SDOT
Seattle Department of Transportation

CITY OF SEATTLE

CENTER CITY CIRCULATION REPORT

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Chapter 1. Overview

About this Study

In the next ten years, several major transit and roadway projects will change the face of downtown Seattle:

- ✪ **The new Central Link light rail line** will operate within the bus tunnel and extend south to Beacon Hill, Rainier Valley, and Tukwila. It will share the existing tunnel with major all-day express buses.

- ✪ **The Green Line monorail** will provide a new rapid transit link southwest to West Seattle and northwest to the 15th Avenue NW corridor, serving Interbay and Ballard and ending at NW 85 Street.

- ✪ **Seattle plans to begin development of modern streetcar lines,** beginning with the Westlake Avenue line between downtown and South Lake Union, while also considering ways to make the Waterfront line more useful.

- ✪ **Washington State Ferries** plans a renovation & redesign of Colman Dock, the primary portal to Seattle from fast-growing Kitsap County. Currently, 9 million riders pass through this ferry terminal each year.

- ✪ **King Street Station** is being rehabilitated to accommodate planned increased Amtrak rail service as well as Sounder commuter rail service between Tacoma and Everett. With this planned increase in service, King Street Station will become the third busiest railroad station west of Chicago, after Los Angeles and San Jose, California.

- ✪ **WSDOT (in partnership with the City of Seattle) must retrofit or replace the Alaskan Way Viaduct**, which narrowly survived the Nisqually Earthquake of 2001 and is not sustainable in its current form.

Because each of these projects has a different lead agency, it is crucial that the City have a coordinated plan for how the projects will work together in the context of a growing downtown. The Center City area currently is home to 235,000 workers and 57,000 residents (in 38,000 housing units). Growth targeted for the area by 2015 would result in about a 25 percent increase in jobs and a 20 percent increase in housing units, with an estimated population increase of 13,000. The Denny Triangle, Downtown Commercial Core and South Lake Union are targeted for the greatest increases in employment growth. Significant residential growth is expected in Belltown, Denny Triangle, First Hill and South Lake Union. Even in the midst of a recession, downtown Seattle is covered with cranes, and while some of this growth consists of projects approved when the economy was better, some of it reflects the fact that even in a recession, downtown Seattle is a great place to be, and more and more people want to be there, whether as residents, employees, or customers.

To allow the City to grow, fast, frequent and reliable transit must connect the Center City and its neighborhoods. This is not a question of virtue but of geometry. Physically, the City can only accommodate its planned growth through a highly efficient transportation system.

Role of this Study

This study attempts to define the relationships among these major capital projects and the city's more comprehensive economic development and quality of life goals. It focuses on the Downtown Urban Center continuing south to South Atlantic Street (to include early future alternatives for Terminal 46), First Hill/Capitol Hill Urban Center, Queen Anne's Uptown Urban Center and the South Lake Union Hub Urban Village.

More importantly, this study asks, after these major capital projects are completed, what else must be done to accommodate Seattle's planned growth? This report addresses five key elements:

1. The existing transportation system;

2. The transportation system upon completion of the many planned projects;

3. The needs to be met by the transportation system, defined as mobility needs due to land use patterns and lifestyle of the residents and visitors to Seattle's Center City;

4. The goals and objectives set forward in the existing plans. Some of the plans reviewed include:

   - Comprehensive Plan
   - Transportation Strategic Plan
   - Center City Neighborhood Plans
   - Blue Ring Strategy
   - 1998 Downtown Circulation Study
   - King County Metro Six Year Plan
   - Monorail Station Area Planning Documents
   - Downtown Transit Tunnel Joint Operations Plan

5. The gaps in the system, defined as any remaining mismatch between the transportation system (present and future) and the needs it must serve.

The overall goal of this project is to:

- ✪ Provide a clear conceptual and visual plan for improving and better integrating Downtown's public transit and non-motorized transportation system.

- ✪ Synthesize existing policy and plans into an easy to understand concept plan.

- ✪ Present gaps and opportunities for improved transit and non-motorized service.

- ✪ Provide a multi-modal, system-wide blueprint for future work.

Study Process

The study followed a fast, simple, three-step process beginning in July, 2003 and finishing just two months later.

1. Core Design Team

To guide the process, staff at the Seattle Department of Transportation pulled together a broad mix of other city agencies plus regional transportation providers such as King County Metro in a Core Design Team. The full list of participants is listed in the Acknowledgments.

2. Existing Conditions

The study team gathered all relevant, available documents regarding growth and transportation downtown, interviewed a small number of key staffers and toured various project areas. No new data was gathered. The results of this effort were pulled together into an "existing conditions" working paper that was used as a resource by participants at the charrette.

3. Charrette

The Core Design Team gathered for an intensive, three-day charrette, August 5-7 to develop the framework concept and its key elements. Participation in the charrette included the Core Design Team, as well as representatives from many public agencies and some citizen advisory committees. Attendees are listed in the Acknowledgments.

The charrette process brought together many of the primary stakeholders in transportation downtown, and allowed them to discuss the broadest implications of proposed transportation changes.

4. Final Report

All of the ideas developed, discussed and agreed upon in the charrette process are presented here in this Final Report. While this document by no means represents the unanimous consensus of those present, it presents a sound starting point for future discussion. While many questions and concerns must be addressed before implementing this report's recommendations, no fatal flaws were identified regarding the ideas herein.

5. Next Steps

This project has been a three-month, high-level process. Its purpose is to develop a conceptual framework, not to form a comprehensive implementation plan. Additional detailed studies will be necessary to implement most of this report's recommendations.

Seattle Department of Transportation will use this document to engage stakeholders in a discussion of transportation needs to support projected growth for Seattle's Center City.

Project Challenges

With its dramatic setting and high quality of life, Seattle is already an extraordinary city, and its appeal can be seen in its rapid growth of jobs and population. How Seattle responds to this impending growth, however, will determine whether it joins the truly great cities of the world – Paris, Sydney, Copenhagen, Zurich – or becomes just another faceless, congested urban mess.

All else being equal, the difference between memorable, pleasurable downtowns and forgettable ones all comes down to transportation: Are they built around the car or the pedestrian? Interestingly, big cities with the greatest long-term economic success also have the least automobile capacity and the least parking.[1]

Too often, questions about urban transportation futures are put in ideological terns – cars are bad, bikes are good – rather than practical and economic terms. This study attempts to focus on the latter. In fact, as this section shows, Seattle has no choice but to invest in high-quality transit in order to accomodate its planned growth while meeting its economic development and quality of life goals.

A great walking environment is the hallmark of great cities

City of Constraints

Transportation in Seattle is defined by its constraints. At the regional and city-wide scale, two primary factors work to limit access in and out of the city center:

- **Geography.** While cities such as Chicago can expand their grid uninterrupted across the prairie, Seattle's streets are bounded by Puget Sound, the Ship Canal and Lake Washington. All traffic across these water bodies is funneled into a small number of ferries and bridges. Approaches must also thread their way around hills, creating many natural bottlenecks such as the space between Queen Anne Hill and Elliott Bay, and between Capitol Hill and Lake Union. Topography has also created a north-south dominated street grid. Locations where east-west streets are given priority serve as constraints to the north-south traffic flow.

- **Limited Regional Highways.** As a result of geography, funding availability and local objections to elevated highways, very few regional highways serve Seattle, and there is limited ability to expand capacity on these facilities.

Similar constraints present themselves in the downtown itself. These include:

- **Topography.** Ridges and bluffs separate downtown Seattle from parts of its waterfront and several of its nearby neighborhoods. While the city enjoys a flexible street grid, many of the platted streets are interrupted by steep slopes, preventing or limiting their use by vehicles.

- **Freeway Structures and Railways.** Freeway structures and railways on all sides of the downtown exacerbate the street interruptions created by steep slopes. I-5 is a particularly troublesome barrier for many pedestrian movements.


Topography and freeways separate districts of Seattle

- **Colliding Grids.** The only edge of downtown not impacted by the above factors is affected by the awkward collision among the water-oriented downtown grids and the compass-aligned grid of the rest of the city. Denny Way's irregularly spaced, multi-legged intersections make this one of Seattle's most frustrating streets for all modes of travel, both for trips along the street and trips that must cross it. The same phenomenon occurs where the downtown and Belltown grids collide along Olive Way and Stewart Street.

- **Freeway Ramps.** The limited number of freeway ramps leading into and out of the downtown focuses high volumes of traffic at a few single points.

The overall effect of these constraints is two "bottleneck rings" that meter traffic into and out of the city as a whole as well as the city center. The outer ring includes the Ship Canal, Lake Union, and Lake Washington as barriers to access for the larger inner city. In the south, the ring of barriers is completed by difficult accesses to West Seattle and limited crossings of the Duwamish River.

The downtown ring is shown in **Figure 1-1: Downtown Bottlenecks and Their Metering Effect**, and summarizes the major constraints discussed above.

[1] PriceWaterhouseCoopers' Emerging Trends in Real Estate, 2003, 2002 and 2001, documents the high long term value of "24-hour" downtowns in cities such as Boston, New York, Chicago and San Francisco -- cities that also have the lowest rates of automobile use and accommodation in the US, according to US Census data. In *The Transit Metropolis* Robert Cervero describes how cities that plan growth around transit can achieve long term economic success.

Figure 1-1: Downtown Bottlenecks and Their Metering Effect

Congestion Can be Good

While Seattle's transportation constraints present certain obstacles for the city and its future growth, they also represent some of Seattle's greatest advantages in its Center City. Because the most highly constrained intersections are around the edges of the downtown, congestion is directed to areas where it has the least impact on downtown circulation. For the most part, traffic within the city center itself flows smoothly.

A relatively small number of intersections in downtown experience significant traffic delays. Almost all of these intersections are in the inner bottleneck ring associated with Denny Way, Olive Way, Stewart Street, the freeway ramps and Colman Dock. Within this ring, almost all intersections function at Level of Service C[2] or better, and they are projected to continue performing well even with significant downtown growth. Similarly, most streets within the ring have volume-to-capacity ratios[3] between 0.2 and 0.8, with an average around 0.5. That is to say downtown streets within the bottleneck ring could handle a near doubling of traffic – or almost half of the travel lanes could be removed – with only modest congestion in normal circumstances.

In a highly constrained environment such as Seattle, traffic engineers have effectively no options for a systemic expansion of automobile capacity. Removing a single bottleneck or a whole series of them does not necessarily increase automobile capacity across the network – it just moves the congestion somewhere else. For example, removing a major capacity constraint by creating a grade separation at Denny Way and Fairview Avenue, would have the unintended consequence of worsening traffic congestion at each of the Stewart Street intersections between Boren Avenue and 4th Avenue. Denny and Fairview meters the flow of traffic into the downtown grid, preventing congestion beyond it.

The ring of bottlenecks gives Seattle flexibility in managing its core downtown streets. With traffic metered at the edges, the City may be able to reallocate right-of-way in the core with fewer negative impacts on automobile traffic than other cities. That is to say, it is possible to create new transit lanes, bike lanes and wider sidewalks in the core while accommodating existing and projected automobile traffic.

Congestion Can also be Bad

The ring of bottlenecks also creates significant obstacles for Seattle. There is a finite limit to the number of cars that can be accommodated into and out of downtown Seattle, and the city is approaching that limit.

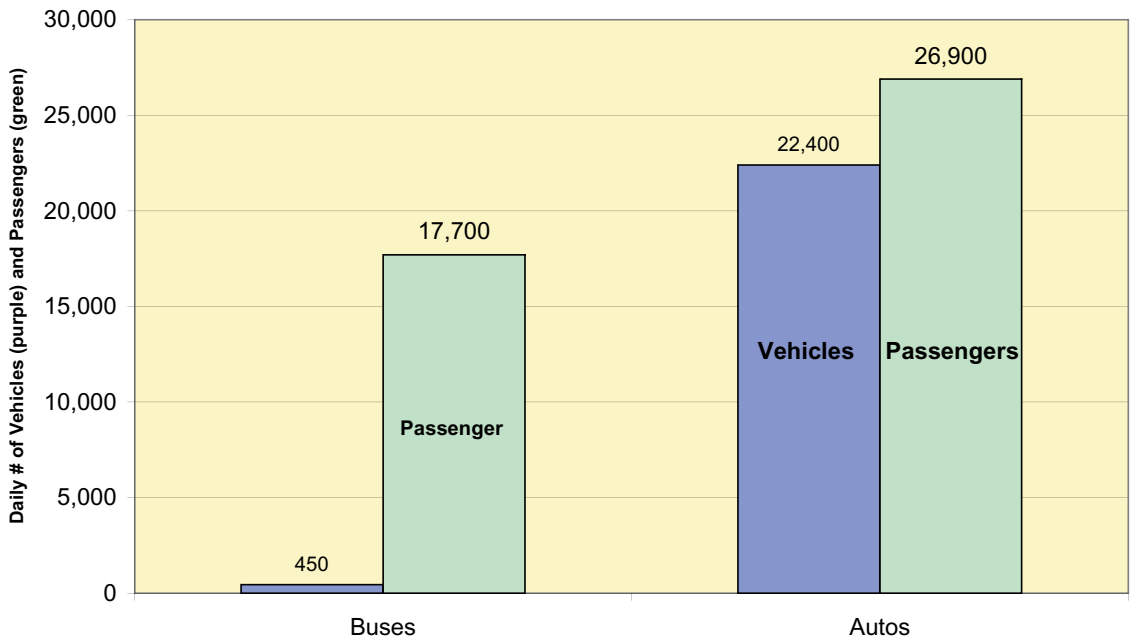
If the city center wishes to grow, it has no choice but to emphasize more efficient modes of transportation. This is not a question of ideology but geometry. Vukan Vuchic of the University of Pennsylvania illustrates this point with his concept of "time-area," which considers not only the physical space transportation modes consume, but also the length of time that they use it.4 Closely spaced vehicles that move quickly, such as subways, consume significantly less time-area than widely spaced or slow moving vehicles, such as cars stuck in congestion. By this measure, a peak hour trip by car consumes 25 times as much time-area than the same trip by bus and more than 60 times the time-area consumed by rapid transit. Another way to illustrate the relative efficiency among modes is to examine the number of travel lanes needed to move 15,000 people in an hour:5

Vuchic points out that it takes 17 travel lanes – in each direction – to move 15,000 people an hour in private cars, while the same people can be moved in two dedicated bus lanes or a single rail lane. It is also worth noting that accommodating 15,000 people in cars would require over 100 acres of land for surface parking – nearly 50 city blocks, most of the Center City. Each parking space for an office worker's car requires more square footage than the office worker.

Figure 1-2 illustrates the difference in the efficiency of transit versus autos in today's downtown Seattle commute. While buses are only 2% of the vehicles on downtown streets, they carry 40% of people commuting by any motorized vehicle. The other 60% -- users of private cars – generate 98% of traffic on downtown streets.

To make transit attractive, it must be fast, frequent and reliable. Unfortunately, all of these qualities are lost when transit vehicles are caught in the same ring of bottlenecks as other vehicles. Ensuring smooth access for transit through the bottlenecks will be the most important – and challenging – task of future downtown transportation planning.

Figure 1-2: Efficiency of Buses in Downtown Seattle



Buses = 2% of the total vehicles, but carry 40% of the total passengers

[2] Automobile Intersection Level of Service measures the typical delay the vehicles experience at signalized intersections. LOS A represents less than 10 seconds of delay. LOS C is an average delay of 20-35 seconds, with vehicles occasionally having to wait for a second cycle to make it through the intersection. LOS F is an average delay of more than 80 seconds, with many vehicles having to wait more than one cycle to pass through.

[3] A Volume-to-Capacity ratio (v/c) is the ratio of the actual volume of vehicles on a given street and the total capacity of the street to carry vehicles at free-flow conditions. A v/c of 0.80 represents the beginning of congested conditions, where an individual's maximum driving speed is effectively limited by the speed of other vehicles. A v/c of 1.20 approaches the ultimate capacity of the street to move vehicles and represents highly congested conditions.

[4] With Eric Bruun in "The Time-Area Concept: Development, Meaning and Application," *TR Record* 1499, Transportation Research Board, 1995. Also *Transportation for Livable Cities,* Center for Urban Policy Research, 2000.

[5] Adapted from Vuchic, *Transportation for Livable Cities.*

The Mobility Challenge Quantified

City policies favor accomodating growth in travel to and through Seattle's Center City by transit and non-SOV travel. An aggressive application of this policy would limit current volume of auto traffic within the downtown (about 650,000 average daily vehicle trips or ADT) at their existing levels as the downtown grows. In other words, all new growth in trips to or within downtown would be accommodated on some alternative mode, whether transit, or increased vehicle occupancy in existing cars, or cycling and walking. Even without these policies, it would be difficult to fit more traffic into downtown during the peak hours, due to the bottlenecks identified in Figure 1-1 above.

While aggressively encouraging carpooling, cycling, and walking, the city must be prepared to handle the bulk of this new demand on transit. The reasons for this lie in the intrinsic limitations of these other modes:

- Carpooling is ideal for rigidly scheduled commutes, but not for anyone who cannot be sure when they will leave work. While it can depart from closer to home than transit, it is a less efficient use of downtown space, because it still requires downtown parking. Carpooling will remain an important part of the mix, but its greatest value is in trips to non-downtown worksites in both the city and its suburbs. Carpooling can also be an appropriate way to gather residents from an area and take them to the nearest transit station, where preferential parking for carpools is often provided.

- Walking and cycling will represent a growing share of tripmaking within downtown and to adjacent neighborhoods, but relatively few people will walk more than two miles or cycle more than about four. Walking and cycling are also constrained by the grades that separate downtown from most of its adjacent neighborhoods. Perhaps most critical, walking and cycling become dramatically less attractive in unpleasant weather and days with limited daylight. Even with increased trips by foot or by bicycle, the capacity represented by walk and bicycle trips must also be available on transit, because in bad weather, all but the hardiest all-weather walkers and cyclists tend to turn to transit as their second choice.

Chapter 2. Framework for Mobility and Growth

Rail Transit's Contribution to Downtown Mobility

The Monorail Green Line and Sound Transit's Central Link LRT will be the beginning of a transition to high-capacity modes. Combined with the regional ferry access at Colman Dock, these services will form the backbone of circulation in the corridors that they serve.

This study takes these projects as a given, but it is important to review their role within downtown and the region:

- The Central Link LRT will run from Westlake station downtown through the bus tunnel and the existing busway (equivalent to 5th Avenue South) to a stop at Lander, then tunnel under Beacon Hill and run the length of the Rainier Valley via Martin Luther King, Jr. Blvd. The final part of the route uses Pacific Highway through Tukwila to end at South 154th St., where shuttle buses will serve SeaTac Airport terminals and other City of SeaTac destinations. While a much more extensive network is planned, only this southern line is funded for completion within the period of this study (to 2010).
- The Monorail's Green Line will run from West Seattle to downtown, passing through downtown via 2nd Avenue, Stewart, 5th to Seattle Center. It then continues west across Lower Queen Anne on Harrison and turns north to serve the 15th Avenue NW corridor as far as NW 85th St. This system, too, is envisioned as the starter line for a much larger network, but only the Green Line is funded, and only this line can be expected to be in place by 2010.
- These are the only two modes that can be called "rail rapid transit," in the sense that they provide high-frequency, high-speed service all day.[1] In addition, of course, there are low-frequency, specialized commute services, notably Sounder, but these, like the ferries, are for regional access to the city, not for circulation within it. Streetcars are frequent rail services, but they are not designed for speed and cannot be called "rail rapid transit," although they are an important part of the local circulation system.

Obviously, the currently funded rail network is incomplete. It does not serve the city's "second downtown," the University District, nor does it serve the largest non-downtown commercial node in the city, Northgate. These are all priorities for Sound Transit, but will depend on voter authorization of new or extended taxes, just as any further Monorail growth will.

Many key destinations of greatest importance to the Center City may not receive rail transit service even if future funding sources are found. Of the many alternatives now under consideration for the northern extension of Sound Transit's Central Link LRT line, only one serves the huge concentration of employment at First Hill, and only two serve Capitol Hill, while the cheapest alternative bypasses both. Many of the dense areas east of downtown do not have rail transit in their immediate futures. No frequent rail transit is funded anywhere north of the Ship Canal except for the Monorail on 15th Avenue NW. Many major urban corridors, then, will continue to need high-intensity bus transit into the Center City for the foreseeable future.

Role of the Bus in Downtown Mobility

Some people view bus services as an inferior mode, and many understandably dislike the noise and vibration of conventional diesel buses. However, the reality today is that Seattle relies on an intensive bus system for circulation within and among its densest core neighborhoods. Any mobility plan that will meet the growing demands for transit in the foreseeable future will continue to rely on buses for a large share of the market.

Buses Are Not an Interim Step

It is tempting to see bus service as a necessary interim step pending new rail services. The fact is, though, that demand for bus service does not shrink as rail grows. Some bus service can be redeployed as feeder service to rail, so that it has less impact on the Central City, but other local demand within the Central City will take its place. The cities that come most often to mind as having thorough rail transit systems, such as New York, Paris, and London, all have surface bus systems operating at very high frequencies supplementing the rail service, including high volumes of service penetrating the densest parts of the urban core.

Why would someone ride a bus in Midtown Manhattan or the core of Paris? In some cases, the answer is fares. Some cities have different fare structures for bus and rail, often creating a time versus cost tradeoff for the rider. This creates the need or duplicative service to satisfy those who prefer a faster trip and those who prefer a lower cost -- often with the result that the whole system is more expensive to operate than if fares were all the same. Certainly, if the Seattle Monorail Project chooses to charge a higher fare than King County Metro, or if the two agencies do not provide free or low-cost transfers, the need for duplicative service will result, to the detriment of both agencies.

However, even when fares are fully integrated, surface bus service continues to thrive alongside rail in dense urban cores. There are several reasons for this:

- Frequent buses are better than rail at serving short trips within dense urban fabric. A trip of 1/2 mile is likely to be faster in a local bus -- even one mixing with traffic -- than in a subway or elevated line, because the latter take more time to access from the street.
- Buses are easier to use spontaneously. Making a short trip within the downtown, you can walk toward your destination and catch a bus if it overtakes you. Some people even decide to make certain quick trips, such as for lunch, because they happen to see the appropriate bus coming.
- Buses can serve more destinations because they do not require complete new rights-of-way to be constructed for them, as most rail transit projects do.

The best evidence of the insatiable market for bus transit is the 1997 fare-policy change in New York City. Prior to the change, the city's bus and rail systems did not offer free transfers between each other. As a result, passengers tended to walk to their nearest subway station. When free transfers were instituted in 1997, the result was a 14% increase in bus ridership in one year, as well as a 4% increase in rail ridership.[1] Of course, the result was also a tremendous increase in overall mobility. Ridership growth occurred not just on bus routes in the outer boroughs that served areas with no subway service. It also occurred on routes running right on top of subway lines in the densest parts of Manhattan.

Even as it expands other transit modes, then, Seattle must expect a continued demand for bus transit. For example, the North Link extension to Northgate will replace two major express bus corridors, but it will also draw new ridership to the overall transit system, including downtown buses. Given the expected growth in downtown demand due to development, the overall need for bus service downtown may not decline substantially even when North Link is complete.

[1] Source: http://www.nymtc.org/files/transportation_statistics/tr-2001.pdf

[2] A wireless bus without noise or emissions will probably require "fuel cell" technology, which is still in early stages of development for cars and will take even longer to perfect for heavier vehicles such as buses.

Bus Service Quality Needs

Seattle's downtown bus transit network has three major deficiencies, all of which must be addressed in order to meet the city's goals for transit use. In general downtown bus service is …

- **slow**. Some major segments are operating at barely above 4 miles per hour -- a brisk walking pace for many adults.
- **confusing.** There are literally hundreds of separate routings that a bus may follow through downtown. Despite considerable efforts in mapping it is often hard to figure out what a given bus is going to do, or whether it might be useful.
- **inadequate to future demand**. Even when the first LRT line and the Monorail are open, the number of buses moving through downtown in a given hour will continue to rise.

This chapter considers each of these problems in turn, with emphasis on the last. In many ways, the growth in downtown bus demand is the most urgent issue that makes a reinvention of downtown bus operations unavoidable.

Bus Service is Slow

Most transit systems in congested and growing urban areas are very gradually slowing down, typically by about 1% a year. This is just gradual enough that it never becomes a political problem -- as it might be, for example, if bus travel times jumped by 10% in any one year after being flat for a decade.

The problem is severe enough in King County that Metro has a department of Speed and Reliability, devoted to finding solutions to these problems. The causes of this gradual slowing are all present in the downtown, including:

- stop spacing
- signal delays
- traffic congestion

One common cause of delay that is not a major factor in downtown Seattle is the time required for fare collection. King County Metro uses a "pay as you leave" policy on all buses heading away from downtown. This permits downtown operations to board passengers at all doors. As new low-floor buses with wider doors improve boarding speed, this advantage will increase slightly.[3] The new smart card technology for fare payment holds considerable promise to allow a free-fare zone and rear door boarding/alighting, within a zone fare system.

Figure 2-1 below shows average speeds for several downtown street segments with heavy bus service. In many cases, bus service is barely faster than walking.

Transit speed is a problem for two reasons:

- it is a disincentive to transit use as opposed to driving, especially for intra-downtown trips.
- It increases the cost of transit service, since the cost is a function of how long it takes to run the length of a route.

Finally, it is important to emphasize that the speed problem is about delay, not about top operating speed. Transit does not need to operate faster than the downtown speed limit, but it does need to be able to operate closer to that limit and spend less time stopping and starting, especially for obstructions related to auto traffic.

An important step in attacking the operating speed problem is to establish policies for acceptable minimum operating speeds for local surface transit. These should become part of the street classification system, and can be tied to different classifications of street. They can be expressed either as a percentage of the street's speed limit (typically 40% or so) or they can be expressed as absolute numbers. For example, based on the strategies outlined in the next section, it should be possible to achieve and maintain an average speed of 9 mph over any half-mile segment of the downtown street network, with the possible exception of 1st Avenue.

Figure 2-1: Average Bus Operating Speeds On Key Downtown Streets

	Avenue / Street	Segment	Average Local Transit Operating Speed (Miles/Hour) 6-9 AM	9 AM - 12	12-3 PM	3-6 PM
NORTHBOUND	1st Ave	Jackson to Union	7.26	6.90	6.68	6.15
		Union to Denny	8.88	8.62	8.32	7.52
	3rd Ave	Washington to Union	5.41	5.65	5.25	4.57
		Union to Olive	6.90	6.42	6.20	5.05
	4th Ave	Jackson to Union	8.71	8.67	8.44	7.53
		Union to Olive	6.74	7.55	8.20	6.07
	Pike St	1st to 4th*	5.93	5.20	4.63	4.58
SOUTHBOUND	1st Ave	Denny to Union	9.13	8.57	7.90	7.93
		Union to Jackson	7.60	7.05	6.64	6.04
	2nd Ave	Pike to Jackson	8.51	7.88	7.34	6.40
	3rd Ave	Stewart to Union	7.96	7.45	7.15	6.04
		Union to Jackson				5.20
	Pine St	5th to 1st*	6.22	5.57	5.30	4.99

* These times include operation on 1st south to/from Union, the next available timepoint, but are indicative of congestion impacts in the Westlake and Pike Market areas.

[3] To be fair, the "pay as you leave" policy is controversial and not widely used in the industry. Its problem in the Seattle region is that many stops outside of downtown Seattle are as busy as a downtown Seattle stop, and in the afternoon, this can produce long queues within the bus as passengers wait to exit past the farebox. It is also intrinsically harder to enforce fares if they are to be collected after the service is provided. Still, King County Metro cannot afford to return to a "pay as you board" system downtown. The next step would likely be a "proof of payment" system, in which passengers can board by any door at any time, but may be required to show proof of payment to a fare inspector. This system is routine on most light rail systems. Converting to "proof of payment" is costly -- the speed improvements that result are valuable, but the resulting operating cost savings are not great enough to pay for a new workforce of fare inspectors. Still, this investment may be appropriate at some point in the future.

Bus Service is Confusing

The 1998 *Downtown Circulation Study* was the city's first major effort to work with King County Metro to make downtown transit service more understandable and thus more useful to the public. That study observed that "the current downtown transit network is extremely difficult to understand and to use. Our assessment is somewhat surprising given that downtown Seattle consumes over 30% of King County Metro Transit's operating hours."[4] That study also pinpointed one of the main sources of the problem: "Many transit routes turn several times within the downtown area. This negatively impacts travel times [because turning usually takes longer than going straight] and confuses riders who expect to be carried along the entire length of a corridor. It creates a downtown transit network that is so confusing that Metro does not map it."

The study led to some improvements in downtown routings, but the system is still extremely confusing. Metro now provides a map of routes that are considered useful for intra-downtown travel, but this map shows only routes that *each* run every 20 minutes or better all day and run well into the evening. Most of the bus routes going through downtown do not meet this standard, though if their routings were consolidated on fewer streets, the result would be a combined service that *does* meet this standard, or at least comes closer to it.

Figure 2-3 on the next page shows the existing all-day transit routings within the downtown, showing all routes that run every 30 minutes or better all day. This map conveys both the high quantity of resources devoted to downtown and the difficulty of figuring it out. For example, some services heading into town on Pine turn left on 3rd, others turn left on 1st, and still others terminate at 2nd. By contrast, if all the buses on Pine went through to 1st, the combined frequency would be so great that it would be easy to transfer to a bus on 3rd if that was your destination, and it would also be possible to clearly present Pine Street service as a direct corridor where every bus is going through to Pike Place Market.

The recommended transit framework, presented in the next section, echoes the recommendations of the 1998 study, as well as the experience of other cities such as Portland that have achieved a much simpler downtown route structure. Even San Francisco, with all its complexity, can draw all transit services on one map that is intricate but legible. Seattle should demand no less.

Bus Service Demand is Growing

Despite the growth in rail modes, bus service within the downtown will need to continue to expand in the long term. The case for this can be seen in the Figure 2-2 below. This calculation requires many assumptions, and these are outlined in the Appendices. The estimates for future transit trips by bus attempt to strike a balance between possible revisions that would push the total bus needs up and those that would push them down.

But the bottom line remains that a decade from now, with two major rail transit projects completed and 120 buses returned to the transit tunnel, there will be more buses on the streets of downtown Seattle than there will be when the transit tunnel is closed for rail reconstruction. For this reason, the recommended transit network presented in this chapter considers the Downtown Transit Tunnel Closure Mitigation surface improvements as a first step, and makes many of its recommendations permanent.

Figure 2-2: Downtown Peak Hour Bus Needs

How Many Buses Are Needed in Downtown in 2015?

City policies and modeling call for only a modest increase in vehicle trips in and to downtown. This means transit must carry most of the forecasted growth in person trips. We estimated the number of peak hour buses needed in downtown in 2015 above and beyond the current number of 600-625, even with completion of the four funded rail projects. A "Minimal" estimate assumes these modes are at full capacity; a "Projected" estimate is based on ridership projections. The estimate is summarized below and shown in detail in Appendix A. Essentially, the estimate shows that the bus tunnel and the streets of the Center City will probably need to be able to carry over 900 buses in the peak hour in 2015. Surface needs are based on the ability of the bus tunnel to carry 120 buses per hour in joint operations with Central Link.

New Transit Trips per Day (2015 vs. 2002)		162,000
Amount in Peak Hour		24,300
Number Accommodated by Non-Bus Modes	**Ridership**	**Capacity**
Monorail	3,700	5,400
Central Link (LRT)	3,100	3,300
S. Lake Union Streetcar	400	1,100
Sounder Commuter Rail	3,500	4,700
Total New Peak Hour Transit Trips by Non-Bus Modes	10,700	14,500
Remaining Transit Trips to Be Accommodated by Bus	13,600	9,800
Passengers per Bus Trip	40	
Bus Vehicle Trip Needs	**Projected**	**Minimal**
New Bus Trips Needed, Peak Hour	340	245
Total Bus Trips Needed, Peak Hour	955	860
Total Surface Bus Trips Needed, Peak Hour	**835**	**740**

A decade from now, with two major rail transit projects completed ... there will be more buses on the streets of downtown Seattle than there will be when the transit tunnel is closed for rail reconstruction.

[4] *Downtown Circulation Study Advisory Group Recommendations*, SDOT PPMP, November 1998, available at www.cityofseattle.net/transportation/dcshome.htm

Figure 2-3: Existing All-Day Service Frequency

Transit Framework

A framework for accommodating Seattle's growth in 2015 is shown in Figure 2-4.

This Framework builds from Seattle's existing assets and follows lessons from comparable cities. It comprises the following key, high-frequency elements:

- **Monorail** connects downtown to Queen Anne, Ballard, and West Seattle. It is a critical component of the overall network, but it does not serve all areas of the city.
- **Light Rail** connects downtown to Rainier Valley and Tukwila.
- **Bus transit** will continue to be the workhorse of the overall transit system, given the limitations of monorail and rail transit. This Framework significantly rearranges the bus network to become more legible and useful. It creates 10 primary radial corridors that serve the new downtown "Transit Spine" (see below). Each of these radial corridors will have peak-hour frequencies of 7 minutes or better so that waiting passengers can usually see the next bus coming. In order to implement these corridors, transit prioritization treatments, and in some cases dedicated lanes, will be necessary, particularly as the bus routes cross the "bottleneck ring" around the edges of downtown.
- **Streetcars,** discussed in the next section, will provide an especially attractive service to support development and tourism.

In order to accommodate the growth needs of the Central City, the proposed bus network meets the following criteria:

- Bus frequencies and capacities are sized to meet travel demands unmet by other modes.
- Network is simple and easy to understand, both for intra-downtown trips as well as trips throughout the rest of the city.
- Bus travel times are protected in key locations to maintain excellent frequency, travel time and reliability, as defined by adopted standards.
- Bus service is clearly integrated into Tunnel, light rail, Monorail and Sounder services.

The core of the network is a Transit Spine along 3rd Avenue that also spills over onto 2nd and 4th at peak. Neighborhood corridors radiate out from the Transit Spine like fingers, combining together various existing routes into more easily understood corridors. Several of these key corridors are described below:

The Transit Spine and other North-South Buses

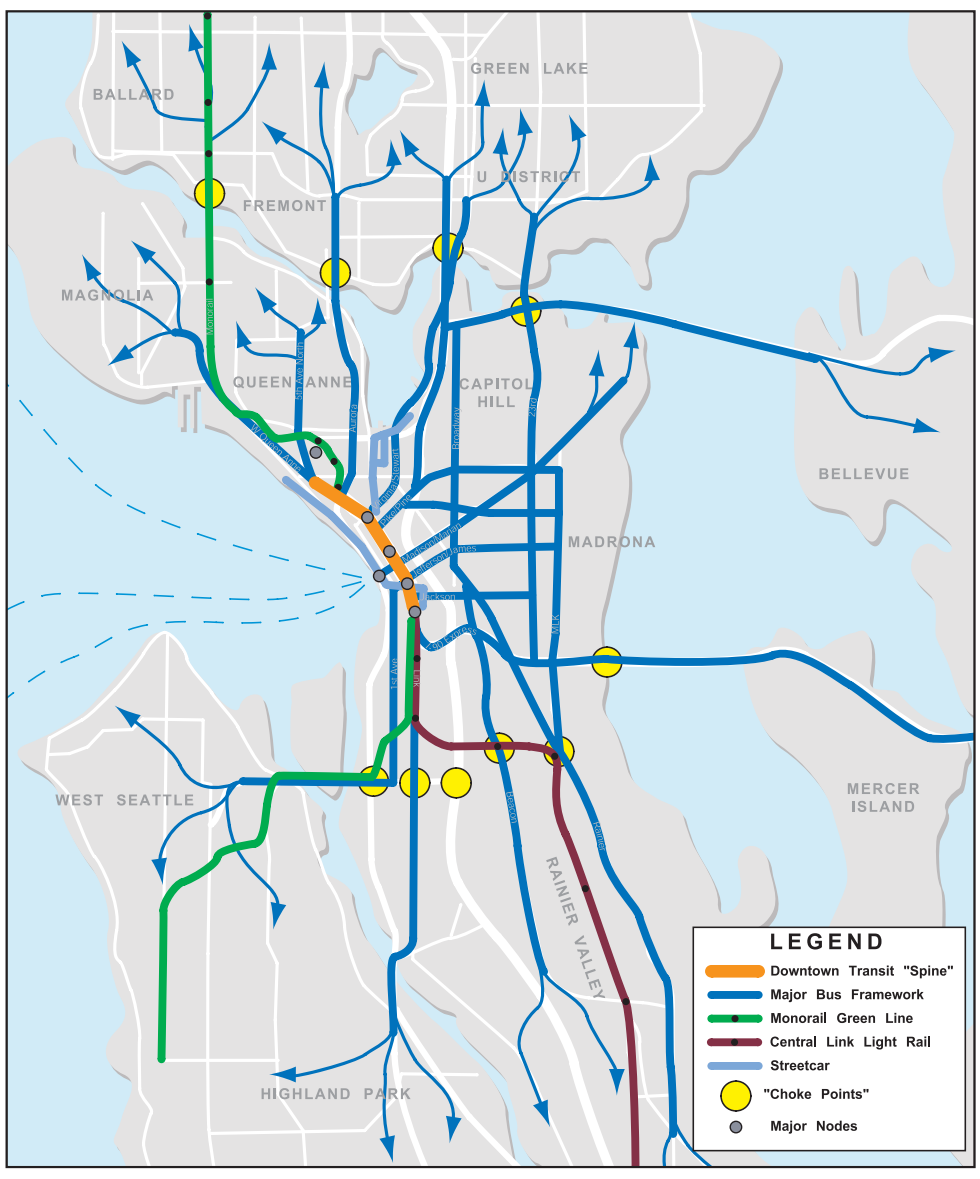
- **Third Avenue Transit Spine**. Most north-south transit is pulled together in the center of downtown along a 3rd Avenue Transit Spine. This street is the primary organizing element of the system, and the street most people will go to when they need to catch a bus or a train to somewhere else. It builds off of the existing bus/light rail tunnel and most of the city's existing bus service.

  Third Avenue is within a quarter mile walk of almost all of downtown and it is roughly at downtown's median elevation. As a result, it is the perfect alignment for most of downtown Seattle's all-day north-south routes. For passengers needing to go north or south within downtown, 3rd Avenue is where they'll always see the next bus coming, with headways less than a minute apart most of the day.

  Just as importantly, 3rd Avenue will be converted for primarily transit-only use during the tunnel retrofit. Once the retrofit is complete, the street is intended to revert back to its existing configuration. According to Seattle's growth projections, however, 3rd Avenue's transit-only configuration will soon be necessary – even with Monorail and light rail – just to accommodate the projected travel needs. The city should consider studying the operations of the street during the tunnel retrofit very carefully, and consider keeping the plan in place after the retrofit is complete.

- **Second and Fourth Avenue Regional Express and Peak Service.** Even with four transit-only lanes on 3rd, there will not be enough capacity on that street for all the projected travel demand during the peak periods. As a result, peak-hour transit only lanes will be needed on 2nd and 4th Avenues in order to provide "spillover" capacity from 3rd. Because they will remain one-way with synchronized traffic lights, 2nd and 4th will also be useful for express buses that have limited stops downtown.
- **First Avenue.** Because of its lower elevation and intense retail nature, and its role in linking many major tourist and recreational destinations, 1st Avenue will need to retain transit service. Given the nature of the street, discussed further in Chapter 3, this service will be slower and less frequent than service on 3rd. Trolley buses appear to be the best means of providing this service given technologies that can be visualized today, though this would require adding trolley wire on 1st between Lenora and Broad. *One Streetcar scenario, discussed in the next section, could eliminate the need for a First Avenue service by providing a continuous streetcar line along either First or Western, connecting to Seattle Center in the north and International District station in the south.*

Figure 2-4: Transit Framework at Citywide Scale



The proposed Transit Framework works at the citywide scale as well as the downtown scale.

Figure 2-5: Frequent Transit Network and Facilities, 2010-15

Aurora Bus Rapid Transit

Aurora BRT would feed directly into the Transit Spine. Aurora BRT is presumed to make few if any stops between Denny and the Ship Canal, with upgraded Dexter Avenue and East Queen Anne lines providing the main local service for this segment.

Radial Routes: 10 Key "Fingers"

- **Ballard/Magnolia** local lines would come together on Western Avenue then feed into the Transit Spine. Transit prioritization treatments would be applied as appropriate, particularly at Denny. Service on this specific finger will be looked at through bus service restructuring associated with the monorail.
- **West Queen Anne** lines would come together at Denny and feed into the Transit Spine. Transit prioritization treatments would be applied as appropriate, particularly at Denny.
- **East Queen Anne** lines would come together on 5th Avenue and feed into the Transit Spine. Transit prioritization treatments would be applied as appropriate, particularly at Denny.
- **Dexter** local bus service frequencies would be improved, and this line would feed into the transit spine. Transit priority would be needed at Denny.
- **Virginia/Stewart, continuing as Fairview** is a radial corridor that crosses the Transit Spine, turning around at 1st Avenue. This corridor continues to the U District. Transit-only lanes would be provided between John Street and 1st Avenue. The current trolley route 70 would be shifted to this east-west alignment only when express service between the downtown transit tunnel and the University is available at all hours, as it needs to be. This route would also serve the 5th & Stewart monorail station. This east-west routing allows the Transit Spine to be used to its fullest possible extent, with no buses turning on or off anywhere between Blanchard and James.
- **Pike/Pine.** This radial route pulls together frequent routes serving Capitol Hill, the U District via 23rd Avenue, and Pine Street/15th Avenue out to Volunteer Park. If Madison Park continues to be served with diesel buses, they would also go this way. Transit-only lanes would be completed on this corridor between 1st Avenue and I-5. All service would turn back at 1st Avenue and layover no further east than 2nd Avenue
- **Madison/Marion** runs from Colman Dock's pedestrian bridge via Madison/Marion and Madison to First Hill and Madrona. The Madison corridor is one of Seattle's fast growing corridors for both multi-family and commercial development. (If trolley bus service can be restored to Madison Park, it would permit the creation of a simple line running all the way across the city on Madison; this is the kind of simplicity that makes a system easy to use and to remember.) Trolley wires would be extended to Western so that buses could turn around by operating west on Madison past 1st, south on Western, east on 2nd. Colman Dock stops would be westbound Madison far side of 1st for arriving buses, and eastbound Marion nearside of 1st for arriving buses, each stop connecting with a pedestrian bridge into the dock's passenger level. Transit-only lanes would be provided between Broadway and Western Ave.
- **James-Jefferson** ties into the Transit Spine and serves Judkins Park and Madrona via Jefferson. King County Metro should also study the possibility of changing this routing between 3rd and 9th Avenues to use Yesler Way instead of James. While this would require moving trolley wire, and would be a longer route, it would be much easier to operate reliably, since buses would not be tangling with freeway traffic at the James Street ramps.
- **Yesler Way** ties into the Transit Spine and connects to Colman Park. This street is particularly underserved today, given its convenient crossing of the freeway far from an interchange.
- **Jackson** service to Mt. Baker could operate crosstown from Terminal 46, but would initially operate out of the Transit Spine. Currently, Jackson is a street with frequent service (two ten-minute routes in addition to Route 14 to Mt. Baker. About 80% are trolley buses.

All-Day Frequent Express Routes

All-day frequent express routes provide the main connections between Seattle and the region, and also to areas of northeast Seattle that will not have rapid transit by 2010. Designed to serve all types of trips, not just commuter, these routes combine with rail transit to form the backbone of the regional transit network.

Seattle should support King County Metro's current intention that the buses operating in the transit tunnel, in joint operation with light rail, should be high-frequency express services, *not* peak-only services. This strategy maximizes the use of the tunnel all day and evening, thus making the most of this major capital facility. It also retains, in the tunnel, the services most likely to be replaced by future light rail expansions.

The following services would run into the tunnel. All others would feed into the Transit Spine.

- **I-5 North** expresses to the U-District and to Northgate, with some services continuing locally to serve NE Seattle.
- **SR 520** express lines to South Kirkland, with branches serving Kirkland, Juanita, Overlake, and Redmond.
- **I-90** express lines to Bellevue and to Issaquah, both with Mercer Island flyer stops.
- **I-5 South** expresses from SeaTac and Renton (these would share the E-3 transitway with LRT)

New or Improved Local Routes

Finally, three major intra-neighborhood routes are proposed so that trips among Seattle's core neighborhoods do not have to go via downtown. These include:

- **Denny**, connecting Seattle Center and Capitol Hill. This is the current Route 8, but at a much-improved frequency. Current service is too infrequent to be useful for the short trips in this corridor. Current services continues as the ML King crosstown.
- **Broadway**, connecting the U-District, Capitol Hill, First Hill, and an LRT connection in Rainier Valley. This is the existing Route 9, which we strongly recommend retaining at high frequency at least between the U-District and McClellan.
- **Mercer**, connecting Queen Anne, South Lake Union and Capitol Hill. This new route would strengthen the developing South Lake Union area by providing more direct east-west access using the most direct available arterial streets. *Mercer Street must continue to connect through to Eastlake to make this movement possible.* Because of the grades climbing Capitol Hill on this route, this will need to be a trolley bus. It is certainly a lower priority than the two existing connections above, but will become more important as South Lake Union redevelops.

Streetcars

Overview

Streetcars are on-street rail services operating either in mixed traffic or sometimes in separate rights of way. Unlike "rapid transit" services such as light rail or the Monorail, streetcars are not intended to be much faster than local buses. When in mixed traffic, in fact, they can be slower and less reliable than a bus operating the same route with the same preferential treatments, because they cannot maneuver around obstacles, such as vehicles double-parked or making parallel-parking movements, in the way that a bus can.

Nevertheless, streetcars are attractive in redeveloping areas because of their value as permanent physical amenities, and also because their "look and feel," including the quality of the ride, is superior to that of buses. Streetcars will continue to have a role in Seattle's transportation picture, both as redevelopment tools (as in South Lake Union) and as amenities that support tourism and recreation (as on the Waterfront)

Historic vs. Modern Streetcars

Seattle's historic waterfront streetcar, while a valuable tourist attraction, is currently of limited utility for meeting downtown's major transportation needs. Short trips require frequent service if transit is to be faster than driving, and the 20 minute frequency of the waterfront line, which is fixed by the limited passing tracks, does not meet this need. The historic vehicles are also operated in the historic manner, with two employees on each car, which makes them exceptionally expensive for each hour of service.

The planned South Lake Union streetcar will be a modern vehicle similar to what now operates in Portland, Oregon. It will have double-track for most of the route; one section may be built initially as single track, with the ability to add a second track as needed for frequency or expansion. It will operate in mixed traffic, which may affect travel time and reliability. *Policies are needed on the minimum operating speed of streetcars, just as they are for buses, in order to identify the point at which actions would need to be taken to protect streetcars from congestion.*

Streetcar Issues

In addition to policies on operating speed, several interrelated issues must be addressed by a streetcar plan. Figure 2-6 on the next page summarizes these issues.

- Whenever the Alaskan Way Viaduct project goes into construction, it will almost certainly shut down the Waterfront streetcar, possibly for years. Is this long shutdown acceptable, or should the streetcar be redesigned in a way that could continue to operate during the Viaduct work? Due to the capital costs involved, this would only be the case if a revised alignment continues to make sense after the Viaduct replacement is done. One alternative alignment south of Union would be to use Western, Yesler, and Occidental to Main, with continuous double-track in mixed traffic, and on a special right-of-way through the pedestrian precinct along Occidental.
- If the streetcar remains on the waterfront, what will it look like when the Viaduct project is complete? At least south of Union, the Viaduct project will have to rebuild the streetcar line in any case. For the streetcar to operate frequently enough to be useful, this segment must be double-tracked and protected from traffic. The latter is especially important at and south of Colman Dock, where any intersection with ferry traffic would hopelessly disrupt streetcar reliability.
- For what frequencies should the streetcar network be designed? We recommend designing for headways as close as five minutes, and planning for 7.5 minute headways on the trunk segment between Union and International District Station, which requires continuous double-track. There are several options for branches at both the north and south ends of this segment, each of which would operate at 15 minute headways – possible on single track with sidings.
- Is it desirable to connect the South Lake Union and Waterfront alignments, and if so, is it physically possible? The benefits could include shared maintenance facilities and fleet, reducing the need for spares and generally achieving economies of scale.
- What extensions and branches should be considered? Popular ideas include:
  - East via King or Jackson through the International District to Rainier Avenue. This would be a logical extension of the Waterfront line.
  - Into Terminal 46 redevelopment. This could be a branch of the Waterfront line, but Terminal 46 is likely to generate higher ridership via a direct connection to International District station, rather than continuous along the waterfront.
  - Into the stadium areas. This could be useful for event-specific high-volume service between the stadiums and Colman Dock ferries, timed to the ferries and the events. This would need to be studied more closely to look if capacity is available to handle this type of service.
  - North along Alaskan Way beyond Broad Street into Interbay.
  - North along Fairview and Eastlake from the currently planned terminus of the South Lake Union line, possibly ultimately to the U-District.

The Waterfront Streetcar Line

Figure 2-6: Streetcar Options, 2010-2015

Some Possible Configurations

As noted above, the trunk waterfront streetcar segment between Union and International District station could operate either:

- Via the current alignment, or
- Via Western, Yesler, Occidental, Main, and the current alignment.

In either case, the route could branch at Union, with 7.5 minute frequencies on the trunk and 15-minute service on each branch. One branch would continue north along Alaskan Way to Broad St. or beyond. The other would climb the hill via Western Avenue, shifting over to 1st between Blanchard and Battery. From there, numerous options exist for a routing that would continue northeast and connect with the South Lake Union line at some point, providing continuous service between the Center City's "two waterfronts." The routing shown on our map uses Battery, but this requires detailed study in relationship to the Aurora and Viaduct projects as well as other Belltown and South Lake Union development issues.

Finally, one permutation of streetcar options has the potential to eliminate the need for 1st Avenue local bus service. This would require that the trunkline be on Western, not Alaskan, between Union and Yesler. The Western Avenue branch north of Union would still shift into 1st at Blanchard/Bell but then continue north on 1st into Lower Queen Anne, then turn east and reach South Lake Union via Mercer or Roy. This option is not consistent with current plans for Mercer Street or Aurora crossings, but it does have the value of eliminating the need for local bus service on 1st Avenue, since Western is close to 1st while also being close enough to Alaskan to replace the Waterfront service south of Union. A branch could still serve Alaskan north of Union, and any number of branching options are possible at the south end.

The primary recommendation regarding streetcars is that the city conduct a comprehensive study of potential streetcar corridors, including an integrated streetcar system. Such a study would consider:

- An overarching vision for the streetcar system that identifies its mission and its relationship to other transit modes.
- Policies determining what makes a good streetcar alignment, as opposed to bus service alignment, and what minimum operating speeds must be achievable for a streetcar to be workable.
- A study of all of the alignment issues outlined above.

Bicycles

Bicycles are key components of any urban transportation system, though they are often given the "leftover" space once cars and transit have been accommodated. The needs of bicyclists in Seattle are discussed conceptually below, with specific street recommendations in the subsequent section of this report.

Adding cycling facilities in downtown will increase bicycle commuting

Bicycle Network

Despite its rainy weather and challenging topography, Seattle is well situated to be one of the best bicycling cities in the country. Seattle, like Vancouver, Portland and San Francisco, developed along its streetcar lines. Streetcars tend to be limited to gentle grades and so do bicycles. While many of its streets are too steep for casual cyclists to ride, nearly every neighborhood in the city is accessible by an easily bikeable route that follows the old streetcar network, abandoned railroad rights-of ways, and other through streets.

Most of these streetcar routes are identifiable as the downtown and neighborhood commercial streets, such as Pine Street and Broadway. As a result, they are often the streets most in demand for transit service, auto traffic and auto parking. The challenge in Seattle is how to create space for bikes while balancing the needs for the other modes.

With the exception of some college towns such as Eugene, OR, and Davis and Palo Alto, CA, bicycling is often overlooked as a means of everyday transportation and congestion relief in the United States. European cities with tighter roadway capacity constraints (and worse weather), such as Amsterdam and Copenhagen, have had no choice but to invest in bicycle infrastructure as a primary means of moving people through the city. The experience of all of these cities offers valuable lessons for Seattle:

- The "design cyclist" should not be seen as a young and athletic person. In order for cycling to generate significant mode share, facilities must be designed with all potential users in mind. Some Dutch cities consider a middle-aged person with two sacks of groceries to be their "design cyclist."
- Potential cyclists who do not bike for everyday transportation are overwhelmingly clear on what it takes to get them to bike to work: First, and most importantly, a connected network of bike lanes and paths. A distant second is a secure place to store their bike on the trip end. Lastly is a place to shower and change clothes at the workplace.
- Significant mode shift occurs only when there is a reasonably complete **network** of bike lanes and paths connecting key neighborhoods and destinations throughout the city[2] This means that the benefits of individual bike lane projects may not be measurable until several projects are connected together. Seattle's Comprehensive Plan policies recognize this by emphasizing direct and continuous bicycle routes and prioritizing bike facilities in urban centers and other growth areas.
- In addition to bike lanes and paths, cities such as Palo Alto have experienced great success with their "bicycle boulevards," a network of narrow residential streets that have been traffic calmed. These streets have been designed so that motor vehicles travel at bike speeds, allowing bikes to use the full width of the roadway. Such designs would be especially valuable in Seattle neighborhoods such as Capitol Hill.

It is estimated that approximately half of Seattle residents own bicycles. However, an estimated 5-10% of the cyclists do 80% of the cycling. A focus should be placed on enhancing the bicycling network so that the next tier of bicycle owners become regular bicycle users.

In considering how to accommodate Seattle's downtown growth through its transit system, Seattle's potential bicycle network was also taken into account. The proposed network begins with Seattle's existing bike facilities, ties them together and adds new connections to major destinations downtown as well as all its surrounding neighborhoods. Appropriate wayfinding for bicycles should also be included in downtown bicycle planning. The complete network is shown in Figure 2-7. The following is a brief summary.

- **Maintain the 2nd Avenue bike lane and create a northbound pair on 4th Avenue.** The 2nd Avenue bike lanes work well and can be maintained even with the Monorail construction, unless the center alignment is chosen. On 2nd and 4th, we recommend a bus-only lane on the west-side curb and a bike lane on the east-side curb. If the Monorail goes on the east side of 2nd, parking can be maintained on the left curb, and this parking could be allowed 24 hours a day. If the Monorail goes on the west side, then the westerly sidewalk should be widened and no parking should be provided on 2nd. 4th Avenue would be the mirror image of 2nd, but it has more flexibility since it would not be the route of the Monorail.
- **Extend the Pine Street bike lanes to 1st.** Pine Street is extremely important for bicyclists, being the most level connection between downtown and all is eastern neighborhoods, including Capitol Hill and First Hill. The existing bike lanes should be extended, with a contra-flow bike lane where Pine becomes one-way.


Dexter Avenue's popular bike lane gets cyclists to the edge of the Center City

[2] Discussed throughout the Federal Highway Administration's *National Bicycling and Walking Study*, particularly: Federal Highway Administration (Stewart A. Goldsmith). *Case Study No. 1: Reasons Why Bicycling and Walking Are Not Being Used More Extensively as Travel Modes*. National Bicycling and Walking Study, U.S. Department of Transportaiton (FHWA), Publication No. FHWA-PD-92-041.

Figure 2-7: Bicycle & Pedestrian Framework

Completing this link will require more than striping, since some curbs will need to be moved to address the traffic needs at the freeway overpass and the varying curb-to-curb width between 1st and 8th Avenues.

- **Connect the Dexter lanes to 2nd and 4th**, using Blanchard and Bell - streets that have some additional traffic capacity. Based on a fall, 2000 count, almost 1,000 cyclists use the Dexter bike lanes on a daily basis.
- **Complete the Alaskan Way Trail.** There are several possibilities for creating a continuous waterfront bike-way, several of which are being studied by the Viaduct replacement project.
- **Consider a northbound bike lane on 1st.** The 1st Avenue right of way allows for a continuation of the landscaped median found on its Pioneer Square stretch, along with left-turn pockets to accommodate heavy left turn movements. With the median, enough right of way is left for a northbound bike lane that would provide a pair to the southbound bike lanes on 2nd. Given the grade difference between 2nd and 4th, a northbound lane on 1st would be highly valuable. The median would help 1st Avenue's role as the downtown "main street."
- **Create a southbound lane on 5th.** This would act as a pair to 4th, but it may be challenging to create given the freeway-access function of 5th.
- **Create uphill bike lanes on Spring and Cherry** to connect downtown and First Hill. These lanes can be accomplished within the existing right of way or by converting diagonal parking to parallel. No downhill lanes are appropriate given the high speeds cyclists reach in descent. The steep grades are likely to discourage all but the most dedicated bicyclists. For this reason, other segments should prioritized over these lanes.
- **Use Thomas and Roy** to connect South Lake Union, Queen Anne Hill, Seattle Center and Belltown. Ensuring good bicycle and pedestrian connections across Aurora at Thomas and Roy will be important. Care must be taken on Thomas at the Seattle Center, which desires excellent bicycle access to its facilities, but does not want to be a major bicycle through-route. Another options to explore is Mercer. These recommendations should be further studied through the South Lake Union transportation study.
- **Add bike lanes to Melrose Avenue** from Roy Street to Pine Street. This route is already a popular and low traffic connection for bicyclists going from the U-District to downtown.
- **Complete the network south of Center City** by completing the I-90 Trail to the waterfront and to the 2nd and 4th Avenue lanes. This area will require more study, but Jackson Street could provide an excellent east-west route that would tie together many of the other good bike streets.

A waterfront bikeway would expand the reach of cycling and allow cyclists to take in the views of downtown

Pedestrian Environment

Almost all travelers -- whether motorists or transit users -- become pedestrians for the last leg of their trip. The pedestrian environment therefore has an powerful impact on the vitality of any downtown.

For the most part, downtown Seattle has an excellent pedestrian network. There are, however, some notable exceptions that merit attention:

Crossing I-5

- **On- and off-ramps** between I-5 and downtown streets all suffer from tensions between the freeway-oriented *Highway Design Manual* and standards more applicable on complex, low-speed downtown streets. The city and WashDOT should work collaboratively to re-design this challenging transition zone, where motorists must change driving behaviors between urban and freeway. For example, where the ramps meet downtown streets, most of them still have design speeds well in excess of downtown speed limits. While the ramps likely meet all applicable standards, where there is a tension between pedestrian safety and a motorist striking a fixed object due to excessive speed, life-safety of pedestrians on downtown streets should take higher priority.
- **Pine** is one of the most important I-5 crossings, as it is the most level connection between Center City and most of Capital Hill and First Hill, along with Pike. Between Melrose and Terry, however, most of its right of way is given over to cars, with a narrow, unprotected sidewalk on the south side only. Pine should be prioritized for urban design treatments to make it more like parallel Pike.
- **Pike**, while better than Pine, still faces pedestrian barriers associated with the freeway ramps. A specific problem with the freeway ramp intersection on Pike Street is the high speed design of the ramps and the presence of pedestrian crossing pushbuttons at all legs of the crossing.

Long-term visions for Denny Way are more pedestrian and transit oriented

- **Denny**, like Pine, has no sidewalks on its north side. The sidewalks should be completed and the intersection at Stewart should be made more pedestrian friendly.
- **Olive** has a two-lane, high-speed HOV ramp with an uncontrolled pedestrian crossing. A push-button controlled pedestrian signal should be considered here also well as other pedestrian treatments.
- **Spring, Cherry and James** all have adequate right of way for pedestrians, but the walk across the freeway is unpleasant. It may be possible to add a cap over the freeway on either side of Spring, partially funded by joint development on the cap. At Cherry and James, continuous storefront development under the freeway would greatly enhance perceived personal safety.


I-5 Limits the connectivity between City Center districts

Other Pedestrian Barriers

- **Aurora** remains a major barrier between South Lake Union, Queen Anne Hill and the Seattle Center. Improved crossings are being considered at Thomas, Mercer and Roy, and pedestrians should be accommodated in the new designs. Thomas in particular should be made an attractive pedestrian route all the way from Lower Queen Anne to South Lake Union.
- **Denny** suffers from its high traffic volumes and exceedingly complex intersections. Denny should be prioritized for improvements to minimize pedestrian crossing distances as well as countdown signals to assist pedestrians with multi-legged crossings.

Recommended Strategies throughout Center City

- **Pedestrian phase pushbuttons** should be removed in the downtown core where pedestrian activity is continuous or at least during active parts of the day.
- **Pedestrian crossing lights should be replaced with countdown signals**, with a focus on wider streets and those with higher pedestrian crash rates.


Countdown signals provide useful information to crossing pedestrians

- **Crosswalks and stoplines should be rigorously maintained** in the Center City. A city program should systematically assess, prioritize and re-stripe pedestrian markings. While these types of programs appear minor on the surface, they work to both improve safety and communicate important messages for potential investors in downtown.
- **Improve accessibility** of the Center City by increasing the deployment of accessible pedestrian signals, upgrading curb ramps to appropriate grades, angles, and textures, and providing curb ramps where they are missing.
- **Provide buffers between pedestrians and traffic.** On-street parking often performs this function, but some of the recommended transit and bicycle improvements may require further elimination of on-street parking. In these cases, bollards or landscaped strips as little as three feet wide, including low shrubs and possibly also street trees, can provide the necessary buffering effect. This buffer would be interrupted at crosswalks and bus stops, but would otherwise have the effect of discouraging jaywalking.


Truncated domes are an important wayfinding tool for visually impaired walkers

Policy Support

In order to accommodate its planned growth, the city must ensure that its transportation and land use plans, policies and performance measures are all compatible with one another, and that they support agreed-upon outcomes. Fortunately, the city's existing Comprehensive Plan, downtown neighborhood plans and Transportation Strategic Plan offer strong, consistent policy guidance in support of all of the recommendations of this document. While all the relevant policy language is in place, however, these plans lack specific implementation language necessary to ensure that policy translates into reality. Five areas needing further refinement include:

- Performance Measures
- Street Typology
- Parking Management and Requirements
- Bicycle and Pedestrian Plan
- Funding and Implementation Strategy

Each of these subjects is discussed in more detail below.

Existing Performance Measures

No matter how good its transportation planning efforts, they will not be successful unless the city measures the important outcomes it seeks. Since the post-War era, most cities have adopted Automobile Level of Service (LOS) as their primary transportation system performance measure. Auto LOS is highly useful since it is easy to measure, and it can effectively estimate a factor of great concern to most cities, auto congestion. At intersections, Auto LOS estimates the average seconds of delay a motor vehicle will experience. Most cities use a letter scale from A (less than 10 seconds of delay) to F (more than 80 seconds of delay), but other cities add additional letters (G, H) to denote further delay.

Similar measures are available for street segments in between intersections, using both a letter scale as well as a numerical volume-to-capacity (v/c) ratio. V/C ratios take the total number of vehicles on a given stretch of roadway and divide by the capacity of that road to handle cars. A v/c ratio of 0.80 or lower represents free-flow conditions, while a ratio of 1.20 represents very congested conditions.

While useful for estimating the effects of congestion on motorists, Auto LOS and v/c ratios do not offer the full picture of a transportation network in a place as complex as downtown Seattle. First, by focusing on spot locations, they say nothing about the ability of the overall transportation network's ability to carry traffic. For example, they do not allow planners to estimate actual average travel time among various destinations – travel time being the factor motorists care most about.

Secondly, and more importantly, these measures estimate delay only to *vehicles*, not *people*. A bus with 50 passengers on board is counted the same as an automobile with one passenger. In order to improve Auto LOS at a given intersection, for example, traffic engineers can remove bike lanes or transit priorities in order to give more accommodation for cars. The result may be that the intersection can handle more vehicles but fewer people. While this result may present short-term benefits for those who drive, it would contradict the city's goals for population and job growth. In the long-term, moreover, as the city grows, managing the transportation system with an exclusive focus on auto congestion paradoxically results in more auto congestion than a more balanced approach.

New Performance Measures

In order to avoid the unintended negative consequences of over-reliance on Auto-LOS and other vehicular measures, we recommend that the city reexamine its objectives for the Center City and quantify specific outcomes it would like to see. It should then translate those objectives into performance indicators with several aims in mind:

- **Relate indicators to objectives**. The indicators should operationalize the city's Strategic Transportation Plan.
- **Minimize data collection costs**.
- **Retain a high-level focus.** While the indicators should encompass as many of the Strategic Transportation Plan objectives as possible, the number should be kept low to retain a high-level focus.
- **Ensure they are comprehensible to the public and policymakers.**

We recommend that the city adopt the following changes into its Comprehensive Plan and Transportation Strategic Plan, environmental compliance guidelines, congestion management program, and elsewhere as appropriate:

- Level of Service should reflect *person* delay rather than vehicle delay.
- Volume to Capacity ratios should examine *person* capacity rather than vehicle capacity.

Performance measures should assess how well we move people and goods, not vehicles

This simple word swap would have far-reaching consequences and should not be done lightly. First, vehicular performance can be measured with simple automated hose counts. Measuring person-based performance may require hand counts of bikes, transit passengers and/or pedestrians, a more costly and complex undertaking. Secondly, on streets with high transit volumes, transit passenger counts may so dwarf auto passenger counts that tiny reductions in transit delay might justify huge increases in auto delay. The city may wish to set some network-wide or street-specific minimum accommodation for cars in order to ensure an appropriate balance among modes. The city may also want to maintain Auto LOS as a secondary measure, with person-based measures primary. Seattle has established the policy basis for these performance measures in both its Comprehensive Plan Transportation Strategic Plan. For example, Strategy A3 of the Transportation Strategic Plan is to "Optimize the People-Moving Capacity of Existing Streets" (p. 70).

Some cities have adopted primary transportation performance measures that have more to do with quality of life than movement. Palo Alto's primary indicator is to ensure that total vehicles trips do not grow beyond 2000 levels. Trenton, NJ has indicators focused around economic development. London includes "public satisfaction," measured through regular polling, among its measures.

Some cities have also specified different performance measures for different types of streets, identifying primary auto streets where vehicular through traffic is given priority, neighborhood commercial streets, where on-street parking and pedestrian activity is given priority, and other designations. In Seattle, Transit Operating Speed will be a key performance measure that will apply in different ways depending upon street typology. Primary Transit Network streets will have a higher transit operating speed by policy than other streets.

Street Typology

While its street design standards and its CityDesign division are among the best in the United States, Seattle may want to refine its street typologies to better reflect the complex functions of its various streets. With its complete urban grid, Seattle has already moved beyond the simplistic arterial-collector-local typologies that dominate most suburban cities. The Blue Ring Plan envisions "Green Streets," "City Corridors," and "City Connectors." These urban design focused designations would be enhanced by designations centered on transportation and access functions. Creating more specificity around the functions of its streets will allow engineers to make better decisions about allocating street rights of way.

Seattle should consider the following designations, many of which may overlap or be discontinuous on a given street:

- **Neighborhood commercial street.** These streets are lined with continuous storefront retail and include portions of streets such as Pike and Broadway. On such streets, maintaining small businesses is paramount. As a result, the highest priority is creating a high-quality pedestrian environment, followed by high-turnover, short-term parking. 1st Avenue may fall into this category. Transit operating speeds will be an important performance criterion, but secondary to other factors such as retail success. Policy operating speeds may be set relatively low at 7-10 mph.
- **Primary bike network street.** Due to Seattle's topography, there are a few streets in the city, such as Pine, that are a high priority for bicyclists. These streets are identified in the Bike Network section.
- **Primary transit network street.** These streets are described in the Transit Framework section. The primary performance criterion for primary transit network streets is transit average operating speed, and they should be set as high as possible. In the Center City, 9-15 mph is a good target, with higher speeds outside the downtown.
- **Primary auto street.** In addition to traditional arterials, primary auto streets are designed to distribute cars heading to and from the freeway ramps, as well as accommodate through auto traffic at a reasonable speed.

Note that designations proposed in the Blue Ring Plan were consulted in developing the recommendations of this plan.

Parking Management

The City of Seattle already has one of the most thoughtful and well implemented parking programs in the United States, particularly for its downtown. There are no minimum parking requirements for residential uses, retrofits of existing buildings, or for small non-residential uses. In addition, the city allows a maximum of 1 parking space per 1,000 square feet of non-residential uses downtown. Elsewhere in the city, parking requirements vary depending upon the proximity to downtown (reflecting actual ownership rates) and whether parking is shared with complementary uses.

While other cities still have suburban-level minimum parking requirements in their downtowns, Seattle recognized early that managing its parking supply is a critical tool for managing congestion. Long-term, commuter-oriented parking spaces have the greatest impact on the traffic network, generating one AM peak period trip and one PM peak period trip each day. Seattle wisely maximizes short-term parking aimed at shoppers, generating many off-peak trips that provide the greatest economic benefits to the city.

To carry these successful efforts further, we recommend the city explore the following changes to its parking code:

- **Eliminate downtown minimum parking requirements entirely.** With is high transit access and automobile access constraints, it is counterproductive to ask developers to build more parking than they think they need.
- **Consider residential parking maximums.** According to two analyses in San Francisco, building a parking space for each residential unit increases the cost of each unit by about 25% and reduces the number of units that can be built on a given parcel by about 25%.
- **Consider reducing non-residential parking maximums.** The city's roadway network cannot easily accommodate any additional commuter-oriented parking, and only limited increases in short-term parking. The city may want to consider tighter limits on commercial parking.

Transportation benefits from well managed curb space

- **Continue to limit curb cuts on key transit streets.** Transit travel time and reliability is generally worsened more by cars turning left or right into driveways than it is by cars moving straight ahead. To maintain good service, new driveways should not be allowed on key streets such as 3rd Avenue or Pine Street.
- **Implement new parking pay station technology** in downtown neighborhoods as well as some neighborhood business districts. Pay stations are automated kiosks that replace multiple meters on a block. The new pay stations will benefit the public by providing more ways to pay (cash, credit cards, smart cards, etc.) as well as help the City more efficiently manage parking.[4]
- **Expand downtown parking provisions to adjacent neighborhoods.** Center City neighborhoods are becoming increasingly like the core of downtown, and these areas are subject to the same traffic constraints as downtown. Downtown's parking restrictions, including those listed above, should be expanded into these revitalized neighborhoods.

Additional parking constraints are not easy to adopt, particularly in neighborhoods that are undergoing rapid urbanization. Existing residents and merchants will be rightly concerned about scarce parking becoming scarcer, and that their quality of life and economic well being will be threatened. In order to reduce the impact upon existing merchants, we recommend the city expand the efforts of the successful "Making the Parking System Work" program. To reduce the impact on residents, we recommend the city explore the following changes to the city-wide residential parking permit program:

- **Limit the number of Residential Parking Zone permits sold to the spaces available.**
- **Sell new off-street permits at market rate.** Depending upon the scarcity of parking, this rate may approach the commercial off-street parking rate. Establishing market rates for restricted on-street parking may require the establishment of a parking district, approved by the vote of affected residents.
- **Provide a buy-back program for permits.** This would provide encouragement for existing residents to sell their vehicle or clean out their garage, allowing them a one-time profit for the sale of their permit back to the city. The city would set the buy-back rate at one-half the market rate, or whatever formula is appropriate to match supply with demand.

In addition, the city may want to explore deed-restricting certain types of developments from joining an adjacent Residential Parking Zone program. For example, when a high-density infill project with limited parking is built in an established low-density neighborhood, community acceptance may require that the new building's occupants be restricted from joining the parking program.

Finally, we recommend that the City establish a close relationship with a carsharing organization. Currently, Flexcar has over 100 vehicles in a dozen Seattle neighborhoods. Seattle works to designate on-street parking spaces for carsharing vehicles. In San Francisco, non-profit City CarShare has eliminated more than 500 private vehicles with its fleet of 74 shared vehicles[5]. Providing City CarShare with free access to on- and off-street parking spaces throughout the city has been one of the most cost-effective programs San Francisco has undertaken to improve parking availability for those who need to drive.

Bicycle and Pedestrian Plan

Despite its many advantages for bicyclists and pedestrians, Seattle currently has no bicycling or walking master plans. Such plans should be developed, or their implementation sections should be directly incorporated into the city's overall Transportation Strategic Plan implementation framework.

Funding and Implementation Strategy

Seattle's excellent planning work can only take it so far if funding is not in place to carry out the city's vision. Such a strategy is well beyond the scope of this study. Chapter 4 notes some of the key next steps and the agencies that would need to be involved in taking them.

[4] There are two main types of this technology from the motorist's standpoint. The system implemented in downtown Portland requires customers to buy a ticket at a kiosk (of which there is typically one per block) then receive a slip and return to their car to place it on the dashboard. A more customer-friendly approach involves numbering the spaces along the block and allowing a customer simply to specify the number of their space and then deposit the money required to rent that space. The latter approach results in slightly fewer parking spaces since all spaces must be marked.

[5] Robert Cervero calculations, UC Berkeley, unpublished, 2003.

Chapter 3. Localized Recommendations by Area and Street

Hub Areas

While there are many points of access to downtown for travel from within the city, most travel to and from the larger region passes through one of four regional hub areas. These hub areas include three of the bus/LRT tunnel stations, plus Colman Dock. Peak commute service to regional destinations also operates through all of the hub areas except Colman Dock.

The University Street Station, while an important transit center in its own right, does not have the same level of regional and intermodal connections as the other stations and is therefore not included here. Convention Place Station is likewise not addressed. While some hub area functions will remain around the site of the former Convention Place Station, particularly in the form of on-street stops for regional transit, light rail will not extend into this area. (The northeast part of downtown is discussed in separate sections on each street or street-group later in this chapter. Stewart, Olive, Pike, and Pine are the key streets serving the general area of the Convention Place.)

Though we do not consider it a regional hub, Pioneer Square Station is discussed briefly below because of its future monorail connection.

The focus of this section is on three key hubs that carry the heaviest volumes of regional traffic and that are the first (or only) point of access to the downtown that one encounters when approaching by regional transit. These are:

- Westlake station area
- King St. Station and International District Station area
- Colman Dock

While this document focuses on the functionality of these hubs, it is important to remember that they become the primary gateways into the city for the majority of visitors, shoppers and commuters. Every effort should be made to ensure that they feel welcoming and safe, and that their design reflects their important role in defining the city's image.

A map of the hub areas appears on the following page.

Westlake Station Area

The character of the hub is shaped by its role as the region's densest retail center, with flagship stores and enclosed malls. The area is also near significant CBD employment. The pedestrian plaza on the east side of 4th, Pike to Pine, in many ways serves as the 'living room' of the city. This hub area already has a feeling of a pedestrian dominated realm, benefiting from narrow streets, short street crossings and high levels of pedestrian amenities.

Transit services in this Hub Area include the Westlake bus tunnel station, the existing Monorail station within Westlake Center, and the intensive on-street transit services of 2nd, 3rd, and 4th avenues and Pike and Pine streets. The Link LRT line will terminate at Westlake tunnel station, and the Green Line monorail will result in a station at 5th and Stewart.

Monorail-Tunnel Connection

Connections between the transit tunnel and the monorail at this location are crucial, and difficult. This is the logical connection point between the north end of the Monorail corridor and express destinations served from the north end of the tunnel. For example, a monorail-tunnel connection for a trip from Loyal Heights to Kirkland, or from Northgate to Seattle Center, would logically occur here at the first point of connection, since to ride any further south would be out-of-direction.

Seattle Center probably has the most to lose or gain from the design of this connection, because it already has monorail access to an ideal Westlake terminus. Since the tunnel carries the primary all-day service from Northgate, the U-District, and other Northeast Seattle points, as well as from the northern Eastside, Seattle Center relies on this connection for its access to all these areas. The current Westlake monorail station is several levels above the tunnel station but almost no horizontal distance from it. In order to provide for a continuous two-way route, the Seattle Monorail Project will replace the current facility with a station two blocks away from the tunnel. For Seattle Center, this increase in connection distance must be weighed against the value of the many additional destinations that the new Monorail will serve directly. Still, it should be cause for concern.

A connection from the 5th & Stewart Monorail station to Westlake Center's food court level is being studied, but is not definitively included in the monorail plan. This connection, accelerated by moving walkways where appropriate, is crucial to minimize the loss of connectivity for Seattle Center to northeast Seattle and Kirkland-Redmond, as well as providing Kirkland-Redmond connections for the whole 15th NW corridor. Although the city is appropriately resistant to new elevated walkways, this walkway would lie in the or near envelope of the existing monorail, so it would not constitute a new visual presence for the area, and could potentially be lighter and more transparent than the existing monorail structure.

Pedestrian Area

As rail and surface transit and bicycling volumes increase, planning must focus on maintaining the current quality of the pedestrian experience. Additions of bus and bike lanes should be matched with increased levels of pedestrian amenities. Signage and enhanced urban design would strengthen connections and visually integrate the major bus street of 3rd Avenue with the plaza on 4th and the monorail station on 5th.

Bicycle Station

For cyclists, recent planning done for the Seattle Monorail Project shows high levels of demand for secure bike parking in the area. The frequency of planned rail service is likely to increase reverse commuting, which would increase bicycle parking demand. This prediction is supported by the station

Figure 3-1 Regional Access Hub Areas

peak period boarding projections of ridership of the Green Line. All day bicycle parking in this area would increase the catchment area for Westlake hub transit stations. However, the real estate and operational costs are difficult for a single transit provider to justify, and the benefits of secure bike parking like a bike station are increased if they serve a diverse market including services in the tunnel, monorail reverse commuters, and employees working in this hub area. Therefore providing a bike station in the area will require the planning and financial collaboration of transit providers, the city and possible private sector partners such as the Downtown Seattle Association or the Westlake Center.

Planters, special pavement and narrow crossings contribute to a comfortable pedestrian environment in the Westlake Center Area.

Colman Dock Area

This area provides the primary access from Kitsap County to the City Center, via Winslow and Bremerton. Non-auto ferries from Vashon Island also serve this hub area. Approximately 28,000 passengers per day use ferries in the area.[1] Other transit services in the area include the limited service of the Waterfront Streetcar, extensive bus service on 1st Avenue, and some Metro services that layover on the nearside of the dock auto exit. A monorail station is likely to be nearby at 2nd and Madison. However, there is a significant distance and elevation change to the nearest tunnel stations, with the Pioneer Square and University Street stations about equidistant from the dock. Generally, while the CBD and its transit services are geographically proximate, the grades, urban design, and viaduct increase the perceived distance and the feeling that the dock area is a separate place.

There is a strong tourist presence throughout the area, particularly to the north of the dock and west of the viaduct. South of the dock, the character is more industrial. To the east of the viaduct, one finds an eclectic mix of small retail, converted warehouses, high-rise residential and some alley-style streets.

The prominence of Colman Dock as a port of entry has often led to calls to upgrade transit connections, possibly with a dedicated CBD shuttle network or circulator that connects with ferries. However, provision of adequate transit at the dock would be difficult due to several factors:

- Autos egressing from the terminal would block transit vehicles,
- Irregular demand in conjunction with ferry arrivals and departures,
- Service would require a confusing loop route and the use of congested streets.

[1] http://www.downtownseattle.com/EconomicInfo/EconomicProfile/Transportation.cfm

Proposed City Position on Ferry Development

The Colman Dock site combines pedestrian and vehicular access to the same ferries, thereby maximizing the efficiency of the boats. The disadvantage of this arrangement is that a high-value site near the center of downtown must be devoted to queuing vehicles. Even if queuing vehicles are moved offsite, as is planned, considerable roadway space and signal time must be devoted to their arrival and departure along Alaskan Way.

At a policy level, the city should support a two-pronged approach to ferry development:

- Support the growth of passenger-only ferries (accommodating bicycles but not motor vehicles) to points throughout Kitsap County and Vashon Island, where transit access and/or Park-and-Ride opportunities exist on the far side. Obvious new markets include direct ferries from Colman Dock to Kingston and Southworth, in addition to the large and established markets at Bremerton and Winslow. *Any redesign of Colman Dock must accommodate passenger-only ferries within the main facility, so that passengers depart through the same terminal area regardless of whether they use a boat that also carries cars.*
- Support the growth of auto-and-passenger ferries to non-downtown hubs, to help deflect the demand for vehicular trips from Kitsap County through downtown Seattle to other destinations in the region. The hubs that already offer vehicular alternatives to Colman Dock are Edmonds and Fauntleroy, both of which could accommodate some growth in ferry traffic, and also provide transit connections for people arriving as pedestrians. Both sites have their own constraints, and there may be reason to explore a new terminal location with better highway access.

Transit Access and Pedestrian Bridges

The Viaduct replacement project and reconstruction of the ferry terminal represents a major opportunity to address the connectivity issues in this area. An improved pedestrian bridge at Marion and a new bridge at Madison will improve the connection to the CBD in conjunction with proposed upgrades to Madison/Marion transit services. This, combined with the challenges of providing transit service to Colman Dock, points against a recommendation to either increase service on Alaskan Way or provide a shuttle service / circulator to move ferry passengers inland.

The following key actions are recommended:

- Retain and upgrade streetcar service along the waterfront, with reliable double-track service either in the Alaskan Way corridor or the adjacent Western Avenue. See the Streetcar section in the previous chapter for detailed discussion. The streetcar would also serve as the primary connection between Colman Dock and the bus/LRT tunnel for trips to and from the south, via International District Station.
- Design the new pedestrian bridge to Madison Street so that it comes out on the north side of the street, providing direct access from the Madison Street bus described in the next bullet, and also reducing by one the number of street crossings needed to reach the monorail station on 2nd Avenue.
- For expedited access between First Hill employment centers and the ferries, extend Madison-Marion trolleybus service to a new terminus at Madison & Western, and operate it every seven minutes all day (near term) and every five minutes or better by 2015. Westbound buses would drop passengers on Madison farside of 1st, where they could access a new pedestrian bridge from the north side of Madison. Buses would then layover on Madison nearside of Western. Departures would turn

left on Western, left on Marion, and pick up passengers from the Marion pedestrian bridge on Marion nearside of 1st. The extension would require three new blocks of trolley wire.

- Reduce and eventually eliminate bus service to the stop adjacent to the ferry terminal on Alaskan Way. The street configuration requires this service to operate in a large one-way loop that serves different markets in the two directions, always an inefficient arrangement for transit.
- If shuttle services continue to be needed, operate them from the 1st Avenue ends of the pedestrian bridges, not from the problematic stop on Alaskan Way. There may be some residual market for shuttles timed to meet particular ferries, offering connections to major destinations within and around the core, though to the extent possible, this demand should be met by frequent regular transit service.

Colman Dock plans should consider mitigations to how the auto vehicle access and egress to the dock blocks north-south pedestrian, bike and vehicle movements on Alaskan Way for periods that often exceed two minutes. Alternatives that include holding some egressing vehicles on the dock should be explored.

Finally, the plans should strive to integrate visually Alaskan Way, the pedestrian bridges, Madison and Marion streets and the Colman Dock with strong and coordinated urban design.

Peds and cyclists wait for signal at Colman Dock

King St. Station/International District Station Area

This hub area is a transition among the places that surround it including the stadiums (southwest), Pioneer Square (northwest), Chinatown/International District (east), a somewhat unformed district to the north, and the new office development over the tunnel station between 4th and 5th avenues that "look in" at a pedestrian plaza. In the center, this area is dominated by heavy traffic as the extension of 2nd Avenue converges into 4th to form the two-way arterial 4th Avenue South.

Transit services in the area are diverse in nature, but generally long-distance focused. Light rail and express buses will use the International District tunnel station. Additional regional services operate on 4th Avenue South. At King Street Station, services include long distance intercity trains offering several trips a day and the peak-direction-only Sounder commuter rail. The Waterfront Streetcar's southern terminus is in this area. The prominence of this hub will increase with the addition of light rail service, a Monorail Green Line station, and increased Sounder and Amtrak service. Accordingly, short- and long-term improvements are being made to King Street Station. The long-term redevelopment of Terminal 46 will also have a significant impact in expanding the role of this hub area.

Recommendations

The challenges in this hub area are to integrate future changes with one another, and to leverage these changes to integrate the areas surrounding the hub. These integrating elements can get 'lost in the cracks' between each project. The crucial, interrelated priorities for this area are:

- Extending the Weller pedestrian bridge to the Monorail.
- Developing a master plan for the undefined area between Yesler and Jackson Streets, roughly east of 2nd Avenue Extension. This area could be a logical site for a major bus layover/terminus facility. Conduct a study to recommend interim and long-term layover improvements in south downtown Seattle (specifically south of Pine Street and north of Lander Street) that will meet the City's and County's needs over the next 20 to 30 years. Bus staging and layover facilities are necessary in this area of the city to achieve cost-effective maintenance of regional and local bus services, minimize their operating budgets and improve their headways and on-time performance. The City and County are currently developing layover improvement recommendations for north downtown Seattle.
- Upgrading the pedestrian realm of 4th Avenue South, including lighting, sidewalk plantings and more and wider crosswalks.
- Providing a multi-use, non-motorized trail within Terminal 46 and across Alaskan Way, penetrating the hub area to the greatest extent possible
- Ensure that special event transit services are adequate and frequent enough to accommodate unpredictable ending times of stadium events

Heavy traffic, "Cobra-head" lights, and a great view on 4th Ave at King St. Station

Event crowds cross 4th Ave at King St. Station

Pioneer Square Station Area

This hub area is an interesting contrast of two markets. To the west, the Pioneer Square historic district is characterized by intensive tourist and retail activity and is most active on weekends. The municipal and county center to the east is an important 9-to-5 market for work and errands, but is inactive on evenings and on weekends. The Pioneer Square area is generally comfortable for pedestrians.

Current services include the tunnel station under 3rd (from Jefferson to Cherry), bus service to First Hill via James and the surface buses on 2nd, 3rd and 4th avenues. The monorail station -- planned roughly for 2nd Avenue and James Street -- will join these services.

This hub area has the potential to offer the shortest walk between a Monorail station and a tunnel (bus/LRT) station, with minimal street crossings.

The monorail and bus stations will actually sit on approximately the same horizontal plane. Absent a new pedestrian connection, however, this transfer will be more difficult than the proximity of the stations on the map implies. A monorail passenger transferring to services in the tunnel would have to descend from the James Station to the 2nd Avenue street level, walk up the grade to 3rd Avenue, and descend the two levels to the tunnel.

The feasibility and cost-effectiveness of providing a 'level transfer' are worth investigating. The city should encourage a collaborative endeavor between itself and the transit agencies to look for ways to optimize this connection.

The Monorail station near Pioneer Square will warrant streetscape and pedestrian facilities upgrades

Alaskan Way

Alaskan Way is Seattle's waterfront boulevard, offering a pedestrian promenade that is heavily used for recreation and tourism. Transit service is limited. It includes the waterfront streetcar, the limitations of which were discussed above, and limited Metro services at Colman Dock.

Alaskan Way cannot be visualized fully in the long term, because its future character will depend the decisions made concerning the Alaskan Way Viaduct. Clearly, though, the goal is to retain and enhance the qualities of this street as a pedestrian promenade and tourist destination, while also accommodating the operations of Colman Dock (discussed under "Hub Areas" above).

Streetcar Needs

Streetcar concepts are discussed in detail in the "Streetcar" section of Chapter 2. The bottom line for Alaskan Way is that the street must be planned to accommodate *one* of the following:

- A new double-track alignment on *Western* between Yesler and Union (extending south via Yesler, Occidental to the existing line), or
- Double-track in exclusive right-of-way adjacent to Alaskan Way, or in its median, at least between Main and Union, so that there is no physical limitation on Streetcar frequencies. If the Streetcar is to remain on the waterfront, full double-tracking is crucial because:
  - Demand is likely to vary significantly by season, and also be affected by special events all along the route, including at the stadiums. The Streetcar must be able to add service to meet high demand if it is to be relevant to mobility in this corridor. This is only possible with full double-track
  - Reliability is difficult to maintain in mixed flow traffic, and impossible to maintain on a single-track. While operations in mixed flow are possible where projected traffic volumes are not great, as on Westlake, Alaskan Way will be a busy street under any scenario, and could be severely congested in the surface boulevard scenario for the Viaduct.
  - Regardless of the future configuration of Colman Dock, vehicle egresses from ferries are likely to continue to cause long delays on Alaskan Way in this area -- and the Streetcar cannot operate reliably if exposed to these delays.

Transit Access to North End

The northern reaches of Alaskan Way are the site of many recent major hotel and residential developments that generate transit demand. The Streetcar can be made relevant for access to these developments from the south, but access from the east, to the adjacent part of downtown or the downtown core, remains problematic. The 1998 Downtown Circulation Study proposed an Alaskan Way bus route that would turn inland at the north and connect with 3rd Avenue. Unfortunately, this is not practical because of the extreme and unpredictable delays caused by the BNRR grade crossings on all available streets. This rail line, used by all freight trains from Seattle to all points north or east, can generate delays of 10 minutes or more, making high-frequency circulator service impossible.

Instead, we recommend using the northern terminus of frequent bus routes from the south to serve this area via a new turnaround. This turnaround (shown in detail in the Transit map of the previous chapter) would provide service to stops along the water side of Elliott Way between Battery and Broad. This is as close as transit from the east can get to Alaskan Way without encountering unacceptable delays.

Multi-Way Boulevard

This plan suggests that street cross-sections of Alaskan Way under either replacement scenario include waterfront-side where slow moving vehicles, loading and parking can be accommodated. Access lanes would be separated from through lanes with a planted median, and while vehicles would operate in the access lanes, the area would be designed to operate as part of the pedestrian realm.

Multi-Use Path

Preliminary cross sections developed as part of the Viaduct replacement planning suggest eliminating the informal and somewhat problematic off-street trail used by many bicyclists, and replacing it with traditional on-street bike lanes between the loading lane and through vehicle lanes.

It is the strong recommendation of this plan, however, that provision of a multi-use path (also called greenways) focused on bicycle use be part of the reconstruction of Alaskan Way. A greenway provides a considerably higher-quality experience for cyclists than bike lanes. Rationales for a multi-use path along the waterfront include:

- Colman Dock on Alaskan Way is the most prominent point-of-entry to the City Center for bicyclists. (Of all cyclists counted at 29 prominent locations in the city in the morning peak, 14% were counted at the ferry terminal.)
- A greenway would extend the high-quality service provided by the Elliot Bay Trail to the City Center
- Greenways are shown to increase cycling, including for commute purpose among persons not typically disposed to non-recreational biking[2]
- A greenway on the waterfront would have minimal vehicle crossings and provide visual and physical access to some of Seattle's most significant natural amenities, right from the City Center
- Urban recreational amenities like greenways support downtown residential redevelopment

The challenge cited in support of the current on-street bike lane proposal is the difficulty in managing conflicts between fast-moving cyclists and waterfront pedestrians, who are typically tourists. In cities ranging from Vancouver to New York, waterfront roadway re-constructions have incorporated greenways and met this challenge using an array of design techniques.

Pedestrian Crossings

Pedestrians will need to easily cross Alaskan Way. Under both reconstruction scenarios, the redesigned Alaskan Way should maintain the narrowest cross-section of fast moving travel lanes as possible. Increases in vehicle volumes will require an increase in the number of signal-controlled crossings. The use of pedestrian push buttons should be limited if used at all, and traffic signal cycle lengths should be as short as is feasible. Other prominent crossings of Alaskan Way, such as University, Madison, and future crossings to Terminal 46 should be considered for 'upgrading' with treatments like those at Pine. Lighting should be pedestrian oriented.

[2] In New York City, the few years old Hudson River Greenway saw a 500% increase in cycling from 2000 to 2001 (New York City Department of City Planning)

Notes for Viaduct Replacement Construction Planning

During the construction of the replacement for the Viaduct, the potential for economically severe construction impacts must not be taken lightly. Small businesses operating in the various piers may not survive a year in which Alaskan Way is too unpleasant for pedestrian life, regardless of how wonderful things will be when the project is done. This is a typical challenge for any major project in such a sensitive area.

From a transportation perspective, we recommend that construction activities for any Viaduct replacement put a high priority on the following:

- Keep the pedestrian bridge at Marion open at all times. If it must be closed, construct and open the Madison bridge before closing the Marion bridge. Direct pedestrian access from Colman Dock to 1st Avenue is crucial because bus transit simply cannot get to an Alaskan Way stop at Colman Dock efficiently in a logical routing. This is true today, and is likely to be even more so during construction.
- Retain pedestrian crossings, with good signage, at the major crossing points that are already improved, and that are already lined with businesses depending on pedestrian traffic. The most important of these are University Street and Pike Hillclimb.
- If a Western Avenue alignment for the Streetcar is chosen south of Union, minimize impacts on the Streetcar as it crosses over to Alaskan Way at Union. A major purpose of a Western alignment for the streetcar would be to minimize the overlap between the Streetcar and the Viaduct construction zone, and also to provide room for the other features of Alaskan Way recommended above. For this alignment to be viable, the Streetcar must be able to cross the construction zone along Union and proceed north along Alaskan Way in its current alignment, with as few construction-related shutdowns as can be managed.

The Pike pedestrian-only crossing of Alaskan Way is as wide as a full street


The current trail on Alaskan is too narrow and clogs with pedestrians, but it is a rare, off-street facility for bikes near major attractions

On Alaskan Way at Yesler, the narrow cross section for vehicles allows for easy pedestian crossings.

North-South Avenues

Western Avenue

Overview

Currently there are no transit services along Western Avenue. Its character varies throughout the City Center. North of Blanchard, Western is one-way northbound for traffic from the Viaduct ramp to Queen Anne and the 15th Avenue West corridor. From Blanchard and Pike, Western functions as a frontage street through Pike Place Market and is congested with local trips. Between Pike and Marion, Western descends, passing under the Marion Street pedestrian bridge. Land uses are an eclectic mix of retail, office and residential, mostly in historic buildings, many of which function as a backside to buildings on 1st Avenue and Alaskan Way. This function and the historic architecture continues south of Marion as Western levels out, but commercially Western is secondary to 1st Avenue.

Streetcar Alternatives

Western Avenue is a possible alternative alignment for the Waterfront Streetcar between Union and Yesler, one that could potentially remain in operation during Viaduct construction. This would be a double-track segment mixed with traffic, and presumes a Viaduct replacement configuration that would not substantially increase traffic volumes on Western.

As the only street climbing the waterfront bluff within the Streetcar's grade limitation, Western is also a possible alignment for a Streetcar branch that would climb the hill from Union to Blanchard, where it would transition to 1st Avenue and follow one of several possible routes to connect with the South Lake Union Line. See the Streetcar section of Chapter 2 for more detail.

Bicycle Needs

Western is a popular alternative to Alaskan Way for bicyclists. Assuming a high quality multi-use path on Alaskan Way, the increase in traffic and the addition of the streetcar would not decrease the level of service for bikes along the waterfront. For pedestrians, as retail and sidewalk cafes sprout on Western, amenity levels should increase.

The gentle grade that makes Western a viable hillclimb route for a streetcar also makes it attractive for cycling. Any streetcar design for Western Avenue should include careful design to minimize the bicycle hazard associated with rails in the street.

The growing pedestrian orientation of Western Avenue would be well served by the Waterfront Streetcar.

Western's gentle climb up the Waterfront bluff makes it ideal for creating a useful streetcar network.

1st Avenue

One of the city's most prominent streets, 1st Avenue serves three of Seattle's famous recreation and tourism centers – Seattle Center, Pike Place Market and Pioneer Square -- all of which are highly valued by residents. 1st Avenue offers nearly continuous street-level small-scale retail from Pioneer Square to north of Pike Street, although the pedestrian environment varies primarily due to the presence, or lack thereof, of a tree-lined median. In Belltown, the character, though not yet continuous, is of high-rise residential over retail. King County Metro offers frequent bus services that are mostly oriented toward Ballard/Magnolia in the north and West Seattle in the south, but most of these services are expected to be replaced, in their downtown segments, by the Green Line Monorail, permitting 1st Avenue transit to be rethought.

At Marion Street, 1st Avenue provides the only level access for pedestrians between Colman Dock and downtown. An additional level crossing is planned at Madison. The stairway-park on the east side of 1st just north of Madison will then complete an attractive pedestrian route between the Monorail and Colman Dock. Meanwhile, transit along 1st will be useful for distributing ferry riders to destinations north and south, including the Pike Market and King St Station areas, as well as the stadiums.

The vision for 1st Avenue is to enhance its role as a "Community Main Street" for Lower Queen Anne, Belltown, and the emerging residential district south of Pike Market, while also being a key corridor of tourist activity.

Transit

Two options exist for transit on 1st Avenue. One is that the Streetcar on Western, with the addition of a branch covering 1st from Broad St. north to Lower Queen Anne, would be the primary transit service. This is not ideal in the Pike Market area, where 1st is at a significantly higher grade then Western, but there will be some overlap of the markets in any case.

The other option for transit on 1st is a locally-oriented, intra-downtown transit service with high frequency (no worse than every 7 minutes, except late at night). A continuous route

would begin at Lower Queen Anne/Seattle Center and run through Pioneer Square to Jackson, then turn east to connect with the spine and multimodal hub at King St. Station. Transit would continue to operate in mixed-flow and thus would be slower than on 3rd Avenue. This overall slow movement of vehicle traffic reflects the focus of this street on the pedestrian experience and the fine-grained, street level retail. Transit signal priority would help maintain bus schedules, especially in the congested southern segment. Bus bulbs with attractive and informative shelters will keep buses from being forced to re-merge into the flow of traffic, and add pedestrian space.

It is important that 1st Avenue operate as an electric bus service since the start-and-stop of diesel vehicles would detract from the 'Main Street' feel. Battery-powered buses may eventually be available for this application, though they would need to recharge at the end of each trip and are currently too small for the potential demand. Implementing the 1st Avenue plan for transit would involve adding a short segment of trolley-bus infrastructure, from Broad to Lenora.

Pedestrians and Bicycles

On many corners that do not already have bus bulbs, curb extensions for pedestrians are appropriate. They are possible due to curb parking and because few buses, trucks or other large vehicles make turns onto westbound streets. Pedestrian amenities like landscaping and pedestrian-scaled lighting should be expanded, and wayfinding signage could also serve to inform pedestrians of the commercial services along the avenue. For bicyclists, the moderate pace of traffic will make 1st Avenue comfortable for many. Because of the retail presence, bike amenities should be focused on providing a high, dispersed supply of 'short-term' parking, i.e. sidewalk racks. Reconfiguring 1st Avenue with a planted median would allow the creation of a northbound bicycle lane as a complement to the southbound lane a block east on 2nd Avenue.

Overall Street Management

It is important to maintain all-day on-street parking on 1st Avenue for the benefit of the street's retail services. Pricing, time, and other restrictions should be used to prioritize short-term users and commercial loading. To the extent possible, commercial loading should be moved to alleys and side streets to prevent double parking.

Median

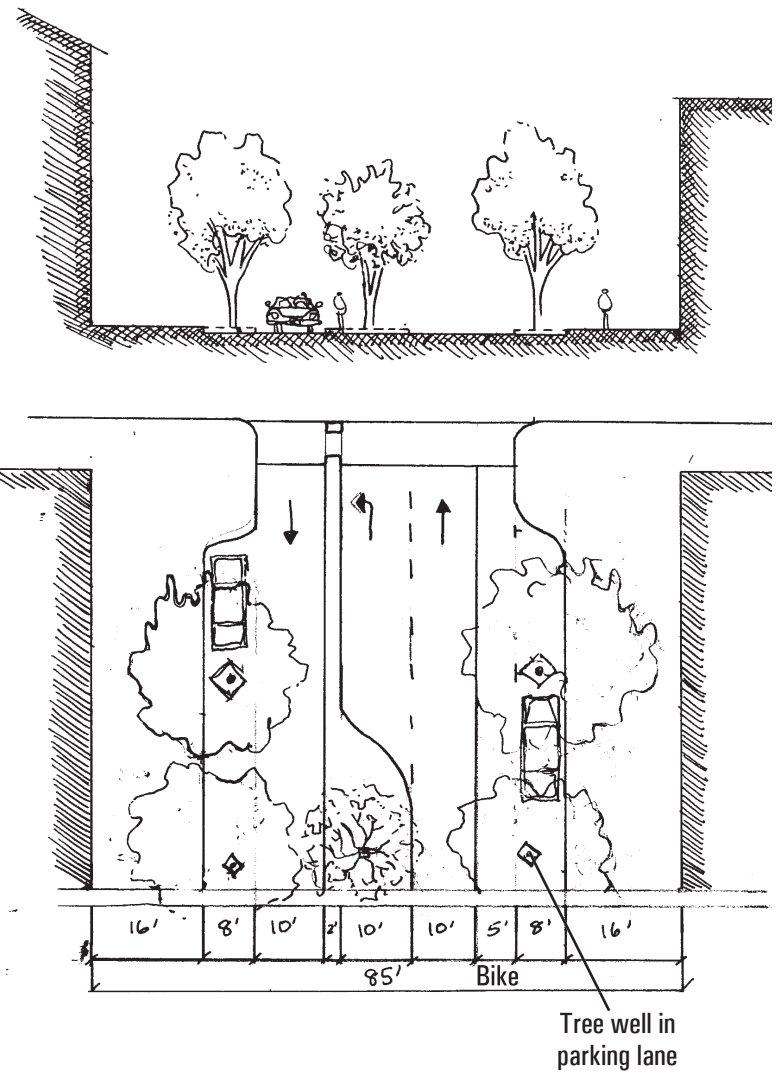
Finally, the 'Main Street' feel of 1st Avenue south of Pine would be greatly enhanced by the tree-lined median. The current unbalanced cross-section on many parts of 1st Avenue north of Yesler --two northbound through lanes, one southbound-- can be reallocated to one through lane in each direction with left-turn pockets. This will benefit through movements by increasing the space for left turn queuing – reducing waits for through movement – and create the opportunity to extend the planted median northward.

Figure 3-2 shows a section drawing of 1st Avenue integrating the above ideas.

The tree-lined median south of Yesler generates the 'Main Street' feel of 1st Avenue.

Reconfiguring 1st Avenue to add extend the planted median and pedestrian-scaled lighting would enhance 1st Avenue's role as the main street to Seattle's main attractions.

Figure 3-2 1st Avenue – Conceptual Plan & Cross-Section



3rd Avenue

Existing Condition and Current Plans

Traffic generally moves slowly along 3rd Avenue. The street offers considerable street level retail, but not central to any particular district, as does 1st Avenue in Pioneer Square or 4th Avenue around Westlake Center. Along with the bus tunnel under 3rd Avenue, surface transit operates at extremely high frequency from Blanchard Street to James Street. For most of the day, the next bus is always in sight in both directions. Most Metro services within the city operate on 3rd Avenue, with West Seattle and northwest services, which operate on 1st Avenue, being exceptions.

The Tunnel Closure Mitigation plan will introduce significant changes in 3rd Avenue, possibly as early as 2005. The plan would close the street to general traffic in peak-periods except for right-turn-in, right-turn-out access, from Yesler Street to Stewart Street. The plan creates a continuous transit-only lane with a separate transit-stopping lane every other block. During off-peak hours, autos would be allowed to share this lane.

Vision: The Transit Spine

Building on current infrastructure and the Tunnel Closure Mitigation Plan, 3rd Avenue is the logical street to become downtown's "Transit Spine," the backbone of the transit circulation network. Most frequent all-day transit routes would be consolidated on the street, leading to high-frequency, all-day service where you can always see the next bus coming. High-frequency all-day express routes would operate beneath the street in the transit tunnel. The case for defining 3rd as the main transit street is presented in Chapter 2. As part of the process of defining 3rd as a transit street, 2nd/4th would be defined as primarily auto streets, except for certain lanes during peak hours.

Transit Priorities on Third

The long-term estimates for bus volumes indicate that the transit priority treatments envisioned in the Tunnel Mitigation program should be made permanent, which means that they can be reflected in a redesign of the street to an extent that would not be appropriate if this were merely a construction mitigation. These changes are below what will be needed to accommodate future bus volumes.

Guiding Policy: Transit Operating Speed

- Buses should be able to operate through downtown on this street at a minimum average of 9 mph, including all stops and other sources of delay. Most other provisions of the street would follow from this, including:
  - Extent of the peak period in which autos are prohibited in the center lane.
  - Signal timing set to accommodate transit travel time, including stops, rather than focused solely on auto travel time.
  - Stop spacing (already planned to be four blocks, the maximum reasonable spacing for local access).

Physical Description of the Reconfigured Street

Third Street's cross-section would consist of four wide lanes with no center turn-lane. All remaining right-of-way would be dedicated to generous sidewalks.

The inside lane would be a continuous through lane for transit buses, with autos permitted only at times and in ways that do not impede transit. The outside or right-hand lane and sidewalks would alternate between two types of character, depending on the one-way pattern of the intersecting streets:

- **Approaching a street that is one-way to the right**: The right hand lane would be available to automobiles. During peak operations, this lane would be accessible only via the cross street at the beginning of the block, and traffic would be forced to turn right again on the street at the end of the block. Most pull-outs for delivery purposes are already in these blocks, and these would continue to be functional at all hours. Pullouts should be expanded to the degree that taxis can also use them, minimizing the need to stop in the auto lane (which in turn would push autos in to the transit lane). No parking would be provided. Except at the delivery pull-outs, a low, permanent landscaping buffer would separate pedestrians from the street.
- **Approaching a street that is one-way to the left**: The right hand lane would be exclusively for buses serving stops in this block. Sidewalks would be widened and landscaped to facilitate access to buses -- typically without landscaped barriers unless these create useful channels that align with bus doors.

Left Turn Prohibition

Even if automobiles are permitted in the through-lane, all left turns off of 3rd must be prohibited at all hours to ensure that the auto flow (between Cedar and James) is continuous and does not block operations in the through-lane. Any motorist wanting to turn left must be directed to make three right turns starting at the next block, thus looping back via 4th (if northbound) or 2nd (if southbound). Signage should provide clear direction on how to do this, and should make clear that no left turns are permitted anywhere on 3rd through downtown.

Extent of "Spine" Treatment

Currently, 3rd Avenue carries its most intense traffic south of Pike Street, because major routes turn off onto Pike/Pine and Stewart/Virginia. North of Virginia, bus volumes are substantially lower.

The recommended downtown route structure (see chapter 2) changes this arrangement so that any bus running on 3rd would use the street continuously between Blanchard and James, with most continuing north as far as Cedar. The recommended design of the street, as described above, would generally extend from Cedar to Yesler. (Southbound, James would be the first street at which left-turns are permitted, so long as major bus routes are turning here).

Between Blanchard and James all routes operating perpendicular to 3rd will cross 3rd rather than turn onto it. This will both improve the throughput of the avenue and provide certainty to persons in the downtown area that any bus on 3rd Avenue is going to take them where they expect. A person dining in Belltown, for example, will know that all she needs to do to get to her show at Pioneer Square is find any bus on 3rd. Given this profile, downtown area maps can be drawn with a bold line *all* along 3rd Avenue. The skip-stop service pattern can be reflected graphically in detailed maps, for example using filled and unfilled circles to denote skip stops.[3] Fully implemented, 3rd Avenue could potentially carry about 250 buses per hour per direction.

Character of Third

Since 3rd Avenue will carry more people than any other street in Seattle, special attention should be paid to its character, and a detailed urban design and economic development study is recommended. Similar to major transit streets in

[3] Unfortunately, bus stops are rarely shown on bus maps and other maps showing bus routes, even when 'zoomed' enough to do so.

cities such as Denver or Portland, 3rd should be the home of major attractors such as department stores, hotels and civic buildings, as well as convenience retail such as drug stores and dry cleaners.

Pedestrians and Bicyclists

The challenge in planning for pedestrians on 3rd Avenue is providing a high quality environment – necessitated by the fine-grained front doors of the street, and high volumes of people walking to and from transit stops – on a street processing as many as four buses per minute in each direction. This can be accomplished by providing a well-designed curb-to-building environment with high quality, attractive pedestrian and transit user amenities. Bollards, planters and street trees can be used to mimic the buffer from moving vehicles typically provided by curb parking. Therefore, it is imperative that the bus-vehicle vision for 3rd Avenue be accompanied by implementation of significant urban design improvements.

Transit priority on the 3rd Avenue 'Transit Spine' would allow buses to pass one another without merging with mixed-traffic

Improving accommodation of bicyclists on 3rd Avenue means both an increase in on-sidewalk, short-term parking (via racks) for retail trips, and in-building, secure all-day bike parking for commuters around high-rise office development– as provided at the new Bicycle Station at 3rd Avenue and Main Street. While bicyclists are likely to use the lanes provided on 2nd and 4th Avenue, the overall lower vehicle volumes and speeds on 3rd Avenue will mean that bicyclists will not be unwelcome on the street.

The Portland Bus Mall provides a comparable level of service as would the 3rd Avenue 'Transit Spine'


On 2nd and 4th Avenues buses merge with mixed traffic to pass buses loading passengers

2nd and 4th Avenues

Existing Conditions

For motorists, 2nd and 4th avenues are the fastest north-south streets for traversing central downtown. This should continue to be the case in the future.

Despite their two-block separation, southbound 2nd Avenue and northbound 4th Avenue operate as a couplet. At the south end of downtown, they converge into the two-way 4th Avenue South. At the north end, their traffic dissipates along several routes, and the streets themselves end, somewhat awkwardly, at Denny.

In peak periods, the curb parking lane is converted to bus use. The cumulative volume of peak-only services provided by Sound Transit, Community Transit and Metro along these streets means buses are typically using two lanes – the curb lane for boarding and alighting and the adjacent mixed flow lane for passing stopped buses. Outside of the peak from about Blanchard to the south end of the City Center, transit services operate at 15-minute cumulative frequencies or better.

From Denny Street to Main Street, 2nd Avenue offers a southbound-only bicycle lane. The Green Line will operate on either the east or west side of 2nd Avenue, from Stewart Street to King Street Station.

Vision

Similar to their current function, these two avenues would work as a high capacity couplet (2nd southbound, 4th northbound), providing a fast "through and to" route for private vehicles, peak-oriented bus transit, and bicycles.

Transit. 2nd and 4th Avenues would be managed to carry regional commuter express buses that run mainly during peak hours, though even midday service would be every 15 minutes or better, at least south of Stewart/Olive. Transit should be able to achieve an average speed of 9 mph along this street.

These avenues provide parallel peak-hour transit capacity to complement the all-day capacity of 3rd Avenue – in essence, a 'thickening' of the spine when demand warrants it. This would entail preserving the current peak-period restrictions on curb parking on the right-hand sides of the streets. In addition, as demand grows, a second lane adjacent to the curb lane would be reserved for buses – allowing a moving bus to pass stopped buses without having to merge into mixed flow conditions. In off-peak periods, the second lane would become a mixed-flow lane, while the right hand lane would become a parking lane except where there are bus stops, or in the half-block preceding a legal right turn. (Actual traffic volumes would dictate the length of the lane for right-turning traffic.) As on 3rd Avenue, bus stops would be located only in the blocks that end with a street that is one-way to the left,

Figure 3-3 2nd Avenue -- Conceptual Plan & Cross-Section

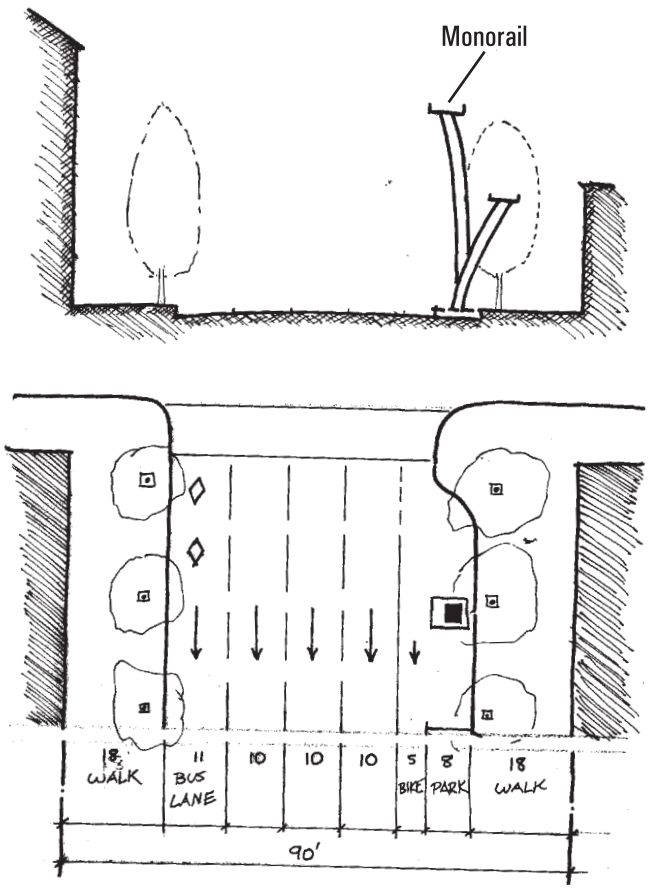
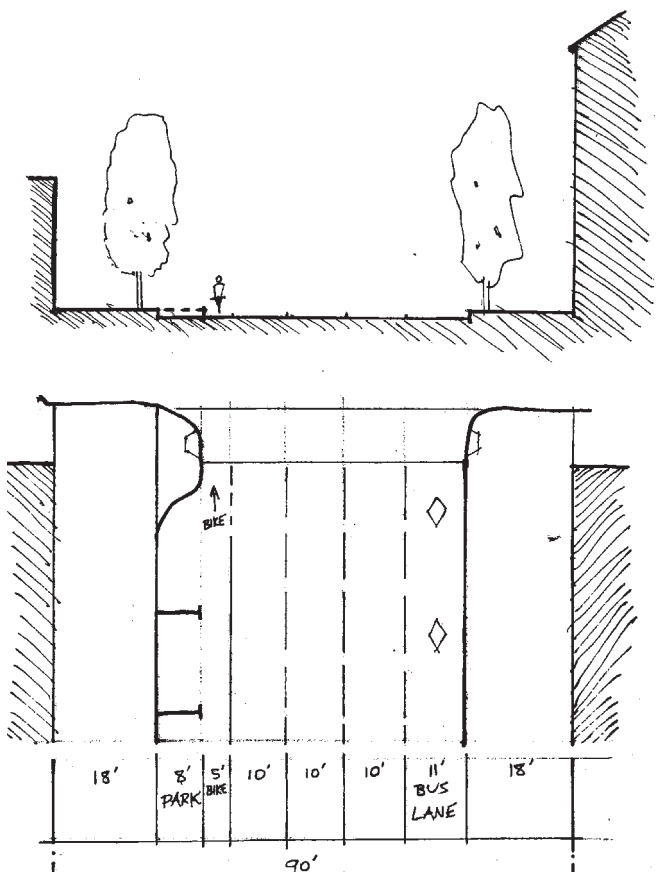


Figure 3-4 4th Avenue -- Conceptual Plan & Cross-Section



so as to eliminate the difficult interface between autos turning right and buses exiting a bus stop. Figures 3-3 and 3-4 show conceptual sections for these streets.

2nd Avenue Monorail's Impact on Transit

West-side bus lanes can be accommodated with any of the three potential monorail alignments on 2nd Avenue – west-side, east-side and center. An east side monorail alignment provides a slight advantage to bus transit in that monorail columns will not interfere with bus loading and unloading. Other considerations, such as urban design, real estate and bike lane accommodation, will likely outweigh bus accommodation in determining the preferred monorail alignment.

Pedestrians and Bicyclists

It is important that the monorail and future bus transit facilities do not come at the expense of the 2nd Avenue bike lane. Preliminary examination of the typical cross-section of 2nd indicates that preservation should be feasible except in the center alignment for the monorail. On 4th Avenue, a bike lane would provide a key northbound route through and to downtown, closing a gap in the bicycle network.

Pedestrian use of these avenues is high, and will increase along with the growth in transit service (both monorail and bus). A concern for pedestrians along 2nd and 4th is the proximity of moving buses to the sidewalk in peak periods. Narrow pedestrian bollards should be used close to the curb line on the sidewalk, as well as increased tree planting in some areas, to visually and physically protect pedestrians from moving vehicles.

Overall Street Management

Similar to current operations, parking would be allowed on the bus lane side at off-peak times only, with pricing and regulations used to prioritize short-term and commercial loading uses. While the dual bus lane may reduce private vehicle capacity of the avenue, this is warranted if the total person throughput capacity increases due to faster transit speeds.

5th and 6th Avenues

From Denny to Cherry (Key Tower), 5th & 6th Avenues can be thought of as a couplet. Both streets are central to the retail and hotel core, and further south they become critical streets for freeway access. The couplet effect ends near Cherry, where 6th briefly reverses direction to become one-way southbound, the same direction that 5th is flowing. 6th reverses direction again at Yesler, with the effect that it tends to feed traffic into Yesler despite the lack of freeway access there. It is a confusing arrangement, and beyond the scope of this study to improve.

While it is continuous, 5th is much less attractive than 2nd for driving the length of downtown. The monorail occupies the median from Denny to Stewart. 5th narrows through the retail core, and south of Pike, it easily clogs with traffic heading to and from nearby I-5. Outside of the retail core, street retail is limited. A mixture of transit services operates on 5th, turning on at various points from Denny to Blanchard and turning off between Union and south of Yesler. Most routes provide frequencies of 20-30 minutes, but they do not combine to provide a useful aggregate frequency.

Recommendations: South of Stewart

The southern part of 5th should remain an auto-oriented street. It will continue to hold vehicles queuing to access I-5. Eventual priority treatments may be needed for southbound HOVs heading for the Key Tower entrance to the express lanes in the afternoon, though this will not be a significant

transit route.

The transit use of 5th will be primarily south of the Key Tower ramps, as certain Metro and Community Transit routes use the contraflow lane between Terrace and Cherry to access the northbound transit lanes during the PM peak hour, and use the same segment of 5th in the other direction during the AM peak hour. The number of routes that will continue to use this routing -- locally known as the "Blue Streak" -- may decline. The routing is useful only for buses that are making single trips in the peak direction, and it has the effect of putting buses on southbound 2nd Avenue even though their destinations are northward -- a counterintuitive arrangement.

Other transit service on 5th would be moved to either the 4th/2nd couplet or 3rd Avenue. The key is to preserve 5th as a place for vehicles to queue onto I-5, allowing other streets to move more freely.

Suggestions North of Stewart

No significant changes are proposed for these streets. However, 6th may have a role as a main route of auto access to Westlake Avenue (see discussion of Westlake Avenue below.)

In addition, the following idea should be considered as part of both the Monorail Project and the future Denny Urban Design study. Because 5th is so constrained going through the core retail area, especially in the block between Olive and Pine, it may be appropriate to rethink this street further north. One possibility for simplifying the tangled movements at Denny would be for 5th to become two-way at some point north of Virginia. If the monorail remains in the median, two-way operation of this street would actually be clearer than the current split-lanes running the same direction. The main advantage of this idea would be to allow traffic to cross directly over Denny on 5th in both directions, eliminating unnecessary turning movements on Denny caused by the awkward point where 6th pours traffic into the street.

East-West Streets

Mercer

Mercer is a prominent multi-modal street that relates to new urban development in South Lake Union and links this district to Queen Anne and Seattle Center. Via Eastlake, Lakeview and Belmont, Mercer also provides key potential transit, bicycle and pedestrian connections between Capitol Hill and the South Lake Union area.

Using Mercer and some adjacent streets, the current "Mercer Maze" serves east-west travel between Lower Queen Anne, South Lake Union, I-5 and Capitol Hill. Recognizing that it does not function well for any mode, the City is redesigning Mercer Avenue in conjunction with the Viaduct project. This effort will ultimately determine how Mercer functions.

The design should address the multi-modal needs in the area, including providing transit, bicycle and pedestrian connections between Queen Anne and redeveloping South Lake Union. Current plans call for acquisition of enough right-of-way to create a multi-way boulevard, which could create a pedestrian realm to support street level retail, slow-moving access lanes that would be comfortable for cyclists, and fast-moving travel lanes that would allow Mercer to carry the high volume of vehicles and transit that travel west from I-5. An east-west crosstown transit route is also proposed for this street. It could be either trolley or diesel, though a trolley route would enable service to more easily continue via Eastlake, Lakeview, Bellevue, and Roy to connect to Capitol Hill, a much stronger destination than Eastlake Avenue.

A crucial input from this study to the Mercer study is the need to retain access to Mercer east of Fairview, where the bulk of Mercer traffic flows into I-5. Our transit mapping presumes that this segment will remain open to eastbound traffic only to Eastlake, with westbound traffic from Eastlake routed via Republican to Fairview to access Mercer. This is important because it is the only viable alignment for a future east-west local transit route on Mercer.

Thomas

With the proposed bicycle/pedestrian bridge across Aurora, Thomas will become a continuous pedestrian street from Lower Queen Anne all the way to Eastlake, though unfortunately there is no crossing of the freeway at this point. Denny Way urban design plans should look jointly at Denny and Thomas, and consider the possibility of replacing the unpleasant pedestrian crossing at Denny with a pedestrian bridge from Capitol Hill to South Lake Union at Thomas. This is a long-term, high-cost project, but there is currently no other linkage between the extremely dense housing east of I-5 and the South Lake Union district, and one will be needed eventually.

Denny Way

Denny Way is one of the least attractive major streets in downtown Seattle, and this is a particular problem because the street is so unavoidable. The current pattern of colliding grids creates many awkward intersections -- indeed some stretches of Denny seem to be nothing but intersection as streets enter slightly offset from each other. Many key streets from both north and south terminate at Denny, forcing even more traffic into the street. The result is a street that is designed primarily for cars but that is actually unpleasant for all modes.

Streets where grids collide can be sites of particular vibrancy. They offer the potential for dramatic developments that "anchor" the view down one or more arterials, either north or south. However, they also require more aggressive attempts at channelization of intersecting traffic, with the goal of minimizing intersections that end in a "T" at Denny, thus forcing traffic into the street that may not want to be there. As one example, it may be appropriate to make Queen Avenue North two way, and direct through traffic over to 1st before this street reaches Denny. In an example from the south, 6th Avenue's approach to Denny should be designed either to encourage motorists to cross over into 6th Avenue North (if this is desirable), or else 6th Avenue through traffic could be turned west to join a two-way 5th under the monorail to flow more cleanly into 5th Avenue N.

A vision for Denny will be determined though the Urban Design Plan called for in the 'Blue Ring' Plan. The latter plan postulates Denny as a possible 'outdoor living room' or 'main street' with a variety of sidewalk activities enhancing its role as a street that connects neighborhoods. Regardless of the ultimate urban design vision, crossing Denny must be made more efficient for transit vehicles, bicycles and pedestrians.

As the only route eastward from Lower Queen Anne and Seattle Center, transit frequency is clearly inadequate, and will need to reach 10 minutes all day to be worth waiting for. *Frequent service on Denny is a higher priority than service on Mercer, and provision for this service must be included in any redesign of the street.*

Transit priority treatments such as signal priority will help high frequency buses and the SLU streetcar cross Denny at Westlake and Fairview avenues. The eventual urban design plan should look at the potential for 'road diets' for the many streets that hit Denny as a result of the colliding grids. Linkages for each mode should be clearly signed. This would make Denny easier to cross and traverse. The opportunity for transportation character changes at Denny is matched by the land use opportunities, which could provide special spaces and developments that anchor the downtown avenues and provide a sense of gateway. The eventual urban design plan for Denny should integrate the potential changes.

Stewart / Virginia / Olive

Traffic is heavy on these streets as they serve various freeway approaches. Transit demand on these streets increases with the Tunnel Closure plan, as routes that now enter the transit tunnel directly from the express lanes are instead routed onto the surface. To expedite this, the Tunnel Closure plan proposes two peak-hour changes:

- Eastbound transit lane on Olive, for access to either the express lanes at Convention Place or the general purpose lanes via the Olive onramp just beyond I-5. The latter is needed for SR 520 buses, which cannot use the express lanes, and for buses traveling in the reverse-peak direction.
    - A signal queue-jump at Boren may be needed so that buses from the right lane of Olive can get over to the left-side onramp to I-5.
- Terry Avenue North will have a northbound transit-only lane. This is needed to permit buses exiting the express lanes into Convention Place to get to westbound Stewart Street.

Route 70 provides service with 15-minute frequency in the peak on Stewart and Virginia (as a couplet), from 3rd Avenue to 9th Avenue. These streets are used as part of a variety of confusing end-of-line routings for South King County services, including both CT and Metro service. Rail will not serve Convention Place, increasing the need for rapid bus operations in this direction, especially expedited expresses for future rail markets such as Northgate and the U-District.

Vision

Stewart and Virginia operate as one of the key transit crosstown corridors to downtown, providing high frequency all-day service and benefiting from transit priority treatments. Increased service operating on Fairview Avenue to Stewart and Virginia provides a connection between South Lake Union and the markets that will be attracted to new employment there.

Moving transit through the congestion in this area would require a number of operational changes by 2015, when general demand growth and SLU development are likely to justify these treatments. The plan elements will be needed at different times transit operating speeds deteriorate, but are likely to include:

Midday

All-day, frequent express-routes to and from the north operate into Convention Place Station (CPS), which will be a staging area for bus operations through the tunnel when operating jointly with light rail. (LRT will not operate east of Westlake.) This group includes express service to and from:

- Northgate via I-5
- U-District via I-5
- Redmond via I-5 to SR 520.

Inbound buses going to the tunnel can exit into CPS from either the general purpose lanes or the express lanes. Northbound, buses leaving the tunnel can enter the express lanes directly from the station when the lanes are open. Otherwise, they must exit the station onto Olive (at Terry), turn right on Olive, merge left, and enter I-5 using the Olive onramp.

All other all-day routes will need to use Stewart from the freeway inbound, and Olive to the freeway outbound.

Peak Only Express Routes

- Southbound buses from I-5 general purpose lanes (which means all SR 520 buses and all buses operating against the peak direction) exit directly into Stewart.
- Southbound buses from I-5 express lanes exit into Convention Place and proceed north on Terry, left on Stewart.
- Northbound buses to I-5 (except those looping south through downtown) use Olive to the express lanes, enter the general purpose lanes from Olive, or could enter the express lanes via Convention Place station.

Metro 70 Trolleybus

Service would be all day and intensive on its current routing, for local service along Fairview. However, instead of turning south into 3rd Avenue as it does now, this route would continue west using Virginia-Stewart to 1st Avenue and terminate in that area.

Street Management Needs

To accommodate the outlined services, the following street managements measures would likely be necessary.

- **Fairview Avenue.** Because of backups from Denny and Mercer, we recommend bus-only lanes on Fairview from the south end (Boren/Virginia) to John, and some preferences to be determined at Mercer.
- **Stewart between I-5 and Terry.** Provide an inbound bus + HOV lane. This would require either removal of a curb parking lane or a mixed-flow lane.
- **Stewart west of 9th Avenue to 2nd Avenue.** Provide a curb bus-only lane and either an adjacent bus only lane or bus and 3+HOV lane. Many inbound express buses and deadheading buses use this segment, with many not making local stops. To remain reliable these trips will need a fast flow past traffic congestion, while Route 70 will need the curb.
- **Circulation.** Prohibit right turns from southbound Westlake Avenue onto Stewart. Demand for this movement would be forced right onto Lenora Street with provisions to turn left on to 5th Avenue, or continue west. In addition, northbound auto access would begin with traffic entering from Virginia or 6th Avenue, leaving a space for the south end of streetcar line to terminate without traffic interference, and opening up the confusing intersection of Westlake and Stewart to create more of a plaza, warranted by the confluence of services (monorail, streetcar, bus transit).

Buses get caught in regional traffic using Fairview, Stewart and Virginia to cross Denny Way

Pike / Pine

As the longest east-west streets in downtown, Pike and Pine are central to many key districts, including Pike Place Market, Westlake/retail core, and the Convention Center area. They operate as a one-way couplet in downtown, but each become two-way across Capitol Hill. Transit is extremely frequent (<5 min.) from Bellevue Avenue to 3rd Avenue. However, frequencies drop to 6-14 minutes at 1st Avenue as difficult turnarounds and layovers displace routes that would logically end there.

Vision. Transit and bicycling services provide strong and complete connections from Capitol Hill to Pike Place market. Pike and Pine operate as a second transit 'radial' / 'finger' perpendicular to the 3rd Avenue spine.

All transit service on Pike and Pine would operate to 1st Avenue and terminate there. This route clarity is likely to greatly increase the number of impulse transit trips within the downtown, for example from the Convention Center to Pike Place market. Bus lanes and transit signal priority would increase the speed and reliability of these services. There is currently a left side bus lane with a boarding island on Pine between 3rd and 4th Avenues, designed for buses turning left on 3rd. This island could be eliminated.

The current one-way couplet structure would be retained; however, for bicycles the inbound Pine Street lane would be extended to 1st Avenue with a contraflow bike lane, also on Pine Street.

Along with 3rd Avenue, the proposal for Pine Street is potentially the most dramatic street reconfiguration proposed in this Plan. Currently Pine Street's roadbed west of 6th Avenue ranges from 38 feet to 36 feet, as it narrows to reflect the high pedestrian volumes between Westlake Center and Pike Place Market. Additionally, curb extensions create

crossing distances of between 26 feet and 20 feet. The curb extensions at 4th Avenue are adorned with large concrete planters. This proposal would require approximately 41 feet of roadbed with crossing distances of 28 – 35 feet through to 1st Avenue (see Figure 3-6) and would result in a single through travel lane for mixed vehicles. As shown, the configuration includes far-side bus bulbs with cutouts for cyclist traveling in the with-flow bike lane.

An added challenge to this plan is the need to layover buses near where the routes would end, on 1st Avenue between Pike and Pine – one of the most prominent intersections in the city. This should be addressed both by a detailed assessment by the city of curb space allocation in this area and the ongoing bus layover study being conducted by KC Metro. A possibility would be to turn some routes south on 1st, perhaps sharing the Madison-Marion turnaround and enjoying the resulting ferry access. This would require double-wiring the turnaround so that the two routes could operate independently.

For Pike Street, proposed changes to the cross section are less dramatic (Figure 3-5), with the typical configuration consisting of a bus lane, two travel lanes and a loading / parking lane. The parking lane and second travel lane would likely be replaced by a widened sidewalk at Westlake Center and 1st Avenue, where pedestrian volumes are highest. It would be vital to protect pedestrians from buses operating curbside on Pike, which could be done with closely spaced (~10 feet) bollards along the curb.

While the proposed changes are significant, the benefits of a high quality bike route through downtown from the east, and clear, fast, and reliable transit in this corridor are great. Vehicles seem to already know to avoid Pine west of 5th Avenue as it is "choked" by the treatment in front of Westlake Center. The same is not true of eastbound Pike, which offers the illusion of a continuous wide street though in fact it can become congested as it approaches the Convention Center area.

Looking East on Pine from 1st Avenue. Cars avoid driving to Pike Market on Pine

University / Union

University and Union streets function as onramps/offramps to I-5's north all access lanes. Transit service is minimal and not useful for intra-downtown travel. Union Street connects through to Alaskan Was as a street, while University Street is a major pedestrian connection to waterfront via steps.

Union is currently used by certain bus routes transitioning from 5th to 1st or Alaskan Way. This confusing routing would be eliminated, eliminating all transit service along Union and allowing some parking to be restored.

Seneca / Spring

This couplet is used only by trolley bus route 2, solely to the east of 3rd Avenue. As higher frequency service on Madison/

Figure 3-5 Pike Street -- Conceptual Plan & Cross-Section

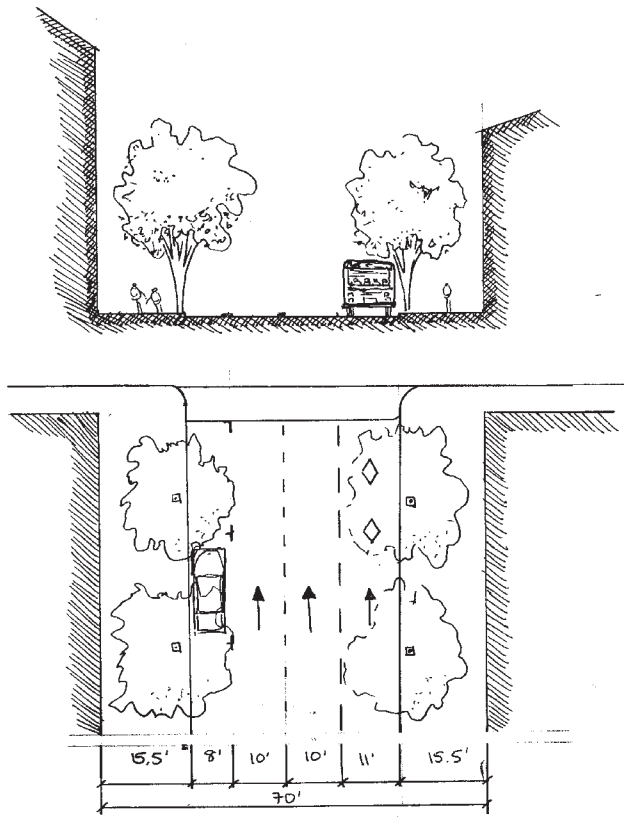
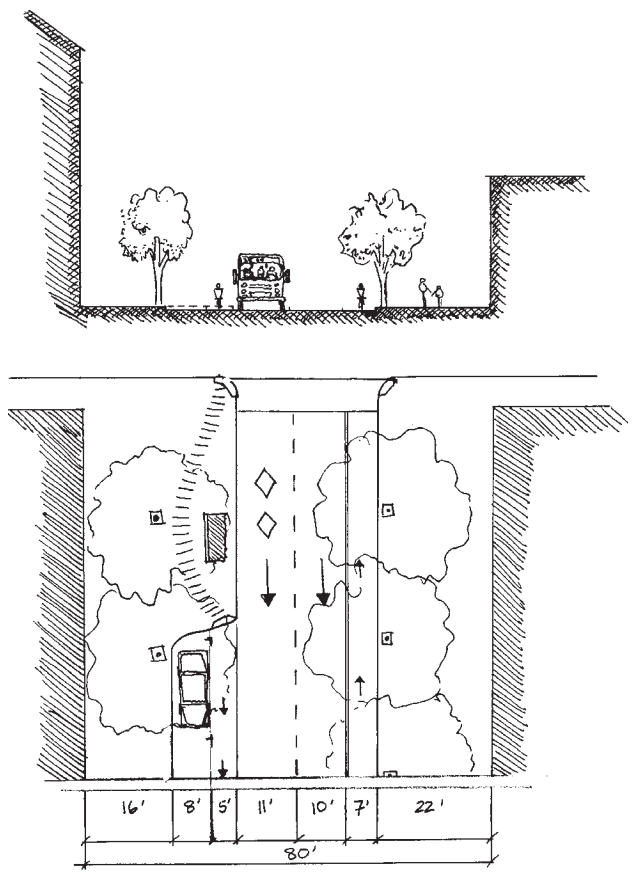


Figure 3-6 Pine Street -- Conceptual Plan & Cross-Section



Marion would be more useful, trolley bus route 2 would be moved from Seneca / Spring to provide higher frequencies on Madison/Marion. Seneca is not suited to transit operations, because the freeway ramps at both ends tend to create unacceptable volumes of traffic.

An uphill bike lane on Spring would connect downtown to First Hill. A lane could be accomplished within the existing right of way or by converting diagonal parking to parallel.

Madison/Marion

West of I-5 and 6th Avenue, Madison and Marion streets operate as a couplet. East of there, Madison is two-way, and runs straight all the way to Lake Washington, one of very few streets that do. Transit service does not reflect Madison's simplicity because the inner segment is trolley bus service, while the outer segment (Madison Park) is diesel. Efforts should continue to be made to create a simpler trolley route between downtown and Madison Park along the full length of Madison, to take advantage of this street's simplicity, even if this requires creating a circulator route for areas of Madison Park where trolley wires are an issue.

After Pike-Pine, Madison-Marion transit services provide the second busiest east-west transit couplet. Frequencies are in the 6-14 minute range, but are erratic. Characteristics of Madison-Marion that make it valuable as a transit street include:

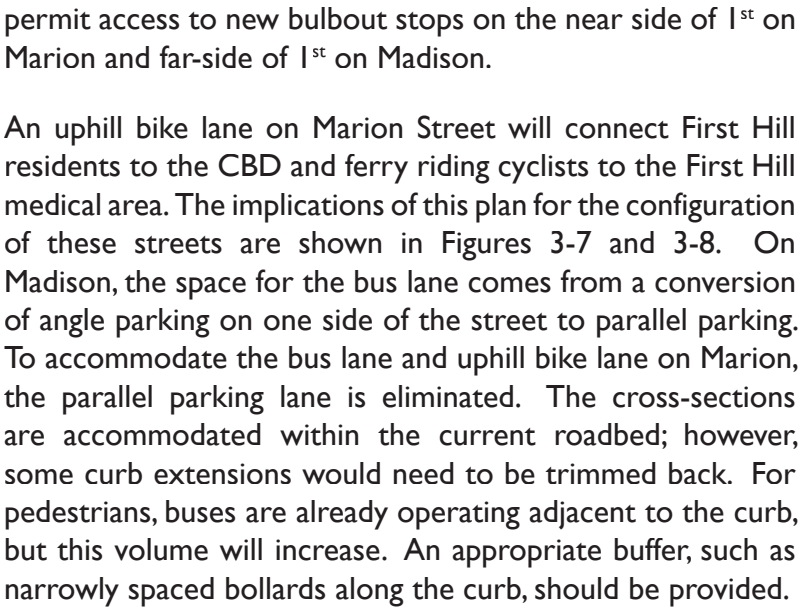
- Provides the most direct route up the steep hill to the First Hill medical area.
- Connects directly to Colman Dock at 1st & Marion.
- Crosses I-5 without encountering an interchange.
- Core of First Hill medical area is on Madison.
- Original Sound Transit LRT had subway station at 9th/ Madison.

Poor access to the bus tunnel and eventual LRT service is the only limit on this couplet's value as a transit street.

Vision. Colman Dock, the CBD and First Hill are strongly connected by high frequency transit service and an uphill bike lane. The Madison and Marion couplet serve as a transit crosstown corridor perpendicular the 3rd Avenue spine -- the most important in the city next to Pike-Pine

Given its value as a transit couplet, this plan recommends increasing the frequency of service, extending service to 1st Avenue to provide the primary intermodal connection to ferry passengers, and providing priority to transit via a bus lane and signal priority. Layover for this routing would occur on westbound Madison near-side of Western and back a few feet so that the left turn is possible. This has implications for the design of the new pedestrian bridges at 1st Avenue to permit access to new bulbout stops on the near side of 1st on Marion and far-side of 1st on Madison.

An uphill bike lane on Marion Street will connect First Hill residents to the CBD and ferry riding cyclists to the First Hill medical area. The implications of this plan for the configuration of these streets are shown in Figures 3-7 and 3-8. On Madison, the space for the bus lane comes from a conversion of angle parking on one side of the street to parallel parking. To accommodate the bus lane and uphill bike lane on Marion, the parallel parking lane is eliminated. The cross-sections are accommodated within the current roadbed; however, some curb extensions would need to be trimmed back. For pedestrians, buses are already operating adjacent to the curb, but this volume will increase. An appropriate buffer, such as narrowly spaced bollards along the curb, should be provided.



Madison Street would be reconfigured to provide an exclusive bus lane while preserving two travel lanes.

Figure 3-7 Madison Street -- Conceptual Plan & Cross-Section

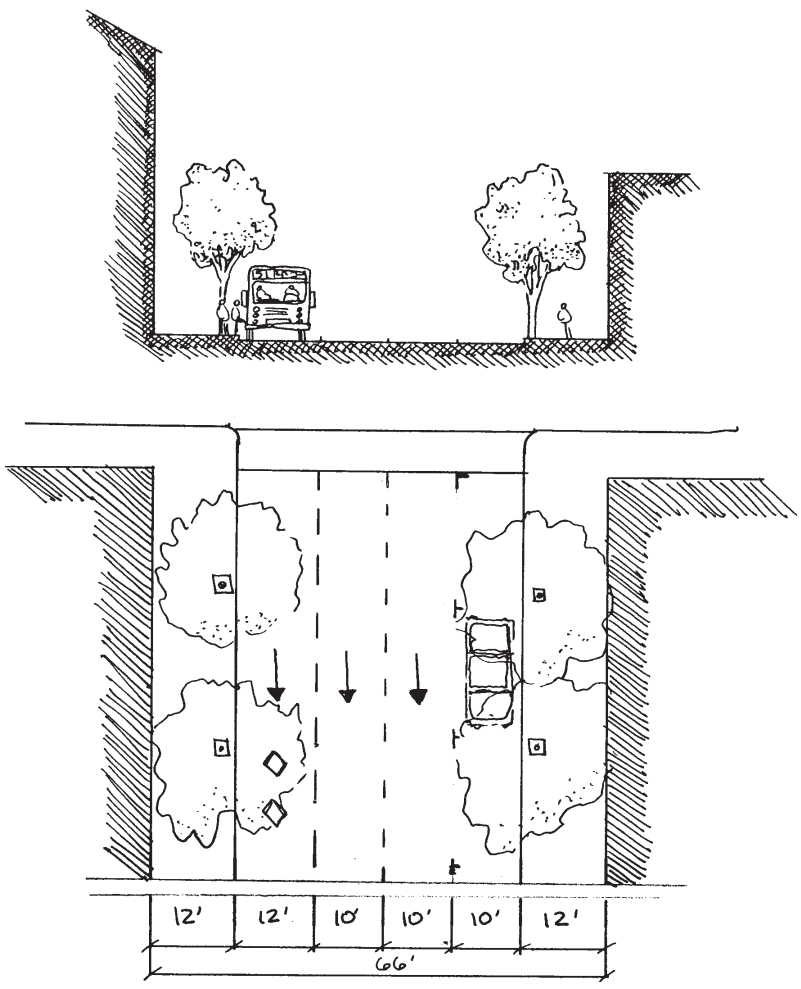
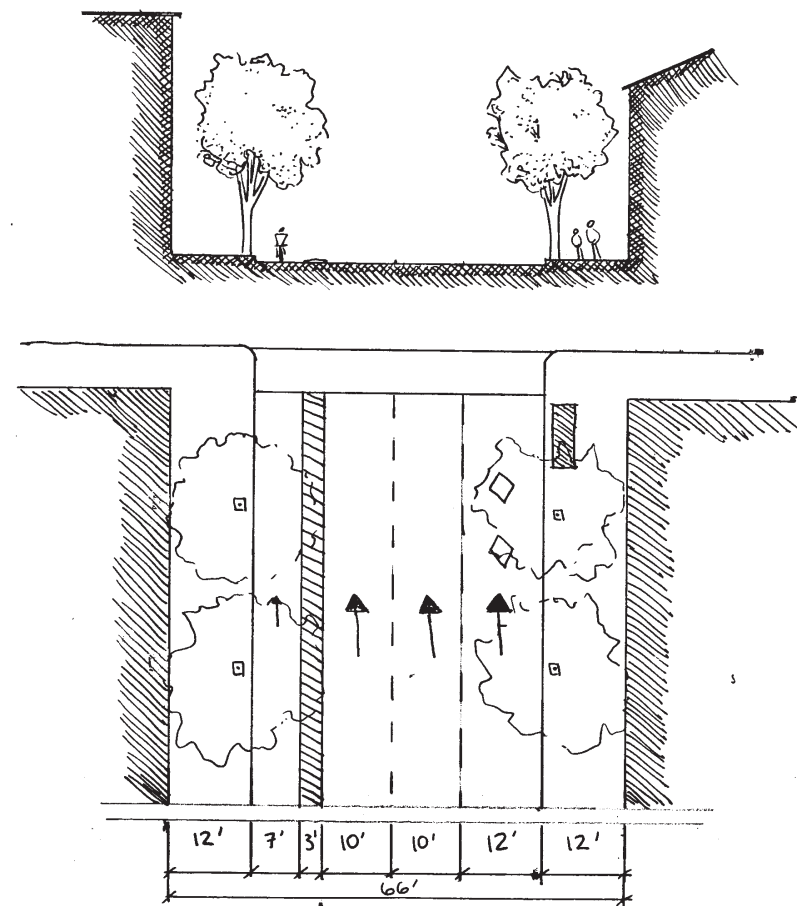


Figure 3-8 Marion Street -- Conceptual Plan & Cross-Section



James

Beginning at 3rd Avenue, James Street provides a rare direct hillclimb route to residential density in First Hill. It is the only two-way, east-west street in the southern downtown grid. Current trolleybus service operates every 10 minutes, providing a convenient connection to the Pioneer Square tunnel station. Some 3rd Avenue service branches off on to James.

Recommendations

Some King County Metro staff have proposed realigning the current service on James (Routes 3 and 4) to instead use Yesler and 9th as their routing to First Hill. This routing is longer, and would require moving some trolley wire, but it has the considerable advantage of protecting transit from freeway-related congestion that tends to affect James near the I-5 interchange. It also would eliminate the need for left turns from the 3rd Avenue transit spine onto James.

Meanwhile, the following short-term alterations would improve bus operations on James Street:

- Restrict north-to-west left turns from 9th Avenue to James Street. General purpose traffic could turn left at Boren or Terry avenues. This would require a new signal at Terry & James and a transit-activated left turn at 9th & James.
- Revise lane striping on westbound James Street between 6th and 7th avenues under I-5. Currently, the southern-most left turn lane is an add lane; instead, feed center westbound lane to the southern left turn lane (there is a double left at 6th Avenue) and make the westbound northernmost lane the add lane at 6th Avenue. Inbound routes 3 and 4 would be in that lane. This would likely result in less queuing in the westbound lanes caused by the large number of vehicles turning left to the south-bound I-5 ramps.

Yesler

Yesler Street is the southern boundary of the CBD grid, creating a function and opportunities similar to Denny Way but over a shorter segment. Vehicle movement is slow and sensitive through Pioneer Square. To the east of 2nd Avenue, Yesler is an attractive east-west corridor for transit given the lack of a freeway interchange and less of a grade relative to James and Madison/Marion. However, use is limited as current mid-day frequencies are only 30-minutes. These should be increased to every 15 minutes when resources permit.

Little physical improvement is needed on Yesler. The street generally flows well, largely because it is protected from I-5 traffic.

Crossing I-5

The availability and quality of crossings of I-5 for bicyclists and pedestrians determine the connectivity between the City Center districts and will affect whether bike, walk and transit trips can accommodate the continued growth in the area. Past planning has included assessments of these crossings and some modifications are underway. This assessment is not meant to be exhaustive, but instead is meant to highlight the opportunities for improvement in relation to the city's growth and creating a high quality Center City circulation network to support it. Some improvements can be made in the very short term while the opportunity for others will come in conjunction with major projects such as reconstruction of segments of I-5 or land use projects on the freeway's air rights. This section looks at key crossings moving from north to south in the study area. Upgrading these crossings would be consistent with the City's Blue Ring Plan. The Blue Ring includes I-5 from Freeway Park north to Harrison Street.

Linking South Lake Union and Capitol Hill

This connection is of growing importance as redevelopment proceeds in South Lake Union. Currently, there is little connectivity between these two districts that are separated by a steep grade as well as I-5. Over half a mile separates the Denny and Belmont crossings, with the next crossing over ¾ mile north of Belmont.

Recommendations

A pedestrian bridge providing elevators, similar to the Bell Street Bridge at Alaskan Way, in the vicinity of Thomas Street, would serve to creating a bike/pedestrian corridor from the forthcoming Thomas Street Bridge at Elliot Bay complete to Capitol Hill.

The Bell Street bridge crosses major infrastructure and allows pedestrians to ascend a significant grade. A similar concept could be used to connect Thomas across I-5.

Crossing I-5 via Denny Way

Denny Way is considered "Center City Connector" in the city's Blue Ring Plan. From I-5 at Denny, there is a view corridor to Elliot Bay. The crossing is somewhat steep and long spanning Eastlake before touching down. New development is occurring in the area and there are many opportunity sites in the corridor. The crossing is unpleasant for pedestrians who have only an unprotected sidewalk on the south side.

An upgrade of this crossing would include:

- Adding planters and pedestrian lighting on the existing south side crosswalk
- Eventually providing a sidewalk, with landscaping and lighting, on the north side of Denny. The planters would provide a barrier between fast moving vehicles on Denny.
- Providing automatic pedestrian crossing phases at Denny and Stewart rather than a pedestrian push button

Ultimately, a civil pedestrian environment worthy of this spectacular site would require widening the Denny overpass. Compared to this, the alternative of a pedestrian overpass at nearby Thomas may seem more reasonable.

Sidewalk crossing I-5 on the south side of Denny offers no buffer from cars and trucks.

North side of Denny over I-5

Crossing I-5 via Olive Way

Vehicle circulation at Olive and I-5 is geared towards allowing freeway access, making nearby Pine more useful to bicyclists for crossing I-5. However, pedestrian volumes are significant and influenced by the nearby Metropolitan Park Towers.

Improving conditions for pedestrians would entail:

- Providing a crosswalk on Olive across Minor Avenue with a stop sign at Minor
- Vehicles yielding to pedestrians in the crosswalk at the I-5 express lanes at Olive. Possible treatments include texturizing the asphalt (rumble striping) as it approaches the crosswalk, zigzag lane markings (see photo), and/or a crosswalk with automated pedestrian detection that activates crosswalk lights or a vehicle signal
- Adding planters to the sidewalks over I-5 along Olive

Bike lane and sidewalk end heading southwest on Pine over I-5

No crosswalk for pedestrians crossing Minor at Olive

Pedestrian using Pine's north side curb as a sidewalk

Pedestrian waiting for compliant vehicles at the I-5 HOV entrance from Olive

Resumption of southbound bike lane on Pine before Boren

Crossing I-5 via Pine Street

The Pine Street crossing of I-5 is important for a number of reasons including its bike lanes, the commercial services on Pine both east and west of I-5, and the Convention Place bus tunnel station and Westlake Center west of I-5. Pine Street also offers perhaps the gentlest grade between the CBD and Capitol Hill. The crossing is unique because Pine intersects with Boren Avenue in the midst of carrying over I-5. The Pine Street bike lanes currently "disappear" and restart while approaching the intersection with Boren in both directions.

Pedestrians and bike crossing Boren at Pine over I-5

Note that some changes to Pine Street are underway in conjunction with the planning for LRT facilities at Convention Place. A number of treatments could improve the functioning of Pine Street for bicyclists and pedestrians, including:

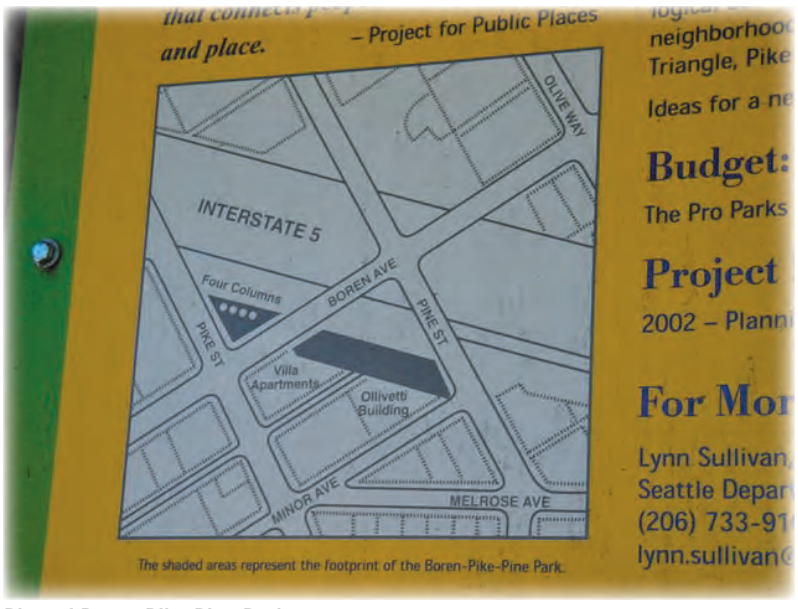
- Providing a "Blue Bike Lane Treatment" of the Pine Street bike lanes in both directions at Boren to provide continuity and enhance safety[4]
- Adding a continuous sidewalk on Pine's north side, which is used by pedestrians either walking in the bike lane or on the narrow curb
- Reducing the cycle length of the intersection of Boren and Pine to decrease pedestrian wait times and providing an automatic pedestrian phase rather than via the pedestrian push button
- Upgrade crosswalk striping and curb ramps
- Adding pedestrian lighting and landscaped planters along Pine

Boren-Pike-Pine Park

This park, which is yet to be renamed, conceptually provides a useful and pleasant walking connection in the freeway area. It could provide an alternative to using the Boren Pine intersection by bringing them to Pike Street. However, pedestrian volumes are low in the park. Its usefulness as a connection is minimal because it requires jaywalking across Boren Avenue.

The City should explore providing the connection between the two park segments via a mid-block crossing. Detailed analysis would determine this concept's feasibility and they type of crossing (e.g. controlled, uncontrolled) that would be appropriate.

Looking toward Pine from Boren

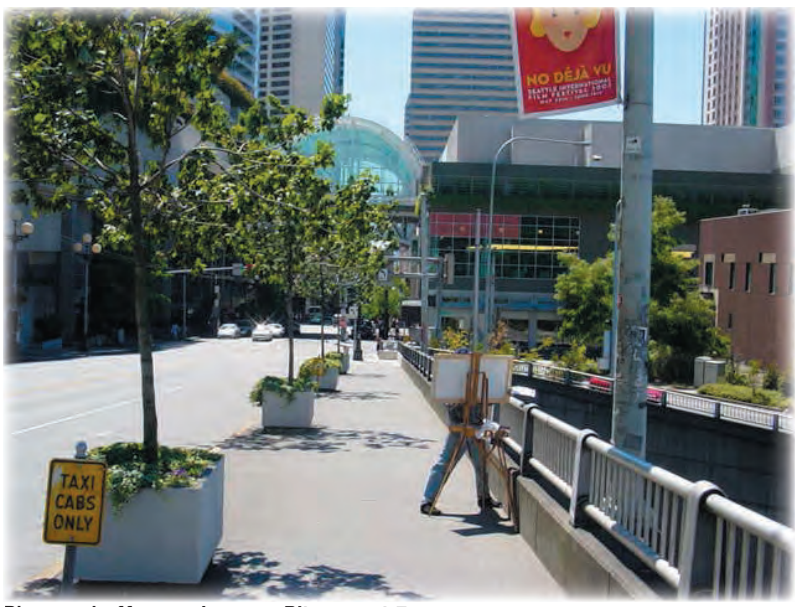


Plan of Boren-Pike-Pine Park

Crossing I-5 Via Pike Street

The crossing along Pike Street is prominent given the presence of the Convention Center as well as CBD oriented hotels east of the freeway. The treatments of Pike as it crosses I-5 can serve as somewhat of a model for other crossings. Sidewalks are provided on both sides of the street, tree planters provide a buffer from vehicles for pedestrians and soften the landscape, streetlights are pedestrian oriented and adorned with planters.

Possible improvements to Pike Street as it crosses I-5 include refinements to the crosswalk at the entrance to I-5, using urban street design details rather than freeway design details.



Planters buffer a painter on Pike over I-5

Freeway Park

Lawrence Halprin's Freeway Park is complete and would be difficult to update at this point. However we did observe some blind corners along the pedestrian path that make the park feel less inviting. The park also is much less inviting when the fountain is not operating. We observed many pedestrians avoiding the park and walking the hill via Seneca even during the daytime. The city should review its policies on shutting down the Freeway Park fountain, since doing so reduces the diversity of people who will be drawn to the area and who collectively would increase the perception of personal safety in the area.

[4] The Blue Bike Lane Treatment was implemented in Portland in areas where the bicyclist travels straight and the motorist crosses the bicycle lane to enter a right-turn lane, as is the case at Pine and Boren. The effectiveness of this treatment is examined in "Evaluation of the Blue Bike Lane Treatment used in Bicycle-Motor Vehicle Conflict Areas in Portland, Oregon", FHWA, August 2000. Available at http://www.walkinginfo.org/pdf/r&d/bluelane.PDF

Crossing I-5 via Madison Street

The Madison Street crossing of I-5 is important because of the street's prominence in First Hill and its location near the core CBD offices. The crossing is the only one in the area that is not affected by freeway ramps. Pedestrians are buffered on both sides of Madison -- by tree planters on the north side and by parking on the south side. Improvements to this crossing could include providing crosswalks and stoplines at each possible crossing at the I-5 service road intersections. Adding pedestrian-scaled lighting will additionally improve the crossing.

Planters on the northeast side of Madison over I-5

The southeast side of Madison over I-5

Looking across Madison over I-5

Crossing I-5 via Cherry Street

Unlike the other crossings discussed, Cherry Street crosses under, rather than over, I-5. Cherry proceeds steeply to First Hill east of I-5. While the pedestrian route is marked and signalized, users must cross a myriad of I-5 access lanes at awkward approach angles. The crossing is dark on the sunniest of days.

A detailed assessment of the crossing could reveal ways to improve the comfort of pedestrians at pedestrian-vehicle conflict points. The effectiveness of the current lighting could be improved, particularly with short street lamps rather than the I-5 "ceiling lights."

Little encourages vehicles to slow and stop for pedestrians crossing at this Cherry eastbound to I-5 northbound access lane.

The long Cherry Street underpass from 6th Avenue.

Chapter 4. Implementation

A detailed implementation plan, which this is not, will begin with two important questions:

- Which actions belong logically to each of three categories?
  - **Short term.** These actions are not dependent on anything else being done first, and are simple and inexpensive enough to be done in a year or less.
  - **Medium term (DSTT Closure Mitigation Project).** This set of actions -- mostly transit preferences on various streets -- is already spelled out in the Downtown Seattle Transit Tunnel (DSTT) Closure Mitigation Project plan. We recommend that these changes be made permanent, and in some cases expanded. If the changes are made with permanence in mind, they can be done to a higher level of amenity and clarity.
  - **Long term (Buildout of all major projects).** This is the outermost year of the study, 2015 or so, though many changes in this category are linked to the Monorail and or LRT completion, which is in the 2008-10 range. The major "if" hanging over certain long-term projects is the completion of the Alaskan Way Viaduct replacement -- the only unfunded project that is assumed in this study due to its importance from a safety perspective.
- What current, future and recommended studies/plans/projects are interconnected with the recommendations of this study, so that implementation must be planned together?

Generally, modest pedestrian improvements such as adding planters and bollards can occur in the short term. While we recommend undertaking efforts such as a Bicycle Master Plan and Pedestrian Master Plan, the addition of some elements of the proposed bike network could be implemented quickly and prior to completion of a full plan. Of course, the policy recommendations form the foundation of future implementation items; therefore implementation of policy changes should begin as soon as possible. Finally, KC Metro and other transit providers can begin restructuring some routes to reflect the network as proposed herein.

Many of the bus priority treatments outlined in this study are already in the DSTT Closure Mitigation Project, and are therefore on-track or near-term implementation. Some frequency increases are also possible through service redesign and speed improvements in the relatively short term. More dramatic route alterations should be implemented as demand grows over the longer term, and as the Link LRT and Green Line Monorail projects free up further bus operating hours.

Sometimes, a current project, which may make sense in the short term, can preclude implementation of some long-term recommendations. Therefore, it is imperative that projects in planning continue to interface with one another and consult the long-term vision outlined herein. The following figure is provided to assist this process. It includes existing and proposed projects and studies on the left column and identifies related recommendations from this study in the right column. At the bottom are a series of new studies that are recommended by this report.

Figure 4-1 Summary of Plans and Recommendations

Project / Plan	Relevant Types of Recommendations
Major capital projects that determine the study context for Long Term	
Alaskan Way Viaduct Replacement Project	Streetcar network Access/Egress to Colman Dock Pedestrian bridges Bus transit access to downtown core
Seattle Monorail Project Green Line & Related Planning Efforts such as City of Seattle station area planning	Hub area pedestrian needs/connections
Sound Transit Central Link Phase 1, including Joint Operations in Tunnel	Hub area pedestrian needs/connections
Projects that determine the study context for the Medium Term	
Downtown Transit Tunnel Closure Mitigation Project	Bus transit service and priority recommendations
South Lake Union Streetcar	Streetcar network and routing
Mercer Corridor Project	Bike/Pedestrian Network Bus transit facilities
South Lake Union Transportation Study	Bike/Pedestrian Network Bus transit service and priority recommendations Streetcar Network Policy support
Other complete or ongoing studies that interact with this study's recommendations	
Metro's Six-Year Transit Development Plans (ongoing)	Transit network, service, and priority Policy support
Seattle Wayfinding Project	Incorporate eventual transit network and physical changes into wayfinding recommendations.
Seattle's Comprehensive Plan & Transportation Strategic Plan	Policy support
Seattle's Transit Plan	Policy support and incorporation of specific Center City Circulation Report recommendations.
KC Metro Downtown Layover Study	Service level and routing
King Street Station Planning	Hub area and bike station recommendations
PSRC Regional Bike Stations Project	Hub area and bike station recommendations
Blue Ring Strategy Implementatiaon	Urban design, pedestrian amenities for areas and streets, I-5 Crossings
Lake to Bay (Potlatch) Trail Plan	Bike/Pedestrian network
Seattle Parking Management Study	Parking polices Street level management guidance
Urban Forest Management Plan	Include recommendations that support desired pedestrian and sidewalk environment in the Center City.
Important Planned Studies	
Colman Dock Redesign (medium- term)	Colman Dock hub area Access/Egress to Colman Dock Pedestrian bridges
Terminal 46 Development Master Plan (long-term)	Bike network Streetcar network
I-5 Reconstruction (long-term)	I-5 Crossings, pedestrian enhancements
New studies recommended by this Report	
Seattle Bicycle Master Plan	Bike network and facilities Some facilities could be completed independently in the short-term.
Seattle Pedestrian Master Plan	Programs Street, Hub Areas, and I-5 Crossings Some enhancements could be completed independently in the short-term. Establish a pedestrian facilities maintenance program.
Downtown Streetcar Master Plan	Streetcar network
Urban Design Plans for Downtown Avenues	Pedestrian amenities needed given vehicle volumes

Impacts and Mitigations

The projects listed in Figure 4-1 will necessitate significant changes to Seattle's street network. While they will result in dramatic increases in the *person* capacity of Seattle's street network, many of the listed transit, bicycle, pedestrian and urban design improvements will result in a loss of on-street parking spaces and/or a loss of capacity for single-occupant motor vehicle traffic. In order to address concerns about such losses, Seattle should refine its existing street management guidelines. The guidelines should be coordinated with on-street parking management guidelines that consider factors related to traffic management objectives and the surrounding land use context when changing or removing on-street parking.

In order to determine when it is appropriate to convert a mixed flow travel lane into a bus-only lane, or reduce auto capacity in order to add a bicycle lane, it is important that Seattle have clear guidelines for how it allocates its street rights-of-way. While it is fairly straightforward to create performance measures for each individual mode of transportation, it is more challenging to identify performance measures for a street or corridor that must serve multiple functions. On a given corridor, how should the City balance competing accommodations for buses, streetcars, motor vehicles, bicycles, pedestrians and parking? What tools can the City use to make such difficult decisions on a quantifiable, defensible basis?

The first step is to refine its existing street typologies, building upon the work that the City has already done for important transit-serving streets. That is, each key street should be labeled according to its relative importance to each mode. Some streets will be of primary importance to cars but minor importance to transit, such as 6th Avenue. Others will be of primary importance to both transit and bicycles, such as Pine.

Typologies should also acknowledge adjacent land uses. In neighborhood commercial districts, for example, sidewalk width and the provision of on-street parking will be very important, regardless of the transportation function of the street.

Figure 4-2 shows a sample matrix of typologies that could form the framework of a system of multimodal performance measures for Seattle's entire street network. Detailing and assigning typologies to individual streets will be a large undertaking, but it will allow shifts in right-of-way allocation to be based upon clear, quantifiable objectives.

Seattle Department of Transportation
Future Center City Transportation Network