



Chapter I. 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 terms – 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 accommodate 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 I-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 C² 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 ratios³ 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.

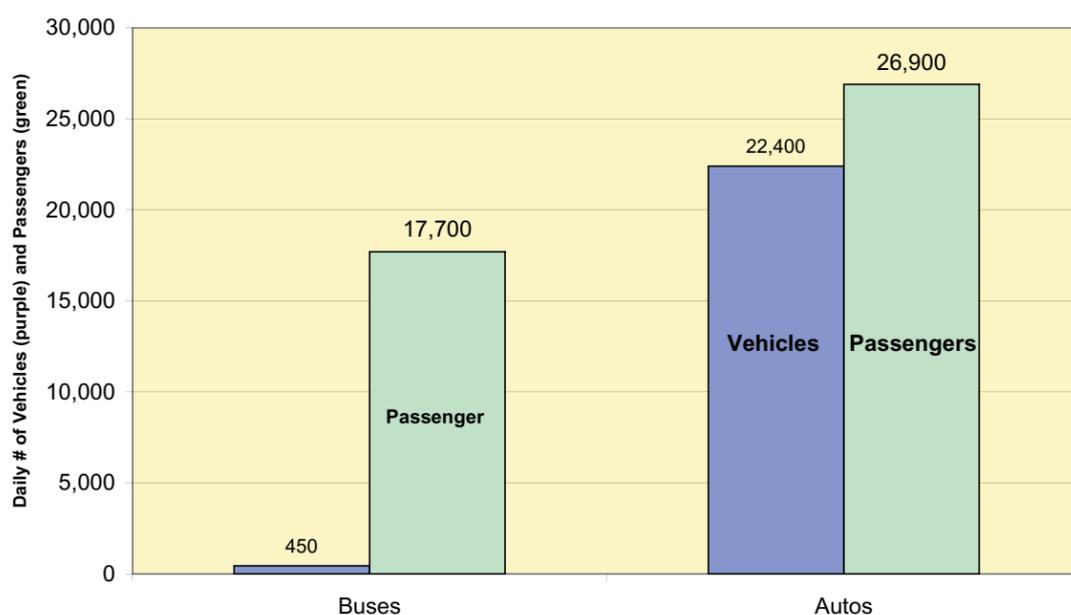
If the city center wishes to grow, it has no choice but to emphasize more efficient modes of transportation. This is not a question of ideology but geometry. Vukan Vuchic of the University of Pennsylvania illustrates this point with his concept of “time-area,” which considers not only the physical space 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

²Automobile 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.

³A 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.

⁴With 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.

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

The Mobility Challenge Quantified

City policies favor accommodating 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 I-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.