Figure 5-2 2030 Candidate UVTN Corridors

				Justification						
City Subarea	**Primary Street of Segment**	**Between ...**	**And ...**	**Built Density**	**Built Institution**	**Zoned Density**	**Ridership**	**Connects UV, UC**	**Mobility within UV, UC**	**Notes**
E	MLK	Madison	McClellan LRT	x			x		x	Some density, but too close to 23rd to be definite.
E	Madison	23rd Ave	Madison Park				x			Completes Madison corridor, but w/lower ridership.
E W	Mercer (Lakeview, Bellevue, Roy)	Elliott & Mercer	Broadway & Roy		x	x		x	x	Important new crosstown for South Lake Union. Possibility of using Republican between Dexter and Fairview, if this is developed as a more transit-friendly street.
N	Wallingford Av, Meridian, 65th St	40th & Wallingford	Roosevelt LRT	x			x			Difficult operations on narrow streets LRT will replace some of the N-S market here.
N NE NW	130 St, 125 St	Greenwood	Lake City Way			x				Definite if LRT station is built at 130 St.
NE	NE 65 St	25 Av NE	35 Av NE			x				Would be upgraded to UVTN only if 35 Avenue NE were also.
NE	35 Av NE	NE 125 St	University Dist.				x	x		Built at low density but with some strong neighborhood nodes. Could become important as a link between Lake City and University District, though Lake City Way should be preferred for this purpose.
NE	25 Av NE	NE 65 St	Lake City Way					x		Low density, but possibly needed to connect 25 NE corridor to Northgate or Lk City.
NE	Sand Point Blvd.	Princeton/Sand Pt (NE 50 St)	NE 74 St	x	x		x			Sand Point beyond Princeton has areas of density but is a weak anchor. Could become Definite corridor given further development around Magnuson Park.
NE	Current 74 Routing (50 St., Ravenna, 55 St)	University Dist.	Princeton/Sand Pt (NE 55 St)	x		x				Various pockets of density, including Greek Row and areas north and west of University Village, but much weaker than other UVTN corridors in the area.
NW	15 Av NW	NW 85 St	Market			x			x	Possible residual local market for trips too short for monorail.
NW	65 St	15 Av NW	24 Av NW			x			x	Possible as part of internal circulation system for large Ballard UC.
SE	ML King	McClellan LRT	Henderson LRT	x		x	x	x	x	Could be a significant local market along MLK due to wide LRT station spacing.
SE	Michigan, Bailey, Albro, Swift, Othello	SR 99	Othello LRT			x		x	x	A possible crosstown corridor, oriented toward Morgan Junction, but the corridor through South Park is the first priority.
SW	35 Av SW	Avalon	Morgan			x		x		This segment lacks the continuous density to support UVTN. Definite corridor for outer 35th extends from Morgan Jct.

				Justification						
City Subarea	**Primary Street of Segment**	**Between ...**	**And ...**	**Built Density**	**Built Institution**	**Zoned Density**	**Ridership**	**Connects UV, UC**	**Mobility within UV, UC**	**Notes**
SW	16 Av SW, etc.	Delridge & Graham	16 Av & Holden		x		x			Community College is the only significant market on this segment.
SW	Morgan, Dumar, Holden	Calif & Morgan	SR 99			x		x		West side of possible crosstown line linking Morgan Junction and Othello LRT
SW	Henderson, 9 Av SW	Westwood/ White Center	SR 99			x		x		Possibly useful as link to Westwood / White Center.

* Areas:

E	E of downtown or Lake Union, between Ship Canal and Yesler
N	N of Lake Union and Ship Canal, between Aurora and I-5
NE	N of Ship Canal, E of I-5
NW	N of Ship Canal, W of Aurora
SE	East of 1st Av South, S of Yesler
SW	West of 1st Av South

Operating Cost Impact

For the purposes of this study, we use revenue hours (including layover) as the key indicator determining operating cost. Actual cost will also reflect other factors outside the scope of this study, such as labor agreements, fuel prices, and the locations of operating bases. However, revenue hours are a reasonable proxy for operating cost at this level.

The revenue hours of service are driven by three of the major Performance Criteria

- Frequency and Span. More frequent service, and longer spans of service, cost proportionally more.
- Speed. Faster service costs proportionally less.

Figure 5-3 shows how these factors interact. The figure for estimated annual revenue hours, 1.1 million, reflects current bus services within the City on future UVTN corridors.

The Frequency and Span standards raise the revenue hours, and therefore operating cost, by 69%. However, the Speed standards save 11%, because faster bus service means fewer buses needed to cycle a route. The combined effect is a growth of around 53%, or just over 2% per year.

This estimate presumes that all non-UVTN corridors continue to operate at current levels of service. It also presumes that duplicative service along UVTN corridors is rationalized to provide UVTN frequency, even if this means that certain direct services are replaced by fast connections.

Figure 5-3 Revenue Hours Impacts of UVTN

SCENARIO		Revenue Hours				Change in
Freq/Span	Speed	Weekday	Saturday	Sunday	Annual	Annual Hours
Existing	Existing	3466	2486	1802	1,118,537	
Existing	Policy	3091	2217	1607	997,454	-11%
Policy	Existing	5592	4194	4194	1,888,656	69%
Policy	Policy	5079	3809	3809	1,715,299	53%

Chapter 6. Passenger Facilities on the UVTN

Types of UVTN Facilities

The UVTN represents two large categories of capital cost for the city:

- Improvements to signals and roadways that help transit to achieve and maintain the UVTN standards for speed and reliability.
- Fixed facilities that serve transit passengers with a level of amenity that is appropriate given the central role of transit in the city's transportation system.

The first category of improvements will arise gradually out of the ongoing process of implementing UVTN corridors. Some preliminary identification of projects has been done for the 2007 UVTN, as discussed in the next chapter.

The second category, fixed facilities, can be enumerated for the entire UVTN. There are two categories of fixed facilities:

- Facilities for bus stops. ALL stops on the UVTN must have a certain level of amenity that (a) makes the UVTN visible and prominent as a "brand," standing out against the background of other transit services and (b), permits customers to make good use of their time while waiting.
- Connection Points. Crucial points where passengers make connections need to have special attention. These are all important stops, and have all the requirements of any other major stop, but they also need attention to the path of pedestrian movements making each connection, including street crossings, sidewalk width, etc.

This chapter focuses on these two categories. One section discusses bus stops in general, while the second discusses UVTN connection points in particular.

Regional Peak-Intensive Facilities

It is important to note that there is a category of facilities that are not part of the UVTN, but that do have a high importance for the region. These represent points of access that generate high peak demand but not high all-day demand – or at least points that do not have high all-day service for whatever reason. Examples include:

- Ferry Terminals at Colman Dock and Fauntleroy.
- Routings into and through downtown (and the University district) used heavily by regional peak commuter buses, but less so by all-day service.

As the rapid transit system expands, the latter category should diminish over time. However, they will still exist to some degree in the foreseeable future, probably including the buildout of a Sound Transit Phase II.

Because these facilities are, by definition, not part of the UVTN, and because much of their value lies outside the City, we recommend developing a separate category for these "Regional Peak-Intensive Facilities." These would be facilities that do not serve UVTN-level services (either intracity or regional) but that do serve important regional access markets at lower frequencies, and at certain times of day.

Facilities at UVTN Bus Stops

The UVTN should be the highest priority for physical facilities designed to improve the customer experience. These facilities typically provide three kinds of benefit:

- Personal safety and comfort improvements include things like shelters, benches, and adequate lighting.
- Time-value improvements increase the range of things that can be done while waiting. The most important of these is real-time information, which informs a customer about the exact length of the wait and thus permits them to leave the stop to conduct other business. Simpler time-value amenities include newsracks and adjacent vendors, as well as adequate light for reading.
- Time-saving improvements for the transit operation. Physical configurations of a stop for fast boarding and alighting are one example. In addition, good information displays in shelters reduce the need for passengers to ask questions of transit operators, which in turn means less delay.

Investment in facilities on the UVTN pay off in two ways:

- Stops with high all-day ridership (which will tend to be on the UVTN) are the logical priorities for facility investment, because these facilities will serve the most

people and therefore have the greatest possible effect on the transit riding experience.

- Distinctive and attractive stops convey a subliminal message that the UVTN is permanent and reliable. This message does more than any signage or advertising to raise awareness about the UVTN services.

The latter value is so strong that the UVTN needs its own "look and feel." Ideally, all stops would have fixed, architectural shelters, as opposed the prefabricated bus shelter that is common today. These shelters would have common design elements that would convey that this is part of the UVTN, though they would obviously differ by location.

In practice, of course, it is unlikely to be cost-effective to put shelters and other customer amenities at every stop, but several strategies can be employed to reach the same goal cost effectively:

- Maxmize stop spacing. King County Metro is already developing wider stop spacing on many of its future UVTN lines. This respacing means that more people will use fewer stop facilities, permitting greater investment at each.
- Establish an aggressive shelter and amenities program covering at least half of the stops in the network.
- In deploying these amenities, give priority to (a) transfer points, and (b) other high-ridership stops. In practice, a shelter program covering half of the stops will serve well over 80% of the boarding passengers on the network, because boarding demand will tend to concentrate at inbound stops and in denser areas.
- In the design scheme for the UVTN stops, include an element that can be represented using a bus stop sign, and use this sign at the remaining unsheltered stops on the UVTN. Vancouver's B-Line system is a good example of this: The distinctive station-like shelters along south Granville Avenue are well known, but other stops on the system have signs that echo the design of those shelters, as along Vancouver's Broadway for example.

Connection Points

Of the fixed facilities associates with the UVTN, the most critical are connection points. A transit network must provide access from every point on the network to every other point, but of course it is not possible to operate direct service from everywhere to everywhere else. Inevitably, customers must connect from one service to another. As the custodian of the physical environment where connections take place, SDOT[17] has a direct responsibility for the quality of these connections. King County Metro, of course, is responsible for the

[17] And other agencies at certain points, such as WSDOT for state highways; Sound Transit and SMP for fixed rapid transit stations.

operational aspects of connections, and the two agencies work together on the crucial matter of siting stops.

The City has already identified a taxonomy of major connection points. These are:

- Multimodal Hubs
- Transportation Centers
- Station Areas

Of course, these were defined prior to the definition of the UVTN. Since connection points are a function of the service design, it would be normal that there would be some revision to these categories in light of a specific network. However, the UVTN connection points do align with these previous categories to a large degree.

For UVTN purposes, we recommend classifying major connection points as follows, with the priorities indicated. For the purposes of these terms, the limited-stop corridors proposed within Seattle are considered local, not rapid:

- **Rapid to Rapid** *(=Multimodal Hub)*. Rapid transit lines (bus or rail) connect with each other at these points. These include the major downtown transfer stations (LRT to monorail) but also include Northgate, where regional bus services from further north would connect to LRT, and Montlake, where translake bus services (and possible future rail service) would connect to LRT. In general, these facilities should be part of new rapid transit projects and will be regional priorities, since they facilitate travel beyond city limits. They are:
  - Northgate LRT (serving LRT and rapid bus service extending further north or east, plus future monorail)
  - Montlake LRT or University District LRT (if served by future SR 520 rapid bus or LRT service). Montlake is not currently defined as a multimodal hub, but will need to be added if LRT adopts this route.)
  - Westlake Hub (Westlake LRT, 5th/Stewart monorail)
  - King St. Station (LRT/monorail, plus I-90 bus or rail)
  - Colman Dock in combination with Pioneer Square LRT/monorail. (Not strictly a UVTN hub, but a continued city and regional priority.)
- **Rapid to Local** *(Transportation Centers and Station Areas)*. These are the points where UVTN local lines connect with regional rapid transit, for both intra-Seattle and regional trips. These should be prioritized based on the population of the UVTN catchment area that makes its primary rapid transit access at each point. The Rapid-Local connection points are:
  - All LRT and monorail stations not listed above, *except* Elliott/Mercer and 65th St monorail, which lack UVTN local connections.

  - The Rainier/I-90 station for translake bus and possible future translake rail.

- **Local to local.** Everywhere that two UVTN lines cross, it is important to optimize the speed and convenience of transferring. These, too, can be prioritized according to the populations served, and the volume of trips likely to be connecting at that point. For example, Market & 24th Ave NW is a local-local transfer point, but not a major one. The most important local-local connections are likely to be:
  - Fremont (35th & Fremont, plus Aurora stop)
  - 85th & Aurora
  - Broadway & Pine
  - 14th, 15th & Madison, Pine, and Union
  - 23rd & Madison, Thomas
  - Boren, Rainier, 12th/14th, & Jackson/Yesler (one or several points, depending on alternative corridor configuration)

Figure 6-1 is a complete list of UVTN transfer points, with their existing and recommended categories.

Figure 6-1 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	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	

					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	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		
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	SA?	LR	C	X		X	X	X	
E		Broadway & Jefferson		LL	C	X			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
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	
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	

					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	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	

Chapter 7. First Steps: The 2007 UVTN

Beginning to implement the UVTN concept involves two significant decisions:

- Defining 2007 implementation goals.
- Choosing 2007 corridors.

This chapter presents recommendations for each, based on consultations between SDOT and King County Metro staffs.

Success in improving the 2007 corridors will be important to two other efforts, which will also be ongoing:

- Establishing the 2030 and 2007 networks as a matter of city policy, and a point of reference for many agencies.
- Developing a "branding" and "look and feel" for the UVTN, through facilities such as those identified in the previous chapter, and also through signage and other public information activities.

Defining 2007 Implementation Goals

Beginning at once, the City's priorities for transit improvement should focus on the UVTN, and specifically on a set of corridors that can reasonably be established by 2007.

Before defining these corridors, it is important to have realistic goals for a successful 2007 implementation. Considering the main performance criteria for the UVTN, and the current service and monitoring methods at King County Metro, we recommend the following:

- **Frequency**. The policy headway of every 15 minutes or better all day should be achieved on the 2007 UVTN. Since little funding is available to add service between now and 2007, this means that the 2007 network must be defined as consisting of corridors that already have this level of service. Phasing in of additional 15-minute corridors, after 2007, would occur in the context of the Six Year Plan process at King County Metro, as resources permit, though span (see below) should be the top priority.
- **Span**. Relatively few existing corridors have the UVTN span (15 minute service for 18 hours a day). For 2007, evening and weekend service are not considered crucial to the UVTN. However, this should be the next priority, in the context of the Six Year Plan process.
- **Reliability and Loading**. Monitoring of these features requires further work between SDOT and King County Metro. Speed improvements (see below) will also affect these measures, so we recommend that the first initiative focus on operating speed.

- **Speed.** The primary focus of monitoring and improvement for 2007. Speed pays off exponentially for transit, because it encourages ridership and makes operations cheaper. The policy operating speed, 30% of speed limit, is far from being achieved on many UVTN corridors, while in other places it is exceeded. (See Maps 7.2 to 7.4 at the end of this chapter.) Improving speed on the corridors selected for 2007 implementation is the highest priority for capital projects and other speed-related initiatives.

Choosing the 2007 Corridors

Considerations

The 2007 UVTN corridors must be chosen with several considerations in mind:

- **Existing service.** No resources exist to deploy new high-frequency service, so 2007 corridors must be places where this service already exists.
- **Existing Speed/Reliability Initiatives.** Many efforts are already underway to improve speed and reliability throughout the city's transit network. Where these have been completed or are already programmed, the UVTN seeks to include these corridors.
- **Plausible Speed/Reliability Initiatives.** SDOT has reviewed the proposed corridors in detail, adding some and deleting others, with the aim of setting challenging but realistic goals for SDOT's own activities in design, engineering, signalization, etc.
- **2030 Network.** The 2007 network must be a subset of the ultimate 2030 network. This may sound obvious, but it goes to a central point of the UVTN. The ultimate 2030 network represents a commitment over the long-term horizon on which many economic development and capital planning projects operate, and this commitment is only credible if the 2007 network shows that existing resources are being used toward that goal. In cases where existing service does something different than what the 2030 network shows, the existing segment should not be part of the UVTN, and therefore not a priority for capital investments, unless those investments pay for themselves within a few years and therefore make sense even if the ultimate alignment is different. If a consensus develops toward a 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.

Proposed 2007 Corridors

Based on the above considerations, Map 7-1 shows the recommended corridors for 2007 implementation. Figure 7-1 shows the same information in tabular form, with notes on current activities that will contribute to achieving the policy operating speeds by 2007.

Figure 7-1 2007 Status of UVTN Corridors

					Street Classifications (Existing)				Current Performance		2007 status			
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Bike Street?**	**Arterial?**	**Transit Street?**	**Truck Street?**	**Frequency and Span**	**Speed as % of Speed Limit (Peak)**	**Include, Passing**	**Include, Challenging**	**Defer**	**Current Projects**
1	C (SLU)	Fairview, Stewart/Virginia OR Westlake, Fairview, Eastlake	Stewart	University Dist.	Yes	Principal	Major and Minor	No	15 Min or Better, Midday and Evening	> 40%	x			Projects: [per Metro] In 2005, potential spot Improvements at: 1. Fairview and Valley - extend transit only westbound turn lane and restrict left turns at nearby driveways 2. Fairview and Mercer - convert one of the northbound right turn lanes to right only except transit and develop signal phasing to provide a transit queue jump.
2	CBD	1st, Cedar	Denny & QA Ave	3rd & Cedar									x	
3	CBD	3rd	Cedar	Jackson	No	Minor	Principal	No	15 Min or Better, Midday and Evening	**20-25%**		x		1. 3rd Avenue Peak Period Traffic Restrictions: signage, lane channelization, and curb/sidewalk modifications to accommodate increased bus traffic during Sound Transit's Link Light Rail construction in the tunnel. Scheduled to Begin Construction: Late 2004/Early 2005, Estimated Cost: $959,000 from Sound Transit
4	CBD	James OR Yesler, 9th	3rd	9th & Jefferson									x	
5	CBD	Olive OR Stewart OR Virginia	1st	I-5	No	Principal and Minor	Principal and Major	No	15 Min or Better, Midday and Evening	TBD		x		Projects: 1. Olive Way Transit Priority: signage, lane channelization, traffic islands, on-street parking, and transit signalization to accommodate increased bus traffic during Sound Transit's Link Light Rail construction of the tunnel. Scheduled to Begin Construction: Late 2004/Early 2005, Estimated Cost: $338,000 from Sound Transit, $102,000 from the County. 2. North Center Study planning, 3. Downtown Bus Layover: Study and Construction scheduled for Late 2004/2005, Estimated Cost: $438,000 FTA grant
6	CBD	Pike/Pine	1st & Pike/Pine	Pine & Summit	Yes	Minor	Principal and Major	No	15 Min or Better, Midday and Evening	**< 20%**		x		1. Pike/Pine Corridor: Possibly in 2005, a near term improvement project in the Pike/Pine corridor, limits to be agreed upon, but interested in including segment from I-5 to Broadway. Parking restrictions are likely to be one of the principal tools for improving transit speed and reliability. Want to assess interest/ability of SDOT to tackle this corridor. Tunnel closure may impact schedule. Resources for this corridor are not identified outside the DSSTT closure period.
7	CBD E	Yesler OR Jackson	1st	MLK						**20-25% on both, to MLK**			x	
8	E	14-15 Av, Boston, 10th Av E, Roanoke, Harvard	Jackson	University Dist.						> 40% south of Galer			x	
9	E	Broadway, 10th Av E, Roanoke, Harvard	Jackson	University Dist.									x	
10	E	Jefferson, Cherry	9th & Jefferson	MLK & Cherry	Cherry, 12th to MLK is Bike St.	Minor	Collector (Jefferson) and Major (Cherry)	No	15 Min or Better, Midday and Evening	**25-30%**		x		1. James Street from 4th Avenue to 14th Avenue, Cherry Street from 4th Avenue to 7th Avenue: The traffic signals along this corridor will be re-timed, or synchronized, to create smoother and quicker trips for traffic, with maximum green-light time. This is part of SDOT's Traffic Signal Synchronization and Optimization Plan that will improve traffic flow in corridors throughout Seattle. Estimated to be completed in Fall/Winter 2004
11	E	Madison	6th Av	23rd Ave									x	
12	E	Madison, Marion	Western Av	6th Av									x	
13	E	Olive, John, Thomas	Pine & Summit	23rd & Thomas									x	
14	E	Pine, Union	Pine & Summit	MLK & Union	Union, 14th to MLK is a bike street.	Minor	Minor	No	15 Min or Better, Midday (Not Evening)	**20-25%**		x		1. Pike/Pine Corridor: Possibly in 2005, a near term improvement project in the Pike/Pine corridor, limits to be agreed upon, but interested in including segment from I-5 to Broadway. Parking restrictions are likely to be one of the principal tools for improving transit speed and reliability. Want to assess interest/ability of SDOT to tackle this corridor. Tunnel closure may impact schedule.

					Street Classifications (Existing)				Current Performance		2007 status			
No.	**City Sub-area**	**Primary Street of Segment**	**Between ...**	**And ...**	**Bike Street?**	**Arterial?**	**Transit Street?**	**Truck Street?**	**Frequency and Span**	**Speed as % of Speed Limit (Peak)**	**Include, Passing**	**Include, Challenging**	**Defer**	**Current Projects**
15	E SE	23-24th Av	Montlake Stn	McClellan LRT	No	Principal	Major and Minor	No	15 min or better midday (not evening)	Some portions 30-40%, others > 40%	x			Completed Route 48 zone consolidation project in 2004.
16	N	92nd St, 1st Av NE	92th & Meridian (NSCC)	Northgate LRT									x	
17	N	Aurora LIMITED STOP	Denny	145 St	No	Principal	Major	Yes	15 min or better midday (not evening)	TBD	x			1. Aurora Redevelopment between N 110th and N 145th: waiting for City PM to kick this project off; need interagency agreement for $500k 2. Aurora/Denny/Dexter Center City Proposal: City has identified a potential project to improve transit access to and through the intersection of Aurora and Denny. It entails prohibiting left turning traffic from Aurora onto Denny. This traffic would be rerouted off Aurora onto Dexter and the left turn would occur at Dexter. Rob Spillar has sketched out this concept and it is being discussed as part of the mitigation for the Aurora Viaduct project. It needs to be determined if this concept is something the city is interested in pursuing in the near term (within 3 years). If the city has a genuine interest in analyzing this concept for near term implementation, the parties would need to scope out the effort and the resources it would require. Possible for 2005..
18	N	Green Lake, 65th. (Options for Aurora to Wallingford Ave: Either Green Lake OR 85th, Wallingford)	85th & Aurora	Roosevelt LRT						> 40%			x	
19	N	Greenwood, Phinney, 43 St, Fremont	Fremont Br & Nickerson	NW 145 St (City limits)						> 30% except for 20-25% between 95th and 105th	x			
20	N	N 45 St OR N 50 St.	Stone Way	University Dist.	45th: Yes.	45th: Minor, 50th: Principal	45th: Major, 50th: Minor	No	45th: 15 min or better midday and evening	< 20%		x		Short-term focus on NE 45 St, with 50 St as possible alternate. Assuming a major corridor study will be done for Ballard to U-District to determine UVTN alignments and investments as well as idenfity short-term solutions and if feasible and funding is available implement them.
21	N	Wallingford, Meridian (NSCC)	85th & Aurora	Northgate LRT									x	
22	N	N 115 St, Meridian Av	115 & Aurora	105 & Meridian									x	
23	N	N/NE 40 St OR N/NE Pacific St.	Stone Way	University Dist.	No, but near Burke Gilman Trail	Pacific: Principal, 40th: Minor	Pacific: Not classified. 40th: Yes.	Pacific: Yes. 40th: No.	40th: 15 min or better midday.	35-40% on 40th E of Stone	x			Short-term focus on NE 40 St, with Pacific St as possible alternate. Assuming a major corridor study will be done for Ballard to U-District to determine UVTN alignments and investments as well as idenfity short-term solutions and if feasible and funding is available implement them.
24	N NW	Holden, NE 105 St, Northgate Way	Crown Hill	Northgate LRT						> 40%			x	

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25	NE	5 Av NE	Roosevelt LRT	Northgate LRT	80th to 85th only.	Minor	Major	No	15 min or better midday (not evening)	**30-35%**	x			Projects: 2007 focus is between Northgate and 80 St. [per Metro] Proposed installation of On Street Parking on 5th Avenue NE: The 5th Avenue NE Streetscape Design Project resulted in a set of design guidelines adopted by Seattle City Council that direct SDOT to pursue a pilot project of off peak on street parking on 5th Avenue NE south of NE 105th This would have the effect of reducing the number of travel lanes from two lanes to one lane in each direction of travel. Metro stated its opposition to this proposal throughout the planning process. Over 230 buses carrying close to 3,000 riders traverse this segment between 9:00am and 3:00pm. This issue remains unresolved and has impeded execution of the interagency agreement that would allow Metro to provide $200k in matching funds it agreed to commit to the city-led streetscape project.
26	NE	15 Av NE	University Dist.	Roosevelt LRT						30-35%			x	
27	NE	15 Av NE, Pinehurst	Northgate LRT	145 St	No	Principal	Major and Minor	No	15 min or better midday (not evening)	Pinehurst 30-40%, 15th over 40%	x			1. 15th Avenue NE from NE 117th Street to NE 125th Street: This project is part of the Seattle Department of Transportation's Arterial Major Maintenance Program and includes asphalt resurfacing, placement of loop detectors for signals, and wheelchair curb ramp upgrades. Estimated cost: $302,000. Scheduled to Begin Construction: Spring 2004. 2. NE 127th Street & 15th Avenue NE: A curb bulb will be installed at this intersection. COMPLETED: Spring 2004. Estimated Cost: $20,000
28	NE	25 Av NE	University Dist.	NE 65 St									x	
29	NE	Lake City Way	Roosevelt LRT	145 St	No	Principal	Major	Yes	125th-145th: 15 min or better	Portions 30-40%, others >40%	x			1. Lake City Way Multimodal - Phase 1: This is a joint project among the City of Seattle, King County Metro, and the Washington State Department of Transportation. The project will improve transit operating efficiency and reliability on Lake City Way NE within Seattle city limits, improve vehicular safety by adding access management features (medians and turn-pockets) to reduce accidents, improve access to transit and businesses for all users by improving the sidewalk system and reducing drainage problems, and improve bus stop lighting. The new west side sidewalk and planting strip will include street trees and landscaping, and the medians will include landscaping. Scheduled to Begin Construction: Late Summer 2004, Estimated Cost: $10.7 million. 2. Lake City Way Multimodal Phase 2 is unfunded.
30	NE	Montlake Av	Montlake Stn	NE 45 St						**<20%**			x	
31	NE	NE 45 St, Sand Point	University Dist.	Princeton/Sand Pt (NE 50 St)									x	
32	NE	NE 65 St	Roosevelt LRT	25 Av NE						**25-30%**			x	
33	NE	Pacific St	Montlake Stn	University Dist.	No, but near Burke Gilman Trail	Principal	Principal	Yes	15 Min or Better, Midday and Evening	**>40%**	x			1. NE Pacific Street & 15th Avenue NE, eastbound: Part of the King County Metro Low Floor Bus Zone Improvement Program, this project includes select street pavement, curb, and sidewalk replacement. COMPLETED: Winter 2004. Estimated Cost: $6,000
34	NW	24 Av NW	NW 65 St	NW 85 St									x	
35	NW	Leary, 20 Av NW	20 Av & Market	14 Av NW & Leary									x	
36	NW	Leary, NW 39 St	14 Av NW & Leary	Stone Way									x	

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37	NW	Market, N 46 St	32 Av NW & Market	Stone Way	Market between 32nd and 22nd Aves: Yes	Principal, Minor, small section of Collector	Major	No	15 Min or Better, Midday and Evening	**< 20% east of 15th. 25-30% west of 15th**		x		
38	NW	NW 85 St	24 Av NW	Aurora	No	Minor	Major and Minor	No	15 min or better midday (not evening)	30-35%	x			1. NW 85th Street from Dayton Avenue to 8th Avenue NW: The traffic signals along this corridor will be re-timed, or synchronized, to create smoother and quicker trips for traffic, with maximum green-light time. This is part of SDOT's Traffic Signal Synchronization and Optimization Plan that will improve traffic flow in corridors throughout Seattle. Estimated to be completed in Fall/Winter 2004. 2. [per Metro] Signal Timing Adjustment: Scope Recommended for SDOT Consideration: Metro had identified a set of signal adjustments along major transit routes that it would like SDOT to consider for implementation. They are as follow: a. Eliminate split phasing at Beacon and Spokane b. Eliminate split phasing at NW 85th and 3rd Avenue NW and NW 85th and 8th Avenue NW. c. Revise left turn phasing for Beacon and McClellan Status: Metro has completed preliminary analysis of these proposals, and recommends them to SDOT. SDOT needs to determine when to implement.
39	SE	1 Av S	Yesler	Spokane	Yes	Principal and Minor	Major and Principal	Yes	15 min or better midday (not evening)	Over 40%, but impacted by AWV project.	x			2007 focus south of Jackson only. 1. 1st Avenue Transit Signal Priority: Approved Scope: Install TSP at 5 intersections. Status: Funded, Interagency Agreement executed, Design completed Equipment Ordered. Next steps: SDOT personnel to secure final approval from City Light for power source; Metro to submit final plan to SDOT the end of April, SDOT personnel to install equipment in September/October; Metro integrate in October/November, 2004, and evaluate in 1st quarter 2005. Request approved for new sign for right turn only except transit at 1st Avenue S and Royal Brougham; waiting for SDOT to install. 2. Emergency Vehicle Signal Priority: In conjunction with Seattle Fire Department vehicles being equipped with Opticom emitters, this project will install receivers for traffic signals at intersections on 1st Avenue and 4th Avenue, and Marion Street and Spring Street in Downtown Seattle. Scheduled to Begin Construction: Late 2004/Early 2005. Estimated Cost: $505,000 from the City, $495,000 from Sound Transit.
40	SE	15 Av S, Albro, through Georgetown and South Park to White Ctr	Jackson	Westwood Vlg. / White Center									x	
41	SE	4 Av S, Michigan, 1 Av S Br, SR 99 LIMITED STOP	Spokane	South Park is last Seattle stop. Could continue to Burien.									x	
42	SE	Beacon, Myrtle, Othello	12th & Jackson	East end of Othello	Jackson to Myrtle: Yes	Minor	Major and Minor	No	Jackson to Myrtle: 15 min or better midday	> 40%	x			2007 focus extends to Beacon & Myrtle only. 1. Eliminate split phasing at Beacon and Spokane, July-December. 2004 Metro has identified Beacon Avenue S and Spokane for TSP. 2.Revise left turn phasing for Beacon and McClellan, July - December 2004. 3. Beacon Avenue S from S College Street to S Columbian Way: The traffic signals along this corridor will be re-timed, or synchronized, to create smoother and quicker trips for traffic, with maximum green-light time. This is part of SDOT's Traffic Signal Synchronization and Optimization Plan that will improve traffic flow in corridors throughout Seattle. Estimated to be completed in Fall/Winter 2004.
43	SE	E3 Transitway, LIMITED STOP	King St LRT	Spokane	No	No	Busway	No	15 min or better midday (not evening)	> 40%	x			"Monitor and Maintain" Efforts – highest priority, E-3/CBD Project
44	SE	Rainier, Rainier Beach	Jackson	Henderson LRT	No	Principal	Major and Principal	No	15 Min or Better, Midday and Evening	portions 35-40%, others > 40%	x			1. Rainier Avenue South from South Alaska Street to South Austin Street. This project is part of the Seattle Department of Transportation's Arterial Major Maintenance Program and includes asphalt resurfacing, loop detector placement, and wheelchair curb ramp upgrades. Rainier Avenue South from South Alaska Street to South Brandon Street: COMPLETED Rainier Avenue South from South Brandon Street to South Austin Street: Construction in Spring 2004. Estimated Cost: $1.3 million 2. Rainier Avenue South from South Massachusetts Street to South Walden Street

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45	SE SW	Columbia, Alaska, Spokane, Admiral	Rainier & Alaska	63 Av SW & Admiral									x	This project is part of the Seattle Department of Transportation's Arterial Major Maintenance Program and includes removal of asphalt resurfacing, placement of loop detectors for signals, trenching for conduits, placement of conduits, and wheelchair curb ramp upgrades.
46	SW	California	Admiral	Morgan Jct	No	Minor	Major	No	Worse than 15 min midday.	**25-30%**			x	2007 focus is between Admiral and West Seattle Jct. COMPLETED. Estimated cost: $900,000
47	SW	Delridge	Spokane	Westwood Vlg. / White Center	No	Principal	Minor	No	15 min or better midday (not evening)	Over 40%	x			[per Metro] 1. Delridge Peak Hour Parking Restrictions - completed. Scope Recommended for SDOT Consideration: Peak hour, peak direction parking restrictions on Delridge. Status: Pre-design study completed by Metro; public process completed by Metro with review/participation by SDOT. Proposed Next Steps: SDOT approves/rejects proposed parking restrictions by May. If approved, parties need to do community follow up. SDOT implementation on or before September 2004 service change is requested.
48	SW	Morgan, 35 Av SW, Roxbury	Morgan Jct	Westwood Vlg. / White Center									x	
49	**W**	5 Av N, Taylor Av N, Boston	Denny & 5 Av N	3 Av W & McGraw	Yes	Minor	Major	No	15 min or better midday (not evening)	35-40%	x			None planned.
50	W	Dexter, Nickerson	Denny & Dexter	Fremont Br & Nickerson	Bike Lake	Minor	Major and Minor	No	15 min or better midday (not evening)	35-40%	x			1. Address Bus/Bike Conflict on Dexter. Scope Recommended for SDOT Consideration: Conduct a demonstration of new channelization/sidewalk concept designed to mitigate the bus/bike operations conflicts on Dexter. Status: Rob Spillar generated an idea for a demonstration project of a new channelization/sidewalk configuration at bus zones along Dexter to mitigate bus/bike conflicts. Projected Next Steps: Confirm the feasibility of this demonstration within SDOT and Metro by July 2004. Parties agree on a demonstration site(s), evaluation methodology and community outreach plan. Metro completes zone consolidation on Dexter by September 2004. Metro designs and construct the demonstration improvements in spring 2005.
51	W	Nickerson, 15 Av W	Dravus & 15 Av NW	Fremont Br & Nickerson									x	
52	W	Olympic, 10 Av W, Gilman Dr W	Denny & QA Ave	Dravus & 15 Av NW									x	
53	**W**	Queen Anne Ave., McGraw, 3rd Av W	Denny & QA Ave	Nickerson & 3rd Av NW	No	Principal and Minor	Major and Minor	No	15 Min or Better, Midday and Evening	**< 20% north of Roy**			x	2007 focus is between Boston and Denny. 1. Mercer Street and Roy Street between 1st Avenue N and 5th Avenue N. Also includes 1st Avenue N, Queen Anne Avenue N and 5th Avenue N between Harrison Street and Roy Street, and W Republican between 1st Avenue N and Queen Anne Avenue N. The traffic signals along these corridors will be re-timed, or synchronized, to create smoother and quicker trips for traffic, with maximum green-light time. This is part of SDOT's Traffic Signal Synchronization and Optimization Plan that will improve traffic flow in corridors throughout Seattle. Estimated to be completed in Fall/Winter 2004.

* Areas (used to assist in locating corridor on map)

C(SLU)	S of Ship Canal, north of Denny, between Aurora and I-5 (South Lake Union)
CBD	S of Denny, N of Jackson, W of I-5 (Downtown Seattle)
E	E of I-5, S of Ship Canal, N of Jackson
N	N of Lake Union and Ship Canal, between Aurora and I-5
NE	N of Ship Canal, E of I-5
NW	N of Ship Canal, W of Aurora
SE	East of 1st Av South, S of Jackson
SW	West of 1st Av South