

# Clark County High Capacity Transit System Study Final Report



**Moving People -  
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**December 2008**

Southwest Washington Regional Transportation Council



# Clark County High Capacity Transit System Study

Clark County, Washington

## Final Report

December 2008

Southwest Washington  
Regional Transportation Council



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# Clark County High Capacity Transit System Study



## Executive Summary

### Introduction

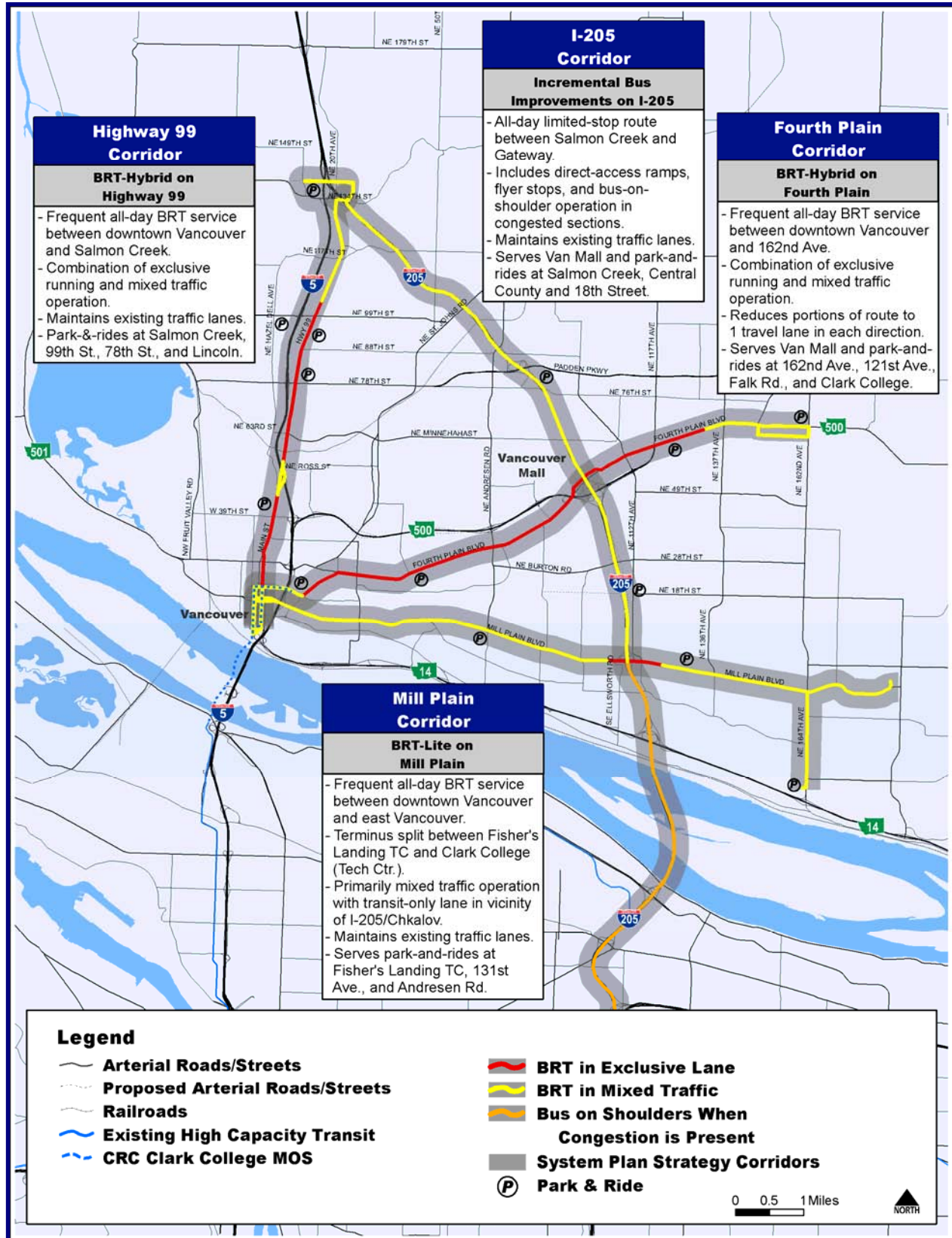
The Southwest Washington Regional Transportation Council (RTC) along with its partner agencies has completed a two-year planning effort to develop a high-capacity transit (HCT) system. The High Capacity Transit System Plan includes bus rapid transit (BRT) improvements in the Highway 99, Fourth Plain, and Mill Plain corridors and significant bus improvements in the I-205 corridor.

This plan provides a blueprint for C-TRAN and the Clark County region as they move forward to implement transportation improvements in the planned HCT corridors. Local jurisdictions and transportation agencies will be asked to consider the ultimate build-out of this plan as they prepare capital improvement programs and work plans.

There are costs associated with implementing this plan. Capital costs will be required to provide substantial segments of exclusive guideway operation where BRT buses can operate separated from adjacent traffic congestion. Preliminary estimates show that future-year transit operating costs could increase with the full implementation of the HCT plan, but will be offset through reliability, travel time savings, and ridership improvements.

Most of the HCT routes identified in this plan represent operational improvements on existing, productive C-TRAN bus routes. As refinement plans/alternatives analyses are prepared in each corridor, they will determine the final mode and alignment issues and include an implementation strategy that could be tied to competing for federal New Starts transit capital grants. The recommended plan is shown in Figure ES-1.

**Figure ES-1  
Clark County HCT System Plan**



## Background

The Clark County High Capacity Transit System Study was initiated in late 2006 to develop a plan for HCT to serve Clark County. HCT is service that can improve reliability and carry more people at higher speeds than a standard bus line. Transit passenger capacity can be expanded through increasing the number of vehicles, vehicle size, frequency, travel speed or a combination of these elements.

The potential to extend a high-capacity transit system from Portland into Clark County has been evaluated several times over the last 15 years. The reason for initiating this HCT system planning process was to examine the potential for HCT within and across all of Clark County. The study was also timely in determining how a Clark County HCT system could connect to the Columbia River Crossing Project. The Columbia River Crossing Project's Locally Preferred Alternative identified light rail to Clark College as the preferred method to connect downtown Vancouver to the Portland MAX system. The Clark County HCT System Study builds from this bi-state connection and addresses HCT connections to the Columbia River Crossing Project, within Clark County and the bi-state connection in the I-205 corridor.

## Study Process

The Clark County HCT planning process moved methodically from evaluating a wide range of potential HCT modes and corridors to identifying the most promising modes and corridors and then to providing a detailed assessment of the modes and corridors. The study processes included the following steps:

- Adopt Study Purpose Statement and Goals and Objectives
- Identify Promising HCT Modes
- Identify Promising HCT Corridors
- Corridor Analysis
- Corridor Evaluation
- System Plan Scenarios
- Policies and Recommendations

Several committees were established to guide and oversee the progress of the HCT study. These included the following:

**Steering Committee** – Comprised of elected officials and agency directors to provide policy direction for the study and provide recommendations to the RTC Board.

**Task Force** – Citizen based committee appointed to represent key stakeholders and constituencies in the county.

### High-Capacity Transit

HCT is service that can improve reliability and carry more people at higher speeds than a standard bus line.



Bus rapid transit vehicle, Springfield, Oregon

**Sounding Board** – At key milestones, active citizens were invited along with the public to hear project updates and provide input.

## Purpose, Goals and Objectives

The Clark County High Capacity Transit System Study has employed an extensive public involvement process. The public has been invited to Sounding Board meetings, Task Force meetings and Steering Committee meetings. Public involvement activities also consisted of open house type public events, presentations to neighborhood groups, a traveling display board, Website, e-mail updates, and on-line surveys. In addition, numerous articles about the study have appeared in local newspapers.

The Task Force developed, and the Steering Committee adopted, a study purpose statement that called for the study to “...identify a high-capacity transit system that provides efficient and high-quality transit service connecting county residents with where they want to go.”

The committees also developed goals and objectives for the study in three major categories:

**Transportation** – Focused on optimizing travel time, access, ridership and regional connections.

**Community** – Focused on supporting economic development, livable and sustainable communities and providing a healthy environment.

**Feasibility** – Focused on developing an affordable and implementable plan and providing for the long-term viability of HCT improvements in the county.

## Modes

The study team identified nine potential HCT modes to be considered. The modes were evaluated based on how well they met the study purpose and goals, whether they were proven technologies, their economic development potential, their cost and their land use compatibility. Based on the initial assessment, four modes – heavy rail, monorail, personal rapid transit and water (river) transit – were eliminated as not being viable to consider for Clark County. The remaining five potentially viable HCT modes included:

- BRT-Lite (bus rapid transit in mixed traffic)
- BRT-Full (bus rapid transit in exclusive guideway)
- Streetcar
- Light Rail
- Commuter Rail



Locomotive-hauled  
commuter rail train,  
Tacoma, Washington



An additional HCT mode option, BRT-hybrid, was developed later in the study. BRT-hybrid was developed to identify capital improvement strategies that had a lower capital cost than the BRT-full concepts, but could maintain the ability to save significant bus travel time by utilizing cost-effective portions of exclusive guideway.

## Corridors

Fifteen travel corridors in Clark County were identified and an initial assessment was prepared measuring their suitability to function as HCT corridors. Based on this initial assessment, five corridors were selected by the Steering Committee as promising HCT corridors that merited more detailed analysis. The five corridors included:

- I-5/Highway 99
- SR-500/Fourth Plain
- I-205
- SR-14/Mill Plain
- Chelatchie Prairie

## Representative HCT Concepts

The study prepared representative HCT concepts in order to evaluate the HCT potential in the five study corridors. The HCT concepts included a range of alignment and mode options in each corridor (except in the Chelatchie Prairie corridor which evaluated only commuter rail). The development of the concepts relied on proven engineering principles to identify right-of-way width, structures, signal requirements and other design elements. The concepts provided enough detail to prepare order-of-magnitude capital cost estimates, prepare a planning-level evaluation of impacts and to prepare an operating plan sufficient to analyze the transportation impacts and ridership potential.

The concepts were mapped showing the general alignments, stations, park-and-rides and connections to other parts of the transit system. It is important to note that these concepts were intended to provide a representation of how HCT could be developed in the corridors and to provide a reasonable method by which to compare alignments and modes within a corridor and to compare among the corridors.

## Corridor Analysis

**Transit Ridership** – Transit ridership was analyzed using RTC’s regional travel demand model for 2030 for each of the concepts.



Light rail transit with exclusive right-of-way, Portland, Oregon

**Land Use** – The study examined existing and the future adopted GMA land use characteristics in each corridor using Clark County geographic information system (GIS) data. Residential and employment densities were calculated for an area within a half-mile of each of the alignment concepts.

**Environmental Issues** – A reconnaissance-level environmental analysis was prepared for each corridor. Because the alignments are only conceptual at this level of analysis, the reconnaissance provided very general findings about the potential for environmental issues and impacts in the corridors.

**Cost** – The study prepared order-of-magnitude capital cost estimates for each design concept. These cost estimates were based on unit costs from recently completed HCT projects and were intended to provide a general level of comparison among design concepts in a corridor and among concepts in different corridors.

## Corridor Evaluation

The corridor evaluation included comparisons of modes and alignments within each corridor and comparisons among the different corridors.

Based on this evaluation, the Steering Committee approved the draft system plan strategy which identified corridor elements to be considered for inclusion in the final HCT System Plan. The draft system plan strategy included HCT elements on the following corridors:

- I-5/Highway 99
- Fourth Plain
- I-205
- Mill Plain

## System Plan Scenarios

A series of five system plan scenarios was developed to test how the HCT treatments in the four corridors would perform as a complete system. The five scenarios are described below:

**Scenario 1** – Developed to test an HCT system with limited capital investment focusing on a small set of corridors.

**Scenario 2** – Developed to test an HCT system that assumes an aggressive level of capital investment with the goal to maximize transit ridership.

**Scenario 3** – Developed to test an HCT system that includes streetcars as a key element serving major travel corridors.

**Scenario 4** – Developed to test an HCT system that focuses major capital improvements on the bi-state corridors (I-5 and I-205).



Modern streetcar vehicle,  
Tacoma, Washington

**Scenario 5** – Developed to test an HCT system that includes BRT capital improvements in each of the four major corridors.

Based on this evaluation, a recommended system plan was developed that maintained a strong level of transit ridership while minimizing the total operating and capital cost.

## HCT System Plan and Policy Context

One of the study's underlying findings is that while the design of a good HCT system is critical, it is not enough to ensure successful HCT project implementation. A well designed set of HCT facilities needs to be complimented by the following:

- Transit-supportive land use strategies
- Collaboration among public agencies
- Commitment to the project at both political and staff levels
- Continued public engagement and support
- Actions by public agencies to amend and implement HCT policies

## HCT System Plan Recommendations

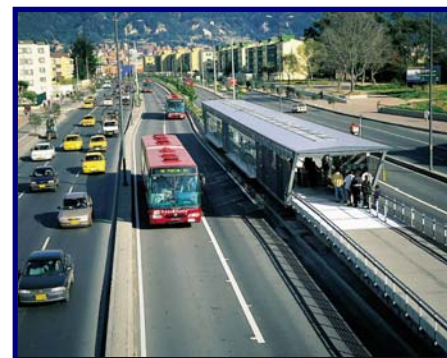
The Clark County High Capacity Transit System Plan recommendations are shown as Figure ES-1 on Page ES-2. The following describes these recommendations by corridor:

**Highway 99 Corridor** – HCT in this corridor needs to serve both intra-Clark County trips and bi-state trips. Recommendations in this corridor include the following:

- Frequent all-day BRT service on Highway 99 between downtown Vancouver and Salmon Creek
- Combination of exclusive and mixed traffic operation
- Maintain existing traffic lanes
- Park-and-rides at Salmon Creek, 99th Street, 78th Street and Lincoln

**Fourth Plain Corridor** – HCT in this corridor should focus on serving intra-Clark County trips with the ability to accommodate some bi-state trips. Recommendations in this corridor include the following:

- Frequent all-day BRT service between downtown Vancouver and 162nd Avenue
- Combination of exclusive and mixed traffic operation
- Reduce portions of route to one travel lane in each direction
- Serve Van Mall and park-and-rides at 162nd Avenue, 121st Avenue, Falk Road and Clark College



**Bus rapid transit with exclusive right-of-way/lanes (BRT-full), Bogotá, Colombia**

**I-205 Corridor** – HCT in this corridor needs to serve both intra-Clark County trips and bi-state trips. Recommendations in this corridor include the following:

- All-day limited-stop route between Salmon Creek and Gateway
- Includes direct-access ramps, flyer stops, and bus-on-shoulder operations
- Maintain existing traffic lanes
- Serves Van Mall and park-and-rides at Salmon Creek, Central County and 18th Street



Bus rapid transit with exclusive right-of-way/lanes (BRT-full), Los Angeles, California

**Mill Plain Corridor** – HCT in this corridor should focus on serving intra-Clark County trips with the ability to accommodate some bi-state trips. Recommendations in this corridor include the following:

- Frequent all-day BRT service between downtown Vancouver and east Vancouver
- Terminus split between Fisher's Landing Transit Center and Clark College (Tech Center)
- Primarily mixed traffic operation with transit-only lane in vicinity of I-205/Chkalov
- Maintain existing traffic lanes
- Serves park-and-rides at Fisher's Landing Transit Center, 131st Avenue and Andresen Road

Table ES-1 summarizes the daily HCT ridership and order-of-magnitude capital cost for the recommended System.

**Table ES-1**  
**HCT Corridors Summary**

HCT Corridor	Daily Ridership	Capital Cost
Highway 99	9,120	\$115 million
Fourth Plain	9,480	\$152 million
I-205	6,109	\$80 million
Mill Plain	8,260	\$60 million



## HCT System Policy Recommendations

Listed below are the central HCT policies that apply across the system and to individual projects.

### Overall HCT Policies

- HCT needs to maximize ridership by serving both intra-county and bi-state transit trips
- HCT system needs to move transit vehicles through corridors faster than conventional bus
- Maximize access to the HCT system by locating stations within walking distance of major activity centers and park and rides
- Balance the trade-offs between ridership and cost

### HCT Land Use Policies

- Transit-supportive densities
- A mix of land use
- Transit-oriented pedestrian environment
- Parking management strategies
- Transit-oriented urban design

### Next Steps

- Selection of a Priority Corridor
- Prepare a New Starts/Small Starts Strategy for HCT Corridors in Clark County
- Alternatives Analysis for Priority Corridor
- Prepare an HCT Funding Strategy



# Study Background



## Chapter 1

### 1.1 Introduction

The Southwest Washington Regional Transportation Council (RTC) along with its partner agencies has completed a two-year planning effort to develop a high-capacity transit (HCT) system. This plan provides a blueprint for C-TRAN and the Clark County region as they move forward to implement transportation improvements in the planned HCT corridors. This report summarizes the study process, technical analysis and recommendations from the Clark County High Capacity Transit System Study.

HCT is transit service that can improve reliability and carry more people at higher speeds than a standard bus line. Capacity can be expanded through increasing the number of vehicles, vehicle size, frequency, travel speed or a combination of these elements. There is a range of HCT services in use nationally and internationally including bus rapid transit (BRT), light rail transit (LRT), commuter rail, streetcar and heavy rail (subway).

Clark County is situated in Southwest Washington State, across the Columbia River from Portland, Oregon. Clark County has approximately 424,200 residents in 2008 and is forecast to grow by approximately 2.2 percent per year through 2030 for a forecast population of 639,000. Clark County has an employment base of approximately 131,000 jobs which is forecast to grow to 284,000 by 2030.

Public transportation has been serving Clark County since the late 1800s. In its earliest incarnation, streetcars connected key points with downtown Vancouver and a ferry that connected to the Portland streetcar system. A direct street connection to Portland

#### High-Capacity Transit

**HCT is service that can improve reliability and carry more people at higher speeds than a standard bus line.**

was available when the original span of the Interstate Bridge opened in 1917. By the 1950s, motor buses had replaced streetcars as the predominant mode of transit serving Clark County.

C-TRAN was established in 1981, replacing City of Vancouver buses with a county-wide system. C-TRAN currently operates 27 fixed-route buses and C-VAN service which provides door-to-door service for elderly and disabled users. C-TRAN provides commuter service connecting to central Portland with peak-period express buses, local all-day service on major arterials in the urbanized portions of the county and connecting service to the smaller cities throughout Clark County.

## 1.2 Study Context

The potential to extend a high-capacity transit system from Portland into Clark County has been evaluated several times over the last 15 years. The reason for initiating this HCT system planning process was to examine the potential for HCT within and across all of Clark County.

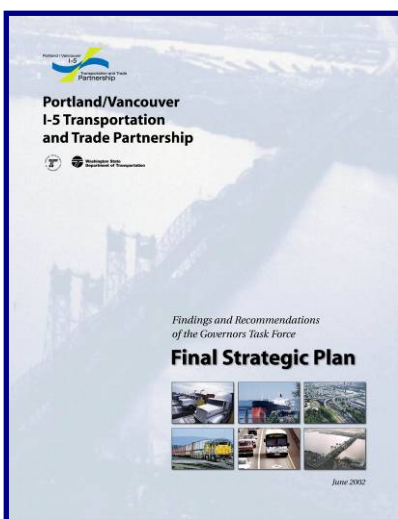
In 1991, the *Clark County High Capacity Transit Analysis* recommended further study of light rail and bus-based HCT options in the I-5 corridor to 179th Street, bus-based HCT options in the I-205 corridor including analysis of an HOV lane, and maintain and improve bus service in the Fourth Plain corridor.

In 1998 the *South/North Corridor Project* published a Draft Environmental Impact Statement that included a light rail project with a Clark County terminus in the vicinity of Clark College along with minimum operable segments (MOS) in north Portland. TriMet proceeded with construction of a light rail line along Interstate Avenue in north Portland with a terminus at the Expo Center on the south bank of the Columbia River.

In June 2002, a bi-state task force appointed by the governors of Washington and Oregon issued the *Portland/Vancouver I-5 Transportation and Trade Partnership Final Strategic Plan*, which recommended a multi-modal strategy including a light rail loop in Clark County with service in the I-5, SR-500 and I-205 corridors.

The *Columbia River Crossing Project (CRC)* was initiated in 2004 to develop a multi-modal project to improve the portion of the I-5 corridor between N Columbia Boulevard in Portland and SR-500 in Vancouver. This project identified a range of highway and transit improvements including light rail and bus rapid transit.

In 2008, the Columbia River Crossing Project issued a Draft Environmental Impact Statement including light rail transit (LRT)



**I-5 Transportation and Trade Partnership Final Strategic Plan**  
June 2002

and bus rapid transit (BRT) options serving three different termini, Lincoln Park-and-Ride (near 39th and Main), Mill District (near Mill Plain and Washington) and Clark College (near McLoughlin east of I-5). In the summer of 2008 the RTC Board endorsed a transit locally preferred alternatives (LPA) that included light rail serving the Clark College terminus.

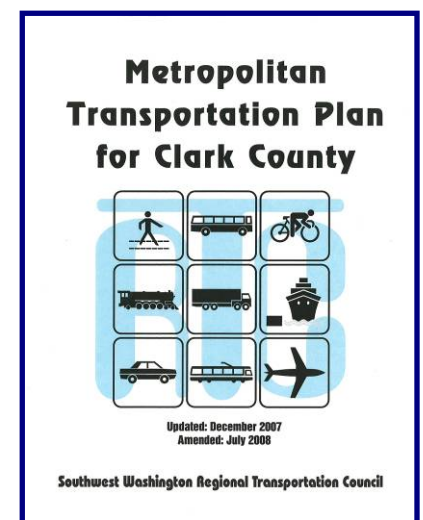
The *Clark County High Capacity Transit System Study* was initiated in late 2006 to develop a plan for high-capacity transit to serve Clark County.

### 1.3 Relationship to Other Plans and Studies

The *Metropolitan Transportation Plan for Clark County* (MTP) is the region's principal long-range transportation planning document. As part of the MTP, the Strategic Plan identifies emerging and long-term projects that require additional decisions and commitment before they can be added into the fiscally constrained MTP. The existing MTP (December 2007, amended July 2008) Strategic Plan recognizes the Clark County High Capacity Transit System Study as the tool for identifying a high-capacity transit system for Clark County. The recommendations of the HCT System Plan will need to be incorporated into the 2009 update of the Metropolitan Transportation Plan.

The HCT System Study was timely in determining how a Clark County HCT system could connect to the Columbia River Crossing Project. As the Clark County HCT System Study got underway the Columbia River Crossing Project was considering a number of HCT concepts and termini. Initially the HCT System Study assumed the Columbia River Crossing Project would terminate at a Lincoln Park-and-Ride near 39th and Main. In 2008, the Columbia River Crossing Project's Locally Preferred Alternative identified light rail to Clark College as the preferred method to connect Vancouver to the Portland MAX system. The final Clark County HCT System concepts address HCT connections to the Columbia River Crossing Project with a Clark College terminus.

Also coinciding with the Clark County HCT System Study, C-TRAN initiated a 20-year Transit Development Plan. This planning process is designed to build upon the existing service and develop future operating scenarios for public transit. The Transit Development Plan process has identified three service alternatives: 1) Coverage-Based Growth, 2) Productivity-Based Growth, and 3) Regional High Capacity Transit. While these concepts are presented as three separate alternatives, it is likely that the final recommended service alternative may include components of each



Metropolitan Transportation Plan for Clark County Amended July 2008

of these alternatives. C-TRAN is scheduled to complete their Transit Development Plan in 2009, and has incorporated the recommendation of the HCT System Study in their HCT alternative.

## 1.4 Other Related Legislation

The Growth Management Act (GMA) was adopted by the Washington State Legislature in 1990 to guide development. The GMA requires city and county coordination in preparing comprehensive plans. Comprehensive plans are required to look at a 20-year horizon in designating urban growth areas, and in making projections for population, employment, and transportation needs in the region. The adopted September 2007 *Clark County 20-Year Comprehensive Growth Management Plan* serves as the basis for 2030 forecast and assumption used in the HCT System Study.

In 1990, the Washington State Legislature passed the High Capacity Transit Act (RCW 81.104) to coordinate the planning and funding for high-capacity transit proposals throughout the state. This legislation recognizes that regional, multimodal transportation planning is an ongoing process that shall be conducted by a regional planning agency. This legislation lays out the steps that should be taken by an HCT system plan. The HCT System study could serve as a basis for the development of a plan that meets the requirements of RCW 81.104.

## 1.5 New Starts Program

New Starts refers to a federal program available to provide capital funding for high-capacity transit projects. Officially known as the Section 5309 Capital Investment Grant Program, it was established by congress to assist local agencies to fund meritorious transit capital projects (including light rail, commuter rail and bus rapid transit). It is a discretionary and competitive grant program. Promising corridors identified through the Clark County High Capacity Transit System Study may be considered for New Starts funding.



FTA has defined three project categories that are eligible for Section 5309 funding:

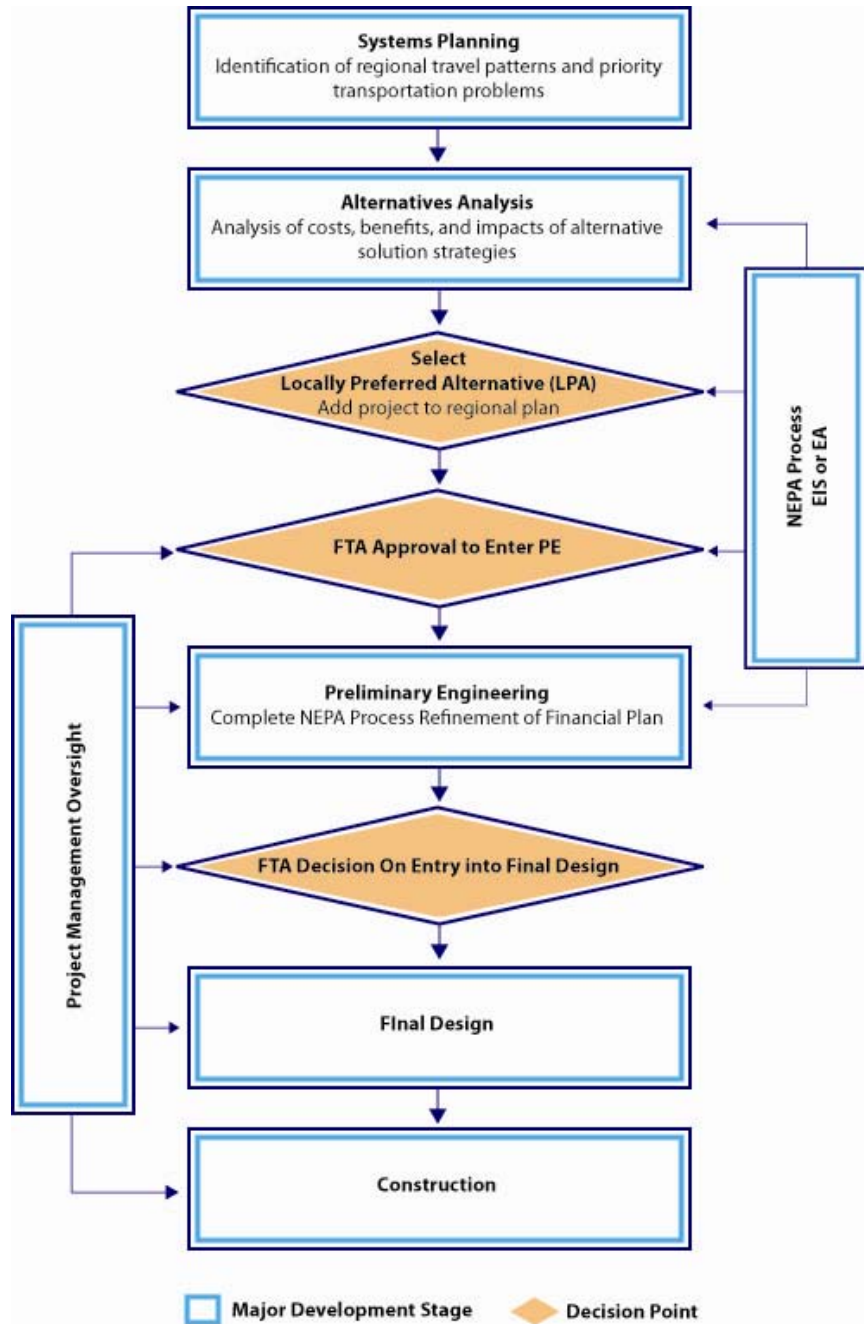
- **Very Small Starts** – Projects with total capital cost of less than \$50 million and less than \$3 million per mile (excluding vehicles).
- **Small Starts** – Projects with a total capital cost of less than \$250 million with no greater than \$75 million requested in federal 5309 funding. Small Starts must have at least 50 percent of the project length in a fixed guideway or be a

corridor BRT project with substantial stations, signal priority, low-floor vehicles, 10-minute peak frequency and at least 14 hours of service per day.

- **New Starts** – Projects with a total capital cost of more than \$250 million. (*Note: the term “New Starts” refers to this specific funding category but it is also used to refer to the overall Section 5309 Capital Investment Grant Program*).

The Clark County High Capacity Transit System Study and inclusion of the study in the MTP are important initial steps in the planning process laid out by FTA for projects seeking New Starts funding. Appendix A provides a detailed description of the New Starts program and project ranking criteria, and lays out the New Starts project development process. Figure 1-1 shows the FTA project development process.

**Figure 1-1  
Project Development Process  
for New Starts Projects**





# Study Process, Structure and Purpose



## Chapter 2

### 2.1 Introduction

The HCT study process was established to move logically from evaluating a wide range of potential HCT corridors and modes to identifying the most promising and providing a more detailed assessment of the promising corridors and modes. This deliberate process ensured that all potential options would be considered and evaluated.

The study was structured to address the following key milestones:

**Adopt Study Purpose Statement and Goals and Objectives –**

The Purpose Statement and Goals and Objectives were adopted to guide the study process and provide a framework for the analysis.

**Identify Promising HCT Modes –** Nine potential high-capacity transit modes were evaluated to determine which had the most promise to serve Clark County and work in conjunction with the Columbia River Crossing improvements. Five potential HCT modes were selected to be studied further.

**Identify Promising HCT Corridors –** Fifteen travel corridors in Clark County were identified and evaluated to determine which were most promising to serve as high-capacity transit corridors. The 15 corridors were narrowed to the five most promising.

**Corridor Analysis –** The five most promising HCT corridors were analyzed in detail. Concept designs were prepared for light rail transit (LRT), bus rapid transit “lite” (BRT-lite), bus rapid transit “full” (BRT-full), streetcar and commuter rail (where appropriate) (see Chapter 3 for detailed mode descriptions). Ridership forecasts were prepared using RTC’s regional travel demand model.

**Corridor Evaluation** – The HCT concepts were evaluated against the adopted study goals and objectives. This evaluation was used to select the most promising modes and alignments to move forward into the system planning phase of the study.

**System Plan Scenarios** – Five system plan scenarios (combinations of the above corridors) were defined based on the findings from the corridor analysis. The HCT concepts for these five scenarios were further refined and ridership forecasts were prepared for each.

**Policies and Recommendations** – The study developed a series of policy and strategic recommendations for moving forward to implement HCT improvements in Clark County.

### Steering Committee Representation

- City of Battle Ground
- C-TRAN
- City of Vancouver
- Port of Vancouver
- Clark County
- WSDOT
- State Representative
- State Senator

### Task Force Representation

- Clark County Neighborhoods
- Human Services Council
- Building Industry Association
- Identity Clark County
- Friends of Clark County
- Leadership Clark County
- Downtown Vancouver Employer
- School Transportation
- Clark College
- Vancouver Neighborhood Association
- C-TRAN Rider
- Youth Council
- Neighborhood Traffic Safety Alliance
- C-VAN Rider

## 2.2 Decision-Making Structure and Public Involvement

Decision-making for the Clark County High Capacity Transit Study utilized an extensive public involvement process. The study included several interrelated public involvement strategies such as coordination with partner jurisdictions and agencies, public information dissemination, opportunities for public input and a political decision-making process.

The RTC Board served as the primary decision-making body. In addition, the RTC Board established two key committees to provide study oversight. The Steering Committee, comprised of elected officials and agency administrators representing the major transportation and planning agencies in Clark County, was designed to provide policy guidance for the study, receive recommendations from the Task Force, and build multi-jurisdictional consensus on recommendations to the RTC Board. The citizen-based Task Force, comprised of citizens appointed to represent key stakeholders and constituencies within the county, was designed to provide communication with the community, receive public input and report to the Steering Committee. The role of the Task Force was advisory. The Task Force included neighborhood leaders, business groups, environmental groups, transit users, student leaders and major institutional representatives.

Because of the size of the study area, the number of neighborhoods and other interested groups, a series of Sounding Board meetings was held in order to bring a broader range of participation to the process. This group received information at critical steps in the process, and provided a forum for interested parties to provide input. The Sounding Board included active citizens who were specifically invited to participate as well as the public at large who were invited through general notification in newspapers and

community newsletters. This group was not asked to provide specific recommendations; however, their input on key topics was recorded and reported to the Task Force and Steering Committee.

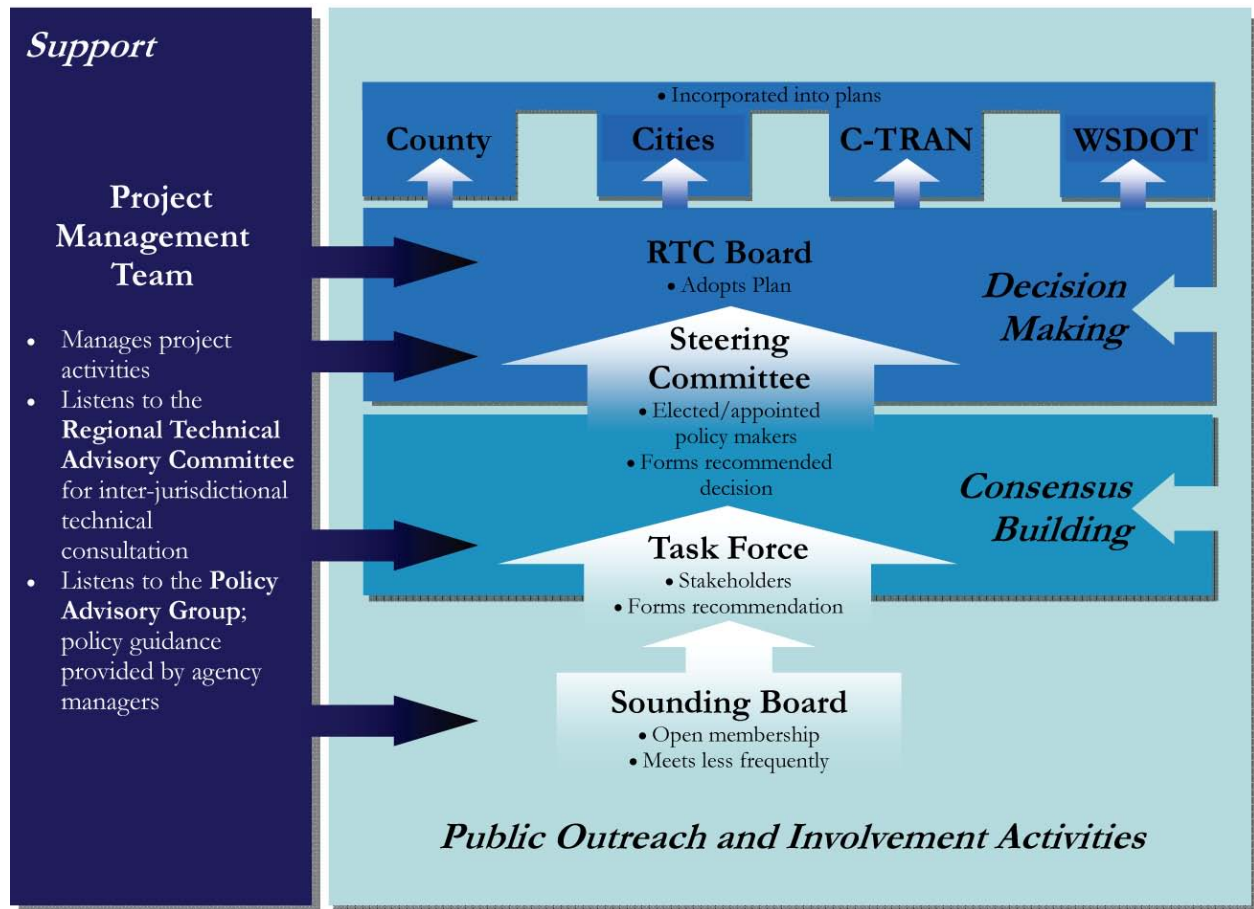
The work of these committees was supported by the work of the staff/technical groups including the Project Management Team (PMT), Policy Advisory Group (PAG), and the Regional Transportation Advisory Committee (RTAC).

The PMT, comprised of technical staff from RTC, City of Vancouver, Clark County, C-TRAN and WSDOT, met regularly to review the technical work and provide direction to RTC and the consulting team. The PAG was comprised of senior staff from participating jurisdictions. This group provided project staff with suggestions on how to best present the technical information to the Steering Committee and to identify any potential policy issues that arose during the study.

Additional public involvement activities consisted of open house type public events, presentations to community and neighborhood groups, a traveling display board, a project website, e-mail updates, and on-line surveys. Numerous articles about the study have appeared in local newspapers. RTC staff made more than 25 presentations on the study to community, neighborhood and business groups throughout Clark County.

Figure 2-1 shows the decision-making structure and role of each of these committees. Appendix B includes a detailed description of the study's public involvement activities, including decisions made at each Steering Committee and Task Force meeting, information provided at each Sounding Board meeting, and information and public comment opportunities available on the study website. Study fact sheets, which were available on the website, are also included in Appendix C.

**Figure 2-1**  
**Study Decision Structure**



### Milestone

The study purpose statement was adopted by the Steering Committee and the RTC Board in early 2007.

## 2.3 Study Purpose

One of the first steps in the Clark County HCT System Study was the preparation of a study purpose statement. The following purpose statement was adopted by the RTC Board and Steering Committee following extensive discussion and input from the Task Force.

### Purpose Statement

Clark County has seen significant economic and population growth over the past 25 years and is planning for continued growth over the next 25 years. This growth has led to economic prosperity. However, growth has outpaced transportation investment, which has resulted in large increases in traffic congestion and travel delay. In response to this need the Clark County region is proposing to undertake a High Capacity Transit System Study that can provide a framework for long-term investments in the region's transit system. The study's recommendations are intended to help maintain the growth and economic prosperity of the region by

providing additional mobility options to key activity centers and along major travel corridors.

*The purpose of the Clark County High Capacity Transit System Study is to identify a high-capacity transit system that provides efficient and high quality transit service connecting county residents with where they want to go.*

The High Capacity Transit System Study process will identify the key underlying policies and possible high-capacity transit options that will expand upon the existing bus transit network to meet new transit markets by providing the following:

- Efficient connections to and among future activity centers in the county.
- Transportation options not subject to roadway congestion.
- Significantly improved transit travel times for major trip movements.
- Transit system service quality and facilities that will attract additional transit users.
- Opportunities for transit-oriented development.
- Improved connections to other regional and bi-state transit systems.
- Infrastructure to support long-term sustainable growth in Clark County.
- Enhance Clark County's place in the bi-state regional economy by connecting major urban centers.
- Reliable, attractive alternatives to the automobile, especially during peak periods.
- Identify the first corridor(s) to move forward into next phase.

## 2.4 Goals and Objectives

The goals and objectives were intended to guide development and evaluation of potential high-capacity transit modes and corridors within Clark County and, ultimately, selection of the modes and corridors to be included in a high-capacity transit system plan that have the highest possible chance of success.

The process to develop this plan provided a fair and credible analysis of all potential high-capacity transit options based on a comprehensive community process and an objective technical analysis of all potential modes and corridors based on how well each satisfied the goals and objectives. The goals and objectives are the measurement criteria by which each mode and corridor is evaluated.

### Milestone

The study goals and objectives were adopted by the Steering Committee and the RTC Board in early 2007.

The goals and objectives address three general topic areas: Transportation, Community and Feasibility. Transportation goals and objectives focus on how well the HCT strategies serve to improve travel in the county by maximizing transit ridership and minimizing negative impacts to traffic operations. Community goals and objectives focus on supporting local businesses, enhancing neighborhoods and minimizing environmental impacts. Feasibility goals and objectives focus on the financial feasibility of an HCT line and planning for the long-range needs of the county.

The following study goals and objectives were adopted by the RTC Board and Steering Committee following extensive discussion and input from the Task Force.

## **Transportation**

### **Goal 1 – Enhance overall transportation opportunities for Clark County residents and businesses**

Objectives:

- Provide reliable transportation choices that meet HCT standards.
- Identify high-capacity transit modes and corridors with the highest transit ridership potential.
- Identify an HCT system that has the greatest potential to manage traffic congestion in the county, while moving more people through the major corridors.

### **Goal 2 – Provide transit riders with an accessible, efficient and well-connected regional transit system**

Objectives:

- Provide a high-capacity transit system that is well-integrated with other transportation options to connect major activity centers within Clark County.
- Provide for efficient connections to the Portland transit system.
- Plan for park-and-ride facilities that are conveniently located for the users and can accommodate appropriate capacity.
- Maximize the potential for bus transfer, bike and walking access.
- Provide a safe and secure system.

## **Community**

### **Goal 3 – Support a vibrant and sustainable Clark County economy**

#### Objectives:

- Promote business and family-wage job creation by providing transportation options to major job and activity centers, both existing and planned, within the county.
- Locate corridors in such a way as to protect and enhance the vitality and stability of business districts.

### **Goal 4 – Support livable communities**

#### Objectives:

- Support the cohesiveness and character of existing residential neighborhoods and business districts.
- Identify ways through which land use planning can be coordinated with HCT corridors to help shape and achieve community visions for a sustainable future.
- Minimize residential and business property impacts.
- Avoid disproportionate impacts to minority and low-income populations, and ensure these communities share equitably in the benefits of the system.

### **Goal 5 – Support a healthy environment**

#### Objectives:

- Support community goals to improve air quality and minimize noise impacts.
- Minimize environmental impacts from construction and operations.



## **Feasibility**

### **Goal 6 – Develop a system with costs that could reasonably be funded, is fair and demonstrates responsible stewardship of public funds**

#### Objectives:

- Identify a system that includes transit elements that have the potential to be funded with a mix of local, federal, state, and, potentially, private funding.
- Develop a system for which the capital and operating costs are reasonable, based on the benefits provided.
- Ensure the users' share of the cost is affordable.

### **Goal 7 – Provide for the long-term viability of the HCT System Plan**

#### Objectives:

- Identify an HCT system that provides the opportunity to protect critical corridors.
- Provide a plan and system that can respond to changing needs, demographics and land use patterns.



# Narrowing the Modes of High-Capacity Transit



## Chapter 3

### 3.1 Introduction

Nine transit modes were initially identified for consideration in the Clark County HCT System Study. The following describes the evaluation and rationale used to narrow the initial modal alternatives down to the most promising applications for Clark County.

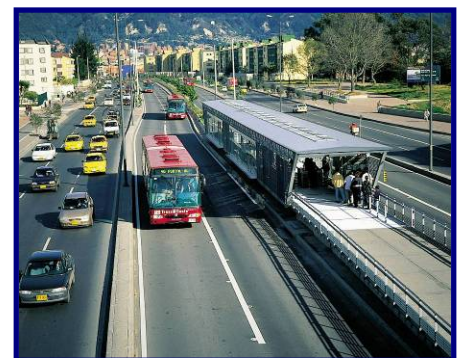
**Bus Rapid Transit** – BRT refers to using a rubber-tired bus and operating with special treatments that allow the bus to operate at a higher speed than adjacent auto traffic and provide certain passenger amenities. Another typical aspect of BRT is the concept of “branding” where the BRT bus route features certain elements that indicate to the community that this is a special type of transit service that is different than standard, local bus service. Branding elements can include special graphics and colors for the vehicles, signature station elements, and special advertising and fare promotions.

For purposes of the initial mode evaluation, the Clark County HCT System Study defined two styles of BRT that bracket the range of potential BRT treatments, BRT-full and BRT-lite.

**BRT-Full** – Refers to operating a branded bus route with an exclusive lane and traffic signal preemption. Exclusive lane operation allows the bus to be separated from traffic congestion on adjacent roadways and provides improved schedule reliability and reduced travel times. BRT-full is typically the most expensive BRT treatment available. The purchase of additional right-of-way and widening adjacent roadways is often required to achieve an exclusive lane operation.



Bus rapid transit with exclusive right-of-way/lanes (BRT-full), Los Angeles, California



Bus rapid transit with exclusive right-of-way/lanes (BRT-full), Bogotá, Colombia

**BRT-Lite** – This refers to operating a branded bus in mixed traffic with special treatments at intersections or at other traffic bottleneck locations. Mixed traffic operation means that the BRT bus is subject to congestion on the roadway. However, treatments such as queue-bypass lanes at key intersections can provide an opportunity to bypass the most congested areas. A BRT-lite treatment typically stays largely within existing right-of-way (except at congested intersections) and is usually considerably less expensive than an exclusive-lane BRT.

**BRT-Hybrid** – BRT-hybrid was not in this early mode narrowing phase. It was developed later in the study as corridor design concepts were refined. The BRT-hybrid corridors maintain some level of exclusive lane operations, but they eliminate some of the larger costly elements from the BRT-full concepts. The purpose of the BRT-hybrid concepts are to identify capital improvement strategies that had a lower capital cost than the BRT-full concepts, but could maintain the ability to save significant bus travel time.

**Light Rail** – Light rail transit refers to rail-based transit that typically operates in exclusive right-of-way but can also operate within shared rights-of-way. Light rail vehicles (LRVs) are typically powered by an overhead power wire (catenary). LRT trains operate in single- or multi-car train sets as needed to meet demand.

**Streetcar** – Modern streetcars have made a comeback recently in the U.S. The streetcar vehicle is similar to, but usually smaller than light rail vehicles. Streetcars are typically powered with an overhead wire. Unlike LRVs, streetcars most typically operate in existing street right-of-way in a lane shared with auto traffic. Streetcars can also operate within exclusive right-of-way.

**Heavy Rail** – Heavy rail refers to rapid transit rail systems such as the New York City subway, Washington D.C. Metro and San Francisco’s BART system. These systems typically operate in a fully exclusive right-of-way for their full length. Heavy rail is typically operated with a “third rail” that parallels the actual rail tracks and provides power to the vehicles from underneath. These systems often operate as subways or elevated trains, carrying large numbers of riders in large, dense urban areas.

**Commuter Rail** – Commuter Rail refers to passenger trains that operate on existing railroad tracks and typically share the tracks with freight rail operations. Commuter rail trains are typically powered by diesel locomotives; however other propulsion systems such as electric-powered and self-propelled diesel units can be found. Commuter rail stations are typically several miles apart with most riders arriving by auto. Commuter rail often operates on rail tracks owned by private railroad operators. In these instances, the commuter rail operator typically provides insurance and pays an



Light rail transit with exclusive right-of-way, Portland, Oregon



Modern streetcar vehicle, Tacoma, Washington



BART (subway) system, San Francisco, California

access fee. If the commuter rail service shares tracks with freight service, it must use vehicles that comply with Federal Railroad Administration (FRA) safety standards.

**Monorail** – Monorail refers to an exclusive guideway transit service operating on a single track, usually on an elevated alignment. Monorails are typically powered underneath the vehicles and have elevated stations.

**Water Transit** – Water (or river) transit refers to a passenger-only ferry providing point-to-point service. Passenger-only ferries can be hovercraft or standard displacement watercraft. The passenger capacity varies depending on the vehicle and the application. True high-frequency, high-capacity river transit systems are rare.

**Personal Rapid Transit** – Personal Rapid Transit (PRT) is a system where individuals and small groups ride in a single computer-controlled vehicle. A demonstration system was developed in Morgantown, West Virginia in the late 1970s connecting West Virginia University with downtown Morgantown. The Morgantown application operates on elevated trackway with eight-person rubber-tired vehicles. PRT applications have not been used to provide high-capacity, longer distance trips.

### 3.2 Mode Narrowing Criteria

The initial screening was established in order to dismiss non-viable or unrealistic HCT modes for further analysis. The following criteria were used for this initial screen:

**Satisfies Study Purpose and Goals** – Consideration of the effectiveness of the mode in meeting the study purpose and goals.

**Proven Technology** – Assessment of whether the technology has been successfully implemented and operational anywhere in the United States.

**Economic Development** – A qualitative assessment of the potential for economic development along the corridor and potential for supporting transit-oriented development (TOD).

**Capital Costs** – Range of capital costs for constructed comparable systems. The cost ranges are based on capital costs for recently constructed systems. The costs have been grouped in general categories (low, medium, high).

**Land Use Compatibility** – A qualitative assessment of how well the land uses in the corridor could support the mode.



Locomotive-hauled  
commuter rail train,  
Tacoma, Washington

### 3.3 Steering Committee Direction On Mode Narrowing

The nine modes were evaluated using the criteria noted in Section 3.2. BRT-full, BRT-lite, light rail, streetcar, and commuter rail scored relatively well on the evaluation criteria and were retained for further analysis. Heavy rail, monorail, water transit, and personal rapid transit were dismissed from further consideration because they did not meet the initial mode screening criteria.

#### Milestone

In May 2007, the Steering Committee and the RTC Board recommended modes to be carried forward for evaluation.

The Task Force and Steering Committee reviewed the mode evaluation and recommended that the following modes continue to be studied for the Clark County HCT System Study:

- BRT-Full
- BRT-Lite
- Light Rail
- Streetcar
- Commuter Rail

The RTC Board unanimously endorsed the Steering Committee's mode recommendation.

The initial mode screening is summarized in the following matrix (Figure 3-1). The most promising modes for Clark County HCT analysis are shown above the heavy line and the four modes below the line were determined not to meet the study's mode narrowing criteria. The following modes were not carried forward for further study:

**Heavy Rail** – Very expensive to implement and would require very high household and employment densities to support the mode.

**Monorail** – Very expensive to implement and would require very high household and employment densities to support the mode.

**Personal Rapid Transit** – Not a proven technology and would not meet study purpose and goals or spur economic development because it is a low-capacity mode.

**Water Transit** – Would not meet study purpose and goals because it would do little to integrate with land use or spur economic development.

**Figure 3-1  
Initial HCT Mode Screening**

Evaluation Category:	Satisfies Purpose and Goals	Proven Technology	Economic Development	Cost	Land Use Compatibility
Criteria:	Addresses the purpose and need and major goals of the study	Existing Applications	Spurs business growth and job creation along corridor	Capital Cost	Integration of Land Use and Transportation
Measure:	Meets Study Purpose	Successful Operation in U.S.	Potential for economic development	Average Cost per Mile	Compatible with Existing Densities and Land Uses
BRT-Lite (Bus Rapid Transit in mixed traffic)	●	●	○	●	●
BRT-Full (Bus Rapid Transit with exclusive lanes)	●	●	●	●	●
Streetcar	●	●	●	●	●
Light Rail	●	●	●	●	●
Commuter Rail	●	●	●	●	●
Heavy Rail (Subway)	○	●	●	○	○
Monorail	○	●	●	○	○
Personal Rapid Transit	○	○	○	●	○
Water (River) Transit (Passenger Only)	○	●	○	●	○

- = Best Meets Criteria
- = Somewhat Meets Criteria
- = Poorly Meets Criteria

**Four modes were eliminated from further consideration:**

- Heavy Rail - Very expensive to implement and would require very high household and employment densities to support the mode.
- Monorail - Very expensive to implement and would require very high household and employment densities to support the mode.
- PRT - Not a proven technology and would not meet study purpose and goals or spur economic development because it is a low-capacity mode.
- Water Transit - Would not meet study purpose and goals because it would do little to integrate with land use or spur economic development.





# Narrowing the County Travel Corridors



## Chapter 4

### 4.1 Introduction

Previous studies that evaluated high-capacity transit in Clark County focused primarily on serving bi-state commute trips using either I-5 or I-205. This study has focused on the ability of HCT to serve intra-Clark County trips in addition to addressing bi-state commute trips. As a first step, the study stepped back and took a broad look at travel movements in the county and at which corridors might constitute potential HCT corridors. Based on projected daily traffic and analysis of travel patterns, 15 travel corridors were identified and evaluated for further study.

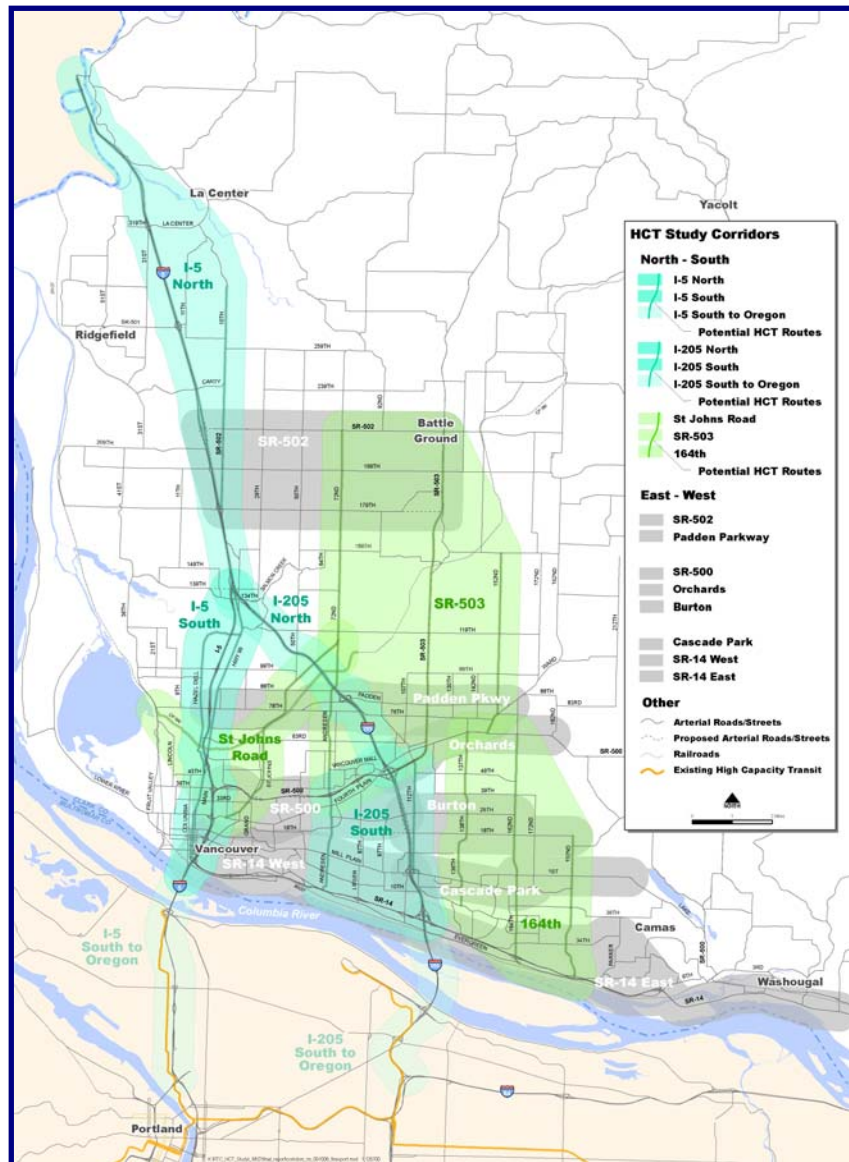
The 15 potential HCT corridors are shown in Figure 4-1 (north-south emphasis) and Figure 4-2 (east-west emphasis). The corridors are defined as broad travel sheds and often contain more than one major roadway. A broad corridor definition allows the focus to be on the nature of the travel demand in the overall corridor and not on the performance of a single roadway. FTA recognizes this broad definition of a corridor in its assessment of HCT project proposals.

The 15 corridors include the following:

#### North-South Corridors

- **I-5 North** – Serves travel between the Salmon Creek area and the northern boundary of Clark County.
- **I-5 South** – Serves travel between downtown Vancouver and the Salmon Creek area. It includes I-5, Main Street, Highway 99, and Hazel Dell Avenue.

**Figure 4-1  
North-South Corridor Map**



- **I-205 North** – Serves travel between the Vancouver Mall/Orchards area and the Salmon Creek area. It includes I-205.
- **I-205 South** – Serves travel on the east side of the region between the Columbia River and the Salmon Creek area. It includes I-205, Andresen Road and 112th Avenue/Chkalov.
- **164th** – Serves travel on the east side of the region between the Columbia River and the Orchards area. It includes 136th/137th/138th Avenue, 162nd/164th Avenue and 192nd Avenue.
- **SR-503** – Serves travel between the Orchards area and Battle Ground. It includes SR-503, NE 72nd Avenue and NE 152nd Avenue.

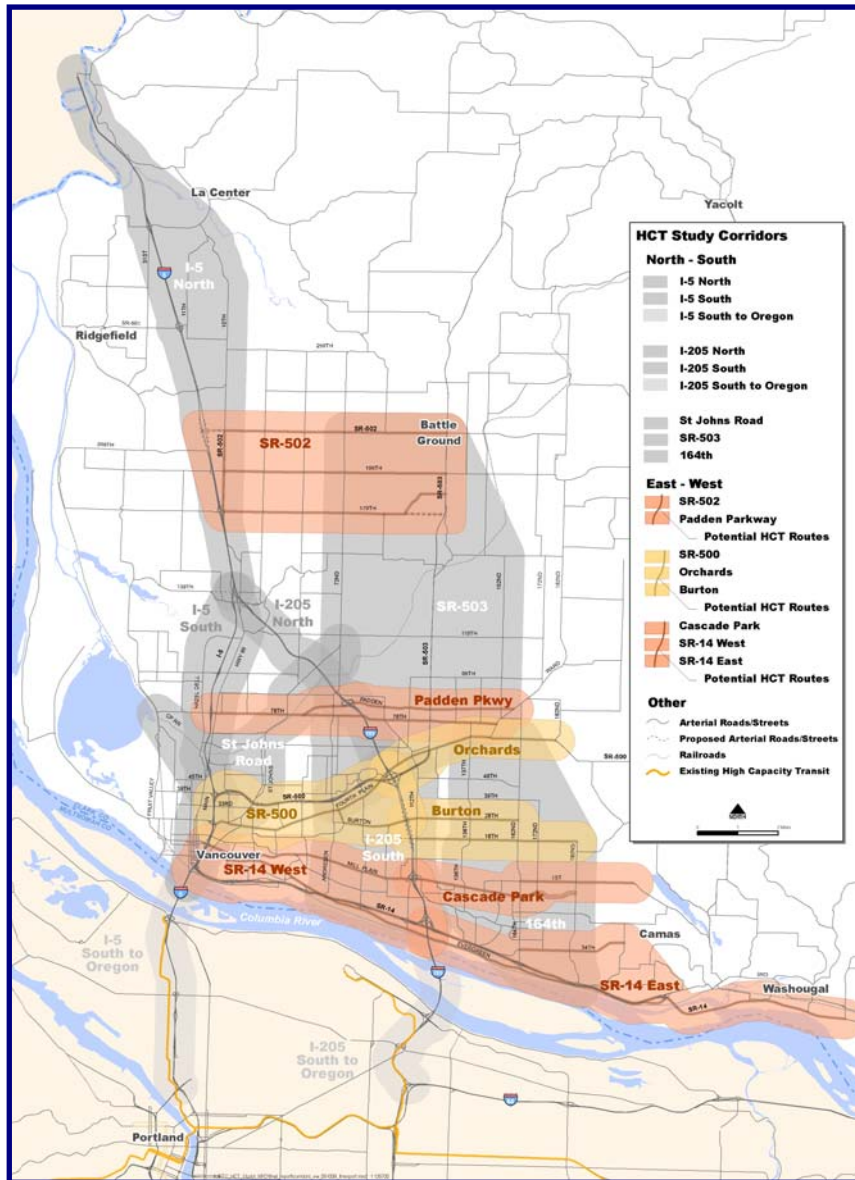


- **St. Johns Road** – Serves travel between inner Vancouver, north of Downtown, and I-205 south of the Salmon Creek area. It includes St. Johns Road and the Chelatchie Prairie Railroad.

### East-West Corridors

- **SR-502** – Serves travel between I-5 near Ridgefield and Battle Ground. It includes SR-502, NE 179th Street and NE 199th Street.

**Figure 4-2  
East-West Corridor Map**



- **Padden Parkway** – Serves travel between I-5 in the Hazel Dell area and Ward Road, northeast of the Orchards area. It includes Padden Parkway, NE 76th Street and NE 78th Street.
- **SR-500** – Serves travel between central Vancouver and the Orchards area. It includes SR-500, Fourth Plain Boulevard, and Burton Road.
- **Orchards** – Serves travel in the Orchards area between I-205 and Ward Road. It includes SR-500 and Fourth Plain Boulevard.
- **Burton** – Serves travel between I-205 and the eastern part of the region. It includes NE 18th Street and NE 28th Street.
- **SR-14 West** – Serves travel along the north shore of the Columbia River between downtown Vancouver and I-205. It includes SR-14, Mill Plain Boulevard and Evergreen Boulevard.
- **SR-14 East** – Serves travel along the north shore of the Columbia River between I-205 and Camas-Washougal. It includes SR-14, Evergreen Highway and SE 34th Street/Pacific Rim Boulevard.
- **Cascade Park** – Serves travel on the east side from I-205 to the Fisher’s Landing area. It includes Mill Plain Boulevard and SE 1st Street.

## 4.2 Initial Corridor Screening

The study team evaluated these corridors using the approved 2030 travel demand forecast. The screening was based on four general criteria: travel demand, travel conditions, land use and growth, and environmental and socio-economic. The criteria used are based on the adopted project goals and objectives. The evaluation relied on existing data sources to compare among the corridors and identify the most promising for HCT. The findings from this analysis are presented in Figure 4-3 and summarized below.

### North-South Corridors

- **I-5 North** – As a regional travel corridor serving the Salmon Creek area, the WSU campus and the Clark County Fairgrounds and Amphitheater, this corridor ranked high on vehicle volumes and activity centers. As a relatively outlying area, it ranked low on population and density measures and on transit ridership.
- **I-5 South** – This corridor ranked high on all measures. As a regional travel corridor, it serves a high volume of traffic, has high transit ridership, and has relatively high levels of congestion. It also serves high density areas and significant

activity centers such as downtown Vancouver and Salmon Creek, and is identified in local land use plans as a high-capacity transit corridor. In addition, as the approach to one of the two bridges across the Columbia River, it connects Clark County to the Portland metropolitan region.

- **I-205 North** – This corridor ranked high on congestion and travel time and medium on most other measures. Volumes and densities are average. Transit ridership is low.
- **I-205 South** – This corridor ranked high on all measures except one, transit ridership, which ranked medium. As a regional travel corridor, it serves a high volume of traffic and has relatively high levels of congestion. It also serves high density areas and significant activity centers and is identified in local land use plans as a high-capacity transit corridor. In addition, as the approach to one of the two interstate bridges across the Columbia River, it connects Clark County to the Portland metropolitan region.
- **164th** – This corridor ranked high on congestion and growth measures. It ranked medium for volume of vehicle trips, transit ridership, density and activity centers. It serves a suburban area, and it is not identified as a high-capacity transit corridor in any plans.
- **SR-503** – This corridor ranked high on congestion and travel time measures. It also ranked high on population growth. The overall household and employment densities in this corridor are low and the corridor has a low proportion of trips originating in or destined to high-density locations.
- **St. Johns Road** – This corridor serves relatively populated, low-income, low-density areas with no significant activity centers. There are no significant traffic congestion issues. The corridor includes the Chelatchie Prairie Railroad right-of-way as a potential alignment for HCT.

### East-West Corridors

- **SR-502** – This corridor serves a low-density area west of Battle Ground. It has relatively low vehicle volumes, low transit ridership and low congestion levels.
- **Padden Parkway** – This corridor has average vehicle volumes, congestion and density. Transit ridership is low and the proportion of trips originating from or destined to high-density locations is relatively low.
- **SR-500** – This corridor ranked high on all of the land use and growth measures and the socio-economic measures. It serves relatively high-density areas and major activity centers and it is identified in local land use plans as a high-capacity transit corridor. It has high transit ridership, but it




ranked medium in vehicular volume and congestion. This was in part due to planned improvements that add roadway capacity in the corridor. It also serves a relatively low-income area.

- **Orchards** – This corridor scored high on the congestion level measure, but it has relatively low household growth and density. Vehicle volumes and transit ridership is also relatively low.
- **Burton** – This corridor ranked medium on most measures. It ranked high on congestion measures but it has relatively low vehicle volumes and a low proportion of trips to and from high-density locations.
- **SR-14 West** – This corridor generally ranked high on the land use and growth measures and the socio-economic measures. It also has high transit ridership and a high proportion of trips destined for high-density areas. While the P.M. peak hour is particularly congested and travel time is relatively good, the corridor does experience significant queuing problems at the approach to I-5 in the A.M. peak period.
- **SR-14 East** – This corridor has moderate vehicle volumes and transit ridership. It serves low-density areas and has no significant congestion issues in 2030. There are planned projects on SR-14 to address existing congestion.
- **Cascade Park** – This corridor ranked medium on all measures. Portions of the Cascade Park corridor experience higher vehicle volumes and congestion than others, particularly the area around Mill Plain and Chkalov near the I-205 interchange. These existing traffic problems are significantly improved by planned projects at the Mill Plain/I-205 interchange and a new interchange to I-205 at 18th Street. This will divert a significant amount of traffic away from the Mill Plain/Chkalov intersection.

Figure 4-3 summarizes the findings from the technical analysis of the study corridors. The high, medium or low ranking was based on the performance of each corridor relative to the other corridors. The best performing corridors are listed at the top of the table and include I-5 South, I-205 South, SR-14 West and SR-500.

**Figure 4-3  
Corridor Evaluation Summary Table**

Corridor	Travel Demand			Travel Conditions		Land Use and Growth						Environmental and Socio-Economic	
	Vehicle Trips	Existing Transit Riders	Concentration of Trip Ends	Corridor Congestion	Corridor Travel Time	Plans Support HCT in Corridor	Total Households and Growth	Household Density	Total Employment and Growth	Employment Density	Activity Centers	Environmental Impacts	Socio-Economic
I-5 South	●	●	●	●	●	●	●	●	●	●	●	NA	●
I-205 South	●	●	●	●	●	●	●	●	●	●	●	NA	●
SR-500	●	●	●	○	○	●	●	●	●	●	●	NA	●
SR-14 West	●	●	●	○	○	●	●	●	●	●	●	NA	●
164th	●	●	○	●	●	○	●	●	●	●	●	NA	●
Cascade Park	●	●	●	●	●	●	●	●	●	●	●	NA	●
I-205 North	●	○	●	●	●	●	○	●	●	●	●	NA	●
SR-503	●	○	○	●	●	●	●	●	○	●	●	NA	●
Burton	○	○	○	●	●	●	●	●	●	●	●	NA	●
I-5 North	●	○	●	●	●	●	○	●	○	●	●	NA	●
Orchards	○	○	●	●	●	●	○	○	●	●	●	NA	●
St. Johns Road	○	●	○	○	○	○	●	○	●	○	○	NA	●
SR-14 East	●	●	●	○	○	●	○	○	○	○	○	NA	●
Padden Parkway	●	○	○	○	○	○	○	○	○	○	○	NA	○
SR-502	○	○	○	○	○	○	○	○	○	○	○	NA	○

 = High Rating  
 = Medium Rating  
 = Low Rating

**Four corridors had the most consistent high scores on the four measurement criteria and were selected to move forward for evaluation:**

- I-5 South
- I-205 South
- SR-500
- SR-14 West

Note: The Chelatchie Prairie Railroad corridor was advanced for further study due to the existence of the publicly-owned right-of-way connecting Battle Ground and Vancouver.



## Milestone

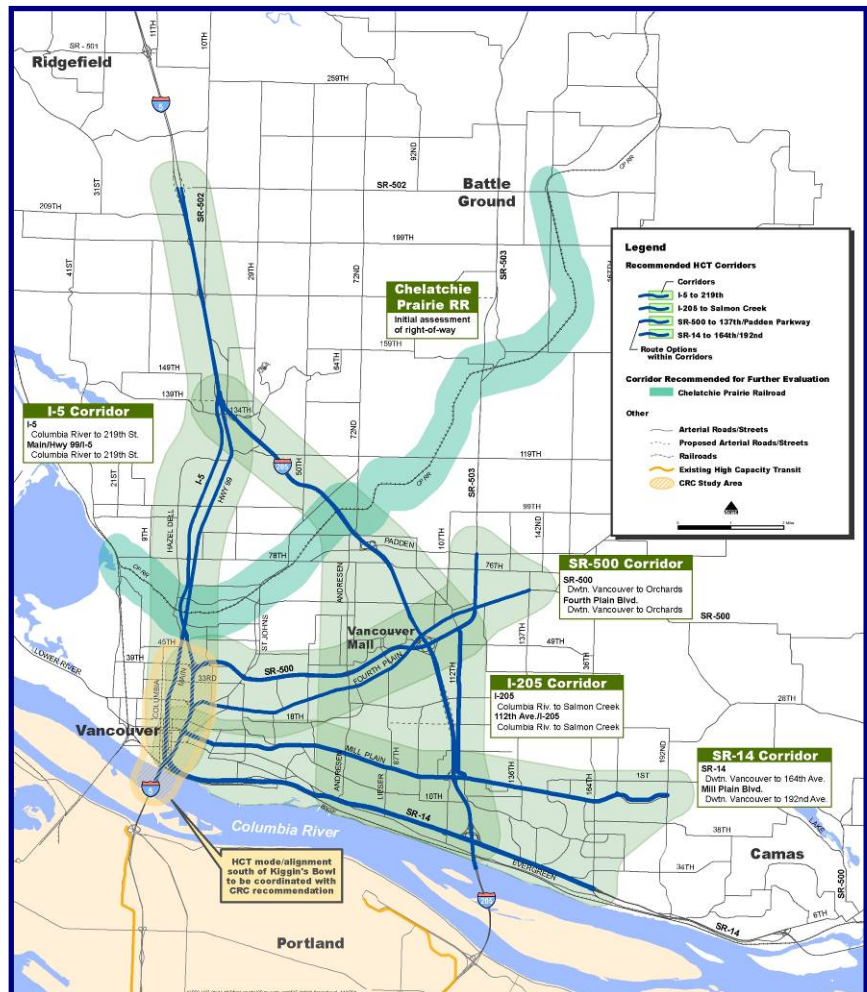
The Steering Committee and the RTC Board recommended corridors to be carried forward for evaluation in May 2007.

## 4.3 Corridor Narrowing

Based on the corridor assessment, recommendations from the Task Force and public input, the Steering Committee directed that four corridors, I-5 (Lincoln P&R to 219th), I-205 (Salmon Creek to Portland), SR-500/Fourth Plain (downtown Vancouver to 162nd) and SR-14/Mill Plain (downtown Vancouver to 192nd) be forwarded for further study. In addition, the Steering Committee also recommended that staff report back with an initial assessment on whether the Chelatchie Prairie Railroad alignment has the potential to serve as an HCT corridor. The Chelatchie Prairie corridor was included because it has existing publicly owned right-of-way. The community expressed a desire to investigate the potential of using this right-of-way for high-capacity transit. Figure 4-4 shows the corridors recommended for further study and the specific route options within each.

The RTC Board unanimously endorsed the Steering Committee recommendation and directed staff to continue with further study of the selected corridors.

**Figure 4-4**  
**Corridor Evaluation Map**



## Steering Committee Recommendations

Corridors recommended to move forward for evaluation:

- I-5 (Lincoln Park-and-Ride to 219th)
- I-205 (Salmon Creek to Portland)
- SR-500 (downtown Vancouver to 162nd)
- SR-14 (downtown Vancouver to 192nd)
- The Chelatchie Prairie Railroad corridor was advanced for further study due to the existing publicly owned right-of-way connecting Battle Ground to Vancouver

# Representative HCT Concepts



## Chapter 5

### 5.1 Introduction

As shown in Figure 4-2, most of the corridors identified for further analysis include multiple potential alignments. Following the narrowing of potential HCT corridors and modes, the study focused on understanding more about the applicability of HCT modes and alignments within the most promising corridors. In order to develop an understanding of how HCT could perform in the corridors, representative HCT alignment and mode concepts were prepared.

Later in the study, the design concepts were modified to reflect new information or evolving thinking. However, this section describes the concepts as defined during this phase of the study. During this study phase the BRT concepts (except I-205) were assumed to utilize the CRC BRT guideway with a transfer connection at Expo Center to the MAX Yellow Line. The LRT concepts (except I-205) were assumed to connect to the CRC LRT and operate through-routed to downtown Portland.

The I-205 BRT concept was assumed to connect across the Columbia River via the Glenn Jackson Bridge and terminate at Gateway Transit Center with a transfer connection to continue to downtown Portland. The I-205 light rail concept was assumed to connect across the Columbia River either on the existing Glenn Jackson Bridge or on a new light rail-only bridge west of the Glenn Jackson Bridge and connect to the MAX system in the vicinity of Cascades Station, and operate through-routed to downtown Portland via the Banfield Freeway segment of the existing MAX line.

The following sections briefly describe each of the representative design concepts. Appendix G includes detailed maps showing a representative alignment for each concept and representative station and park-and-ride locations, Appendix H includes maps showing additional detail on other planned transportation improvements in each corridor and potential traffic issues that would need to be addressed with each design concept.

## 5.2 I-5/Highway 99 Corridor

The study team developed six HCT concepts for serving the I-5/Highway 99 corridor. All of the HCT concepts were assumed to connect to the CRC transit improvements at the Lincoln Park-and-Ride in the vicinity of 39th and Main. The six concepts developed for the I-5/Highway 99 corridor include:

- I-5/Highway 99 BRT-Full
- I-5/Highway 99 LRT
- Highway 99 BRT-Full
- Highway 99 BRT-Lite
- Highway 99 LRT
- Highway 99 Streetcar



Interstate 5 corridor at 129th looking north



Highway 99 corridor

**I-5/Highway 99** – BRT-full and LRT concepts were developed for the I-5/Highway 99 alignment. The alignment would run from the Lincoln Park-and-Ride north on Main Street/Highway 99, operating in the median of Highway 99. At NE 88th Street the I-5/Highway 99 alignment would turn west and cross I-5. The alignment would continue north along the west side of I-5, serving the 99th Street Park-and-Ride and the relocated Salmon Creek Park-and-Ride. From the Salmon Creek Park-and-Ride, the alignment would continue north to the Clark County Fairgrounds and 219th Street via NE 10th Avenue and I-5.

**Highway 99** – BRT-full, BRT-lite, LRT, and streetcar concepts were developed for the Highway 99 alignment. BRT-full and LRT would operate in the median of Highway 99, which would be widened on each side to accommodate HCT. BRT-lite and streetcar would operate in mixed traffic in the right travel lane.

The alignment would run from the Lincoln Park-and-Ride north on Main/Highway 99 to Salmon Creek. The Highway 99 concepts would not serve the existing 99th Street Park-and-Ride or the relocated Salmon Creek Park-and-Ride. New park-and-ride lots to serve the HCT route would be located along Highway 99 in the vicinity of 78th and 99th. The BRT-full, BRT-lite, and LRT concepts would continue north to the Clark County Fairgrounds and 219th Street via NE 20th Avenue and NE 10th Avenue. The streetcar concept would terminate in the Salmon Creek area.



## 5.3 SR-500/Fourth Plain Corridor

The six concepts developed for the SR-500/Fourth Plain corridor include:

- SR-500 BRT-Full
- SR-500 LRT
- Fourth Plain BRT-Full
- Fourth Plain BRT-Lite
- Fourth Plain LRT
- Fourth Plain Streetcar

**SR-500** – BRT-full and LRT concepts were developed for the SR-500 alignment. BRT-full and LRT would operate on exclusive guideway adjacent to SR-500.

The SR-500 alignments would run east from the Lincoln Park-and-Ride along the north side of SR-500, including major structures at interchange areas. The alignment would provide access to Vancouver Mall from the south edge of the parking lot. East of Vancouver Mall, the alignment would follow Fourth Plain Boulevard to SR-503, with center-running in the middle of SR-503 to a terminus park-and-ride north of Padden Parkway.

**Fourth Plain** – BRT-full, BRT-lite, LRT, and streetcar concepts were developed for the Fourth Plain alignment. The Fourth Plain alignment concepts would connect with the CRC at Main Street and McLoughlin Blvd, follow Fort Vancouver Way past Clark College, then follow Fourth Plain to Vancouver Mall and continue through Orchards to NE Ward Road. BRT-full and LRT would operate in exclusive guideway in the median of Fourth Plain, which would be reduced to one general purpose travel lane in each direction from Grand to Brandt. East of Brandt the design concept would maintain two general purpose traffic lanes in each direction, with some limited roadway widening where necessary to accommodate HCT. BRT-lite and streetcar would operate in mixed traffic in the right travel lane.

## 5.4 I-205 Corridor

The two concepts developed for the I-205 corridor include:

- I-205 BRT-Full
- I-205 LRT

BRT-full and LRT concepts were developed for the I-205 corridor. The transit analysis included I-205 BRT-full using an exclusive median BRT guideway north of the Glenn Jackson I-205 Bridge and traveling on shoulders from the I-205 Bridge to Gateway. I-205 LRT would run in the median of I-205 north of Mill Plain.



Interstate 205 corridor at 18th

South of Mill Plain, it would use SE Ellsworth Road and then either a new bridge across the Columbia River or the existing Glenn Jackson Bridge, connecting to the MAX Red Line in the vicinity of Cascade Station. Appendix D includes a preliminary assessment of the feasibility of accommodating light rail or BRT-full on the Glenn Jackson Bridge, including structural and highway capacity constraints. Further analysis would be required if a proposal to use the Glenn Jackson Bridge were to move forward into an Alternatives Analysis.

I-205 BRT-Full would connect to the MAX system at Gateway. I-205 LRT would be through routed onto the MAX Red Line into downtown Portland.

## 5.5 SR-14/Mill Plain Corridor

The five concepts developed for the SR-14/Mill Plain corridor include:

- SR-14 BRT-Full
- SR-14 BRT-Lite
- SR-14 LRT
- Mill Plain BRT-Full
- Mill Plain BRT-Lite

**SR-14** – BRT-full, BRT-lite and LRT concepts were developed for the SR-14 alignment. The SR-14 BRT-full and LRT would operate in an exclusive guideway adjacent to SR-14 to the Fisher’s Landing Transit Center. SR-14 BRT-lite would operate in mixed traffic on SR-14 with stops located at interchanges.

**Mill Plain** – BRT-full and BRT-lite concepts were developed for the Mill Plain alignment. BRT-full would operate in the median of Mill Plain Boulevard, which would be widened on each side to accommodate BRT. BRT-lite would operate in mixed traffic in the right travel lane. The Mill Plain BRT-full and BRT-lite concepts would run from downtown Vancouver to 192nd Avenue.

## 5.6 Chelatchie Prairie Railroad

One transit concept was prepared for operating on the Chelatchie Prairie Railroad right-of-way. The Chelatchie Prairie concept would use a self-propelled Diesel Multiple Unit (DMU) operating as a bi-directional peak-period commuter service between Highway 99 and 219th in Battle Ground. The Chelatchie Prairie Commuter Rail (CPCR) was assumed to operate with 30-minute headways (6 runs in each direction in the morning and 6 runs in each direction in the evening) and connect with a BRT or light rail station in the vicinity of Highway 99 near the Ross Complex.



SR-14 corridor at Evergreen



Chelatchie Prairie Railroad bridge over Highway 99

Appendix E includes an initial assessment of the potential to operate on the Chelatchie Prairie right-of-way, describing general right-of-way widths, current lease agreements, operational agreement requirements, and track upgrade needs.



# Analysis of HCT Corridors



## Chapter 6

### 6.1 Technical Analysis

This chapter describes the technical analysis of the five most promising HCT corridors. The analysis described here focused on:

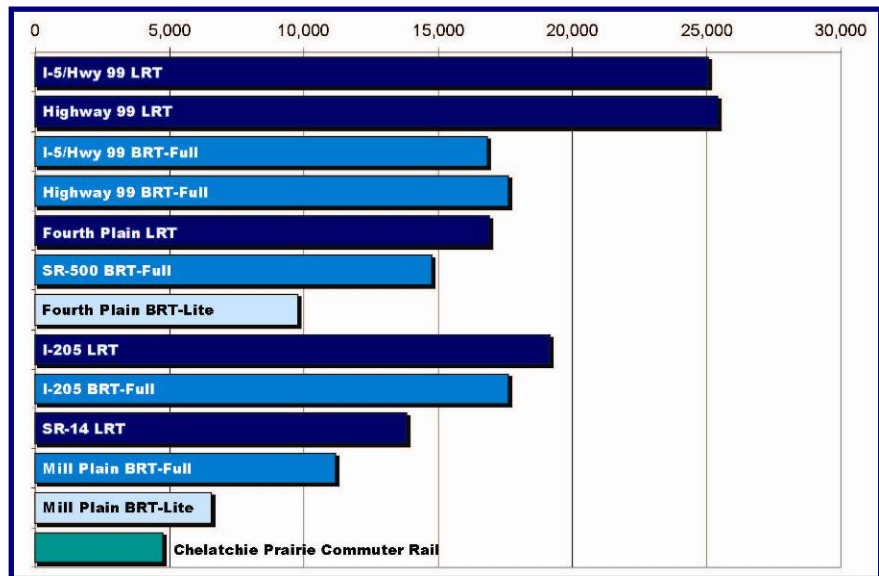
- Transit ridership
- Land use
- Environmental
- Cost

The study analyzed transit ridership and overall travel patterns for each corridor using RTC's regional travel demand model for 2030. Travel demand models project future travel patterns based on historic travel behavior, adopted land use plans, population and employment forecasts, and the planned transportation network. Data from this analysis enabled conclusions on the performance of the representative HCT concepts in each corridor. The results of this analysis provide data on which modes and corridors might attract the most riders and might best serve intra-Clark County trips versus bi-state trips.

Figure 6-1 shows the average weekday ridership forecast on each HCT concept in 2030. As shown in the figure, alignments in the I-5/Highway 99 corridor tend to have high ridership. Alignments in the SR-500/Fourth Plain corridor and the I-205 corridor also have strong ridership.

Among the modes analyzed, LRT tended to attract the highest ridership, with BRT-full also attracting strong ridership. BRT-lite and commuter rail attracted relatively low ridership.

**Figure 6-1**  
**2030 HCT Ridership by Alignment**  
**(Average Weekday)**



The study examined existing and future land use characteristics in each corridor using Clark County GIS data. Residential and employment densities were calculated for an area within a half-mile of each of the alignment concepts. This enabled broad conclusions to be drawn about which corridors and alignments would serve the most riders and which might have the best potential to promote redevelopment.

Table 6-1 lists household and employment densities in a base year (2000) and in 2030 within a half-mile of each alignment. As shown in the table, there is not a large difference in household densities among the different corridors. The SR-500/Fourth Plain corridor has the highest household densities. Household densities in the Chelatchie Prairie corridor are significantly lower than the other corridors.

Employment densities have a wider range than household densities, with the SR-500, Fourth Plain, and Mill Plain alignments having significantly higher employment densities than other alignments.

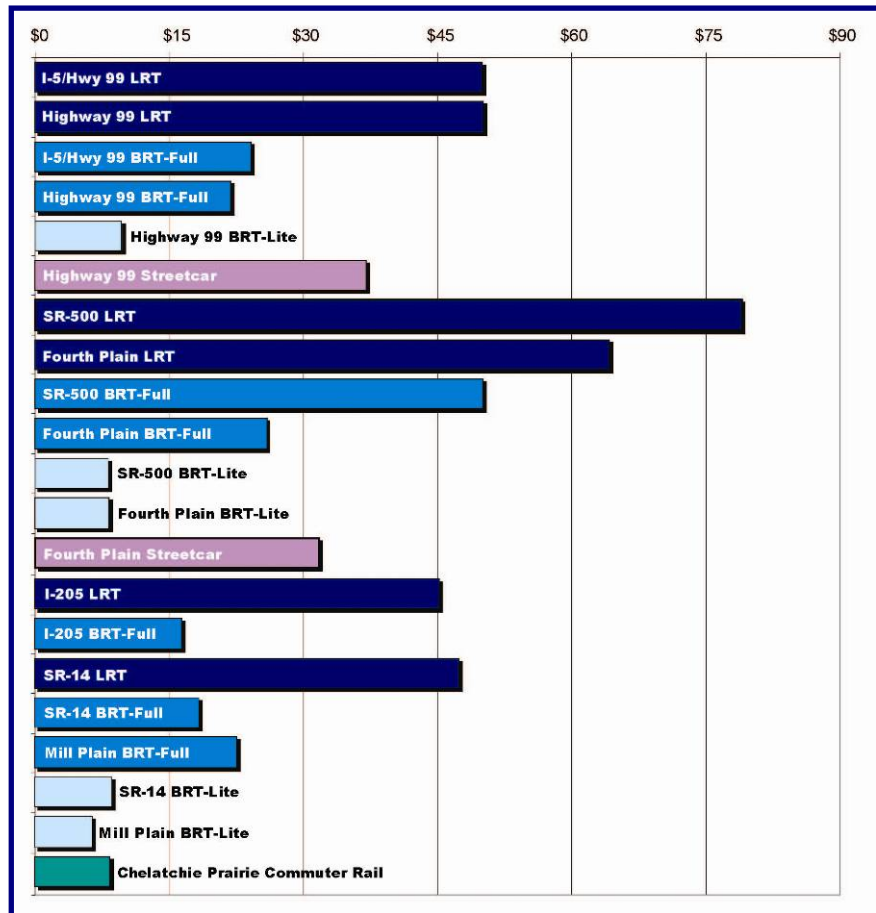
**Table 6-1  
Household and Employment Density  
by Alignment (Per Square Mile)**

HCT Alignment	Household Density		Employment Density	
	2000	2030	2000	2030
I-5/Highway 99	1,280	1,820	2,020	2,220
Highway 99	1,230	1,970	2,050	2,350
SR-500	1,460	2,110	3,280	3,130
Fourth Plain	1,420	2,030	3,610	4,030
I-205	1,060	1,710	1,560	1,750
SR-14	1,140	1,800	1,250	1,270
Mill Plain	1,450	1,860	3,120	4,030
Chelatchie Prairie	540	1,010	850	1,910

A reconnaissance-level environmental analysis was prepared for each corridor. Because the alignments are only conceptual at this level of analysis, the reconnaissance provided very general findings about the potential for environmental issues and impacts in the corridors.

The study prepared order-of-magnitude capital cost estimates for each design concept. These cost estimates were based on unit costs from recently completed HCT projects and were intended to provide a general level of comparison among design concepts in a corridor and among concepts in different corridors. Figure 6-2 shows the order-of-magnitude capital cost estimates for each of the alignment concepts. As shown in the figure, LRT has the highest capital cost per mile. BRT-full and streetcar would have moderate capital cost per mile. BRT-lite and commuter rail would have the lowest capital cost per mile.

**Figure 6-2**  
**Order-of-Magnitude Capital Cost per Mile**  
 (In Millions, 2007 Dollars)



Operating cost estimates for each of the HCT concepts were also prepared. These include only the cost to operate the corridor HCT route and do not include other operating costs normally associated with implementation of an HCT line.

The following lists some of the key findings of the corridor analysis:

### Transit Ridership Findings

- Light rail would provide a faster trip to downtown Portland in 2030 than BRT, largely because it was configured as an extension of existing light rail lines and, therefore, would not require a transfer to access downtown Portland.
- Travel times would be faster on freeway alignments than on arterial alignments.
- East-west alignments would attract a higher proportion of intra-Clark County trips than north-south alignments.



- Arterial alignments would serve more major destinations than freeway alignments.
- Commuter rail on the Chelatchie Prairie alignment was forecast to carry the fewest riders of any of the HCT corridors. However, it compares favorably with existing commuter rail operations in the western United States.

### **Land Use Findings**

- The Highway 99 corridor has relatively low existing densities; however, implementation of the adopted comprehensive plan would result in a significant increase in densities by 2030.
- There is significant opportunity for redevelopment and increased density, particularly in mixed use, transit-oriented development along Highway 99, Fourth Plain, and Mill Plain.
- Freeway alignments would have fewer opportunities for redevelopment than arterial alignments due to larger land areas dedicated to transportation use, poorer pedestrian connections, and less frequent stations.
- The SR-500, Fourth Plain, and Mill Plain alignments have the highest existing and projected densities of all of the corridors studied.
- The Chelatchie Prairie corridor has very low existing densities and is planned for continued low-density development.

### **Environmental Reconnaissance Findings**

- Highway 99 crosses the Salmon Creek floodway at a narrower location than the I-5 alignment and, therefore, would likely have a smaller impact.
- The HCT alignments along SR-500 would encounter more environmentally sensitive areas than the Fourth Plain alignments. There are abundant wetlands and hydric soils along SR-500, as well as a higher probability of archaeological sites.
- There are some wetlands and critical habitats in the I-205 corridor. Because construction would be largely limited to the freeway median, there is a low risk of impact to environmentally sensitive areas.
- There are a limited number of sensitive wetlands and critical habitats and a higher probability that archaeological sites exist along the SR-14 alignment. Mill Plain has no wetlands or critical habitats.

### **Cost Findings**

- Generally light rail would be the most expensive mode to implement, followed by streetcar, BRT-full and BRT-lite. Commuter rail on Chelatchie Prairie would have capital costs comparable to BRT-lite.
- The SR-500 alignment would have the highest capital cost of any of the HCT concepts due to the presence of wetlands and interchanges with confined spaces, requiring extensive use of structures.
- I-205 LRT would likely require an additional cost of approximately \$500 million to build a new bridge across the Columbia River.
- A commuter rail service along the Chelatchie Prairie Railroad could be implemented relatively affordably.

# Corridor Evaluation



## Chapter 7

### 7.1 Introduction

Chapter 6 presented a summary of the technical analysis for various mode and alignment concepts in each of the potential HCT corridors. This chapter uses that technical analysis to compare how well each concept would perform compared to other concepts within the same corridor and with concepts in the other corridors. This comparison is presented for each of the adopted study goals and objectives.

Detailed evaluation matrices were prepared which described the performance of the HCT concepts within each study corridor. These detailed evaluation matrices were used as a guide to assist the Task Force and Steering Committee in narrowing the HCT concepts to the most promising modes and alignments within each corridor. Figure 7-1 provides an overall evaluation matrix that summarizes the findings from each of the detailed corridor matrices. The figure shows how each alignment concept ranked on each of the adopted study goals.

Following the evaluation matrix is a description of some of the key findings from the corridor evaluation based on the adopted study goals.

Figure 7-1  
Corridor Evaluation Summary Table

Goals / Design Concepts	I-5/Highway 99 Corridor				SR 500/Fourth Plain Corridor				SR-14/Mill Plain Corridor				CPRR	
	I-5 Alignments		Highway 99 Alignments		SR-500 Alignments		Fourth Plain Alignments		SR-14 Alignments		Mill Plain Alignments			
	I-5 Light Rail	I-5 BRT/Full	Highway 99 Light Rail	Highway 99 BRT/Full	SR-500 Light Rail	SR-500 BRT/Full	Fourth Plain Light Rail	Fourth Plain BRT/Full	SR-14 Light Rail	SR-14 BRT/Full	Mill Plain BRT/Full	Mill Plain BRT/Full		
<b>Transportation</b>														
Goal #1: Enhance Transportation Opportunities	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Goal #2: Accessible, Efficient, Connected System	White	White	White	White	White	White	White	White	White	White	White	White	White	White
<b>Community</b>														
Goal #3: Vibrant and Sustainable Economy	White	White	White	White	White	White	White	White	White	White	White	White	White	White
Goal #4: Support Livable Communities	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Goal #5: Support a Healthy Environment	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
<b>Feasibility</b>														
Goal #6: Develop a Fundable System and Provide Stewardship of Public Funds	White	White	White	White	White	White	White	White	White	White	White	White	White	White
Goal #7: Provide for the Long-Term Viability of the HCT System Plan	White	White	White	White	White	White	White	White	White	White	White	White	White	White

- Ratings:
- Green circle: Very Good
  - Light Green circle: Good
  - White circle: Moderate
  - Red circle: Moderate to Poor
  - Red circle: Poor

This table was used as a tool to help guide Task Force and Steering Committee discussion on corridors and modes to move forward into the next phase of analysis.

## 7.2 Transportation

### Goal 1 – Enhance overall transportation opportunities for Clark County residents and businesses

#### Individual Corridor Findings

- **I-5/Highway 99**
  - I-5 alignment concepts (LRT and BRT-full) had higher ridership than Highway 99 concepts due to faster travel times and better service to major park-and-ride lots.
  - Among the Highway 99 alignment concepts, LRT and BRT-full had higher ridership than BRT-lite or streetcar.
- **SR-500/Fourth Plain**
  - Light rail and BRT-full on SR-500 attract relatively high ridership due to fast travel times.
  - Light rail and BRT-full on Fourth Plain attract relatively high ridership due to good access along Fourth Plain Boulevard.
- **I-205**
  - Both BRT-full and light rail attract good ridership. They both provide comparable travel times within the corridor. However, light rail was assumed to be through-routed to downtown Portland and would avoid transfer time at Gateway.
- **SR-14/Mill Plain**
  - SR-14 light rail would provide a fast travel time and attract relatively good ridership.
  - BRT-lite on SR-14 or Mill Plain ridership would be relatively low due to slower travel times compared to BRT-full and LRT.
- **Chelatchie Prairie**
  - Transit ridership with Chelatchie Prairie commuter rail would be much lower than in the other corridors, but would be reasonable compared with comparable services elsewhere in the west.



134th Street in Salmon Creek



99th Street at I-5 Interchange

#### Comparison among Corridors

- Light rail had the highest transit ridership in all of the corridors where it was evaluated.
- The highest ridership corridors overall were I-5/Highway 99, SR-500/Fourth Plain and I-205.

## Goal 2 – Provide transit riders with an accessible, efficient and well-connected regional transit system

### Individual Corridor Findings



EmX BRT,  
Eugene, Oregon

- **I-5/Highway 99**
  - I-5 alignment concepts provide poor access to Salmon Creek activity centers.
  - Highway 99 alignment concepts provide more stations and better access to jobs and households.
- **SR-500/Fourth Plain**
  - SR-500 alignment concepts have fewer stations and less access to jobs and households.
  - Fourth Plain alignment concept provides access to more jobs and households and has a better pedestrian environment.
- **I-205**
  - Both BRT-full and light rail stations would have poor bike and pedestrian access and a relatively low number of jobs and households within ½ mile of stations.
- **SR-14/Mill Plain**
  - SR-14 alignment concepts would have poor bike and pedestrian access and poor station coverage.
  - Mill Plain alignment concepts would have good coverage.
- **Chelatchie Prairie**
  - Chelatchie Prairie commuter rail would have a limited number of stations resulting in poor station area coverage.



Fisher's Landing Transit Center

### Comparison among Corridors

- Alignments on Fourth Plain, Mill Plain and Highway 99 have good pedestrian and bike access and good station coverage.
- Light rail concepts would provide through-routed service to downtown Portland, while all other modes would require a transfer.



## 7.3 Community

### Goal 3 – Support a vibrant and sustainable Clark County economy

#### Individual Corridor Findings

- **I-5/Highway 99**
  - Highway 99 concepts would provide better access to jobs along Highway 99 and in the Salmon Creek area.
  - I-5 concepts would provide limited opportunity for transit-supportive development north of 88th Street.
- **SR-500/Fourth Plain**
  - SR-500 alignment concepts would have fewer jobs and limited transit-supportive development opportunities.
  - Fourth Plain alignment concepts provide access to more jobs and a better pedestrian environment.
- **I-205**
  - Both BRT-full and light rail alignments would have very limited opportunities for transit-supportive development.
- **SR-14/Mill Plain**
  - SR-14 alignment concepts would have a relatively small number of jobs within ½ mile of stations.
  - Mill Plain alignment concepts would have a large number of jobs and good opportunities for transit-supportive development.
- **Chelatchie Prairie**
  - Chelatchie Prairie commuter rail would have a limited opportunity for transit-supportive development and a limited ability to serve employment sites.



Esther Short Park and Vancouvercenter



SW Washington Medical Center

#### Comparison among Corridors

- Mill Plain and Fourth Plain would have the highest number of jobs within one-half mile of the alignment.
- Mill Plain, Fourth Plain and Highway 99 alignment concepts would have the best opportunities for transit-supportive development.



## Goal 4 – Support livable communities

### Individual Corridor Findings

- **I-5/Highway 99**
  - I-5 BRT-full and light rail concepts would have some property impacts to neighborhoods along the west side of I-5.
  - Highway 99 BRT-full and light rail concepts would have impacts to some adjacent properties, primarily parking lots. BRT-lite and streetcar concepts would have minimal property impacts.
- **SR-500/Fourth Plain**
  - SR-500 BRT-full and light rail concepts would have some property impacts along the north side of the freeway.
  - Fourth Plain alignment concepts would slightly increase the barrier effect of Fourth Plain Boulevard. The BRT-full and light rail concepts would have potential property impacts.
- **I-205**
  - Both BRT-full and light rail concepts would not increase the barrier effect due to the existing freeway. Neither concept would have significant property impacts.
- **SR-14/Mill Plain**
  - SR-14 BRT-full and light rail concepts would have only limited property impacts.
  - Mill Plain BRT-full concepts would have some property impacts at some locations.
- **Chelatchie Prairie**
  - Increased train frequency could increase barrier effect along the alignment.



Residential neighborhood in the Lincoln area



Condominiums adjacent to Esther Short Park

### Comparison among Corridors

- BRT-lite and streetcar concepts would have only limited property impacts along their alignments.
- Freeway alignment (I-5, SR-500, I-205, SR-14) BRT-full and light rail concepts would not increase the barrier effects of the freeway and would generally minimize impacts to adjacent properties.

## Goal 5 – Support a healthy environment

### Individual Corridor Findings

- **I-5/Highway 99**
  - BRT-full and light rail concepts on both I-5 and Highway 99 alignments would have a good transit mode share resulting in slight air quality improvements due to fewer auto trips.
  - Highway 99 BRT-full and light rail concepts would require construction in the roadway median resulting in noise and traffic impacts.
- **SR-500/Fourth Plain**
  - SR-500 BRT-full or light rail concepts would encounter stream crossings and wetland issues.
  - Fourth Plain BRT-full or light rail concepts would require construction in the roadway median resulting in noise and traffic impacts.
- **I-205**
  - Both BRT-full and light rail concepts would have limited construction impacts.
- **SR-14/Mill Plain**
  - SR-14 concepts have a relatively high risk for environmental impacts due to its proximity to the Columbia River and floodplains in the vicinity.
  - Mill Plain alignment concepts would be in the vicinity of schools and a major regional hospital.
  - Mill Plain BRT-full concept would require construction in the roadway median resulting in noise and traffic impacts.
- **Chelatchie Prairie**
  - Chelatchie Prairie commuter rail would be constructed largely within the existing Chelatchie Prairie right-of-way, thus limiting potential environmental impacts.



Officer's Row



SR-14

### Comparison among Corridors

- HCT concepts in the SR-500/Fourth Plain corridor have a higher risk of environmental impacts due to stream crossings, wetlands and construction impacts.
- BRT-full and light rail concepts in the median of arterials would have a high potential for construction impacts (noise, traffic, etc.).

## 7.4 Feasibility

**Goal 6 – Develop a system with costs that could reasonably be funded, is fair and demonstrates responsible stewardship of public funds**

### Individual Corridor Findings

- **I-5/Highway 99**
  - Light rail on either an I-5 alignment or a Highway 99 alignment would cost over \$50 million per mile.
  - Light rail and BRT-full on either an I-5 or Highway 99 alignment would have very little difference in cost-effectiveness.
- **SR-500/Fourth Plain**
  - Fourth Plain BRT-lite has the lowest cost per boarding ride in the corridor.
  - Overall cost per mile in this corridor is higher than other corridors due to structures required along SR-500 and construction impacts along Fourth Plain Boulevard.
  - SR-500 light rail has the highest cost per mile of any HCT concept studied.
- **I-205**
  - I-205 light rail cost per mile of \$45 million does not include cost for a river crossing or improvements that would be required on the Oregon side to connect into the existing MAX system.
- **SR-14/Mill Plain**
  - Mill Plain BRT-lite would have the lowest cost per mile of any HCT concept.
- **Chelatchie Prairie**
  - Chelatchie Prairie commuter rail cost of \$8 million per mile is relatively low. However, the cost per boarding ride is high due to a low number of boardings.

### Comparison among Corridors

- BRT-full and LRT concepts on the SR-500 alignment have the highest cost per mile of any of the HCT concepts studied.
- HCT concepts on arterials are generally more affordable than alignments along freeways, and may be more likely to be funded due to the potential to promote redevelopment.

## **Goal 7 – Provide for the long-term viability of the HCT System Plan**

Goal 7 is a system level goal and was not included in this phase of the evaluation.

### **7.5 Draft System Plan**

Using the information from the corridor evaluation described above, the Task Force recommended and the Steering Committee adopted a Draft System Plan Strategy Map, which included the most promising modes and corridors and recommended that those elements be evaluated for inclusion in an HCT System Plan to be developed further in the next study phase. Figure 7-2 shows the adopted Draft System Plan Strategy Map, which includes the following:

#### **Milestone**

**The Steering Committee and the RTC Board adopted the Draft System Plan Strategy Map in April 2008.**

#### **I-5/Highway 99 Corridor**

- Continue to study exclusive and shared guideway options between Lincoln and Salmon Creek via I-5 or Highway 99.
- Possible future HCT extension to 219th Street.

#### **SR-500/Fourth Plain Corridor**

- Focus HCT improvements on Fourth Plain.
- Continue to study exclusive and shared guideway options.
- Terminus options on both Fourth Plain and SR-503.
- Possible long-term extension of exclusive guideway on SR-500.

#### **I-205 Corridor**

- Continue to study BRT strategy with terminus at Salmon Creek.
- Possible long-term conversion to LRT.

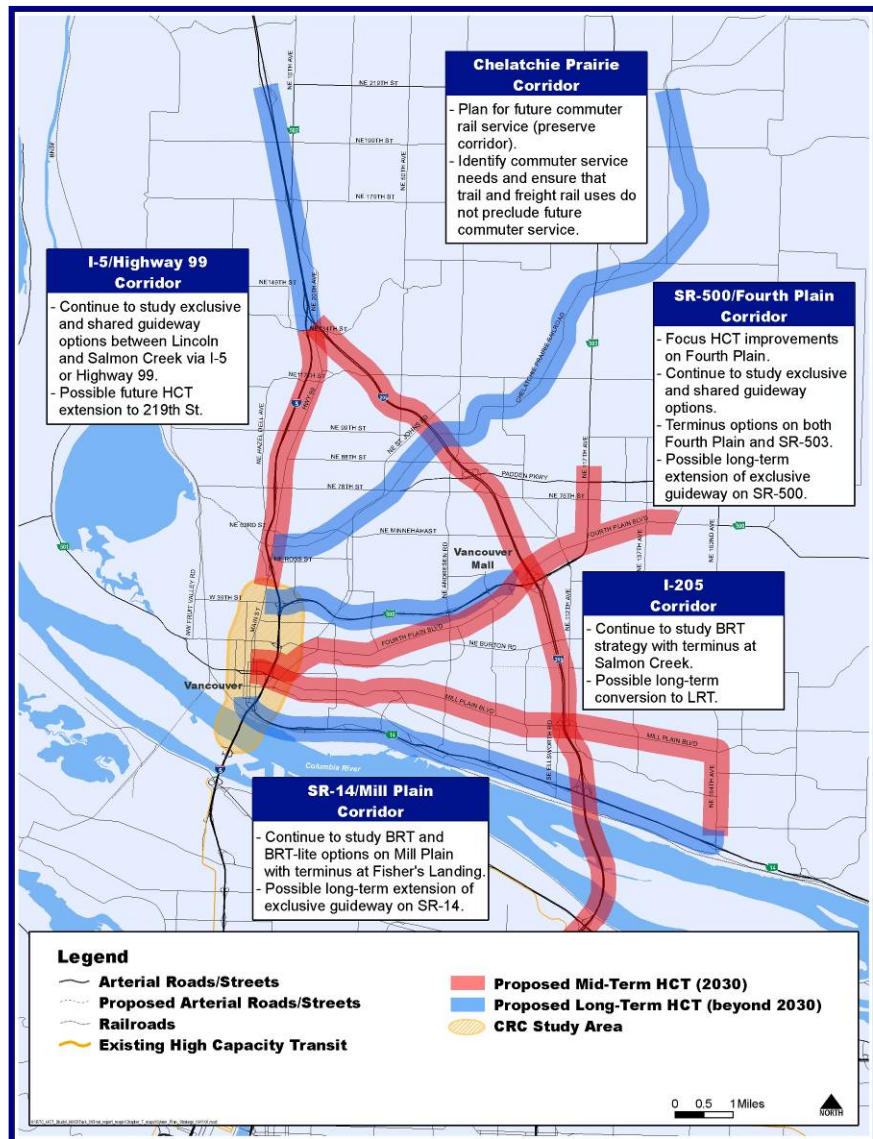
#### **SR-14/Mill Plain Corridor**

- Continue to study BRT and BRT-lite options on Mill Plain with terminus at Fisher's Landing.
- Possible long-term extension of exclusive guideway on SR-14.

#### **Chelatchie Prairie**

- Plan for future commuter rail service (preserve corridor).
- Identify commuter service needs and ensure that trail and freight rail uses do not preclude future commuter service.

**Figure 7-2  
Draft System Plan Strategy**



The Draft System Plan Strategy Map describes the elements to be included in the next phase of the study. These recommended strategies were further refined into a series of five system plan scenarios that were analyzed to evaluate how the various elements would perform as part of an overall system.



# System Plan Scenarios



## Chapter 8

### 8.1 Introduction and Scenarios

Following the detailed corridor analysis and evaluation described in Chapters 6 and 7, the Steering Committee adopted a system plan strategy (Figure 7-2) that defined the parameters for the next study phase. The purpose of the next study phase was to define and analyze a set of system plan scenarios that would represent various ways that the system plan strategy elements could be packaged as a complete HCT system. While the system plan strategy represents a significant narrowing of the potential HCT options in each corridor, there are still a number of ways the HCT elements could be packaged.

Five scenarios, each with a different emphasis, were developed by staff and refined with input from the Task Force and Steering Committee. The five scenarios were defined in detail in order to use the travel demand model to measure how well each would perform in attracting transit trips.

In addition to modeling the five system plan scenarios, the representative HCT design concepts were modified to reflect changes in the termini or the alignments. Appendix I includes maps showing these refined design concepts. The maps include updated alignments, termini, station and park-and-ride locations, and portions of each design concept that would operate in exclusive lanes or in mixed traffic.

The most fundamental modification to the design concepts was the development of a hybrid BRT concept. The BRT-hybrid concept was developed for the Highway 99, Fourth Plain and Mill Plain alignments. The BRT-hybrid corridors each maintain some level of exclusive lane operations, but they eliminate some of the larger

impacts and costly elements from the BRT-full concepts. The purpose of the BRT-hybrid concept was to identify capital improvement strategies that had a lower cost than the BRT-full concepts, but could maintain the ability to save significant bus travel time.

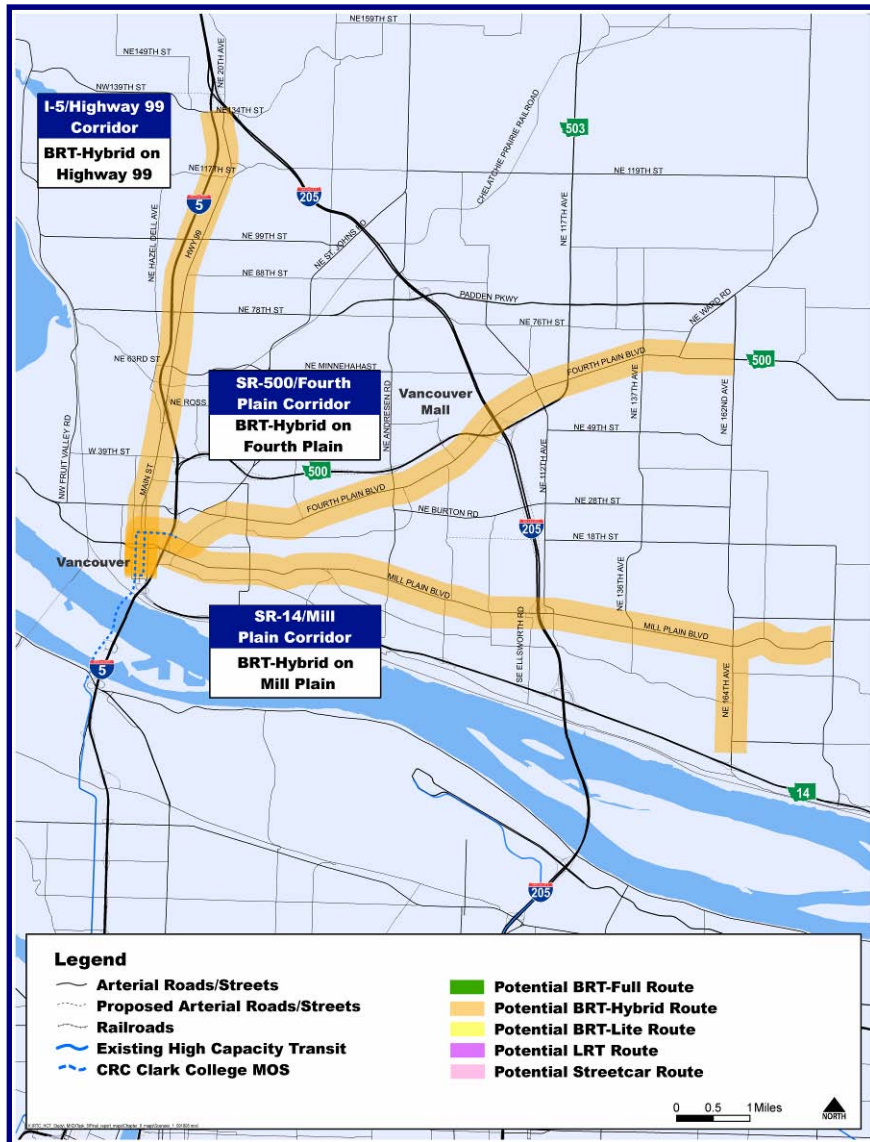
At this phase of the study, the CRC project had chosen light rail with a Clark College MOS as the transit LPA. Therefore, the Highway 99, Fourth Plain, and Mill Plain HCT concepts were extended into downtown Vancouver to provide a connection to the CRC. The BRT options would make a loop through downtown, while LRT options would be through routed to downtown Portland. I-205 LRT would be through routed to Clackamas, requiring a transfer to reach downtown Portland. The Mill Plain BRT-hybrid was refined to include a split near the east end with buses alternating between the Clark College Tech Center Campus and Fisher's Landing Transit Center.

The following figures illustrate which alignments and modes are included in each scenario.



**Scenario 1**, shown in Figure 8-1, was developed to test an HCT system with limited capital investment focusing on a small set of corridors. It includes BRT-hybrid on Highway 99, Fourth Plain and Mill Plain

**Figure 8-1**  
**Scenario 1: Limited Investment –**  
**Intra-Clark County**



**Scenario 1**  
**Limited Investment**  
**Intra-Clark County**

- BRT-Hybrid on Highway 99
- BRT-Hybrid on Fourth Plain
- BRT-Hybrid on Mill Plain

**Scenario 2**, shown in Figure 8-2, was developed to test an HCT system that assumes an aggressive level of capital investment with the goal to maximize transit ridership. It includes LRT on I-5/Highway 99, Fourth Plain, and I-205, and BRT-hybrid on Mill Plain. Two variations of this scenario were tested, one that eliminated most express bus services in the I-5 and I-205 corridors (2A) and one that maintained express bus service in the corridors (2B).

**Figure 8-2**  
**Scenarios 2A and 2B:**  
**High Capital/High Ridership**

**Scenario 2A/2B**  
**High Capital/  
 High Ridership**

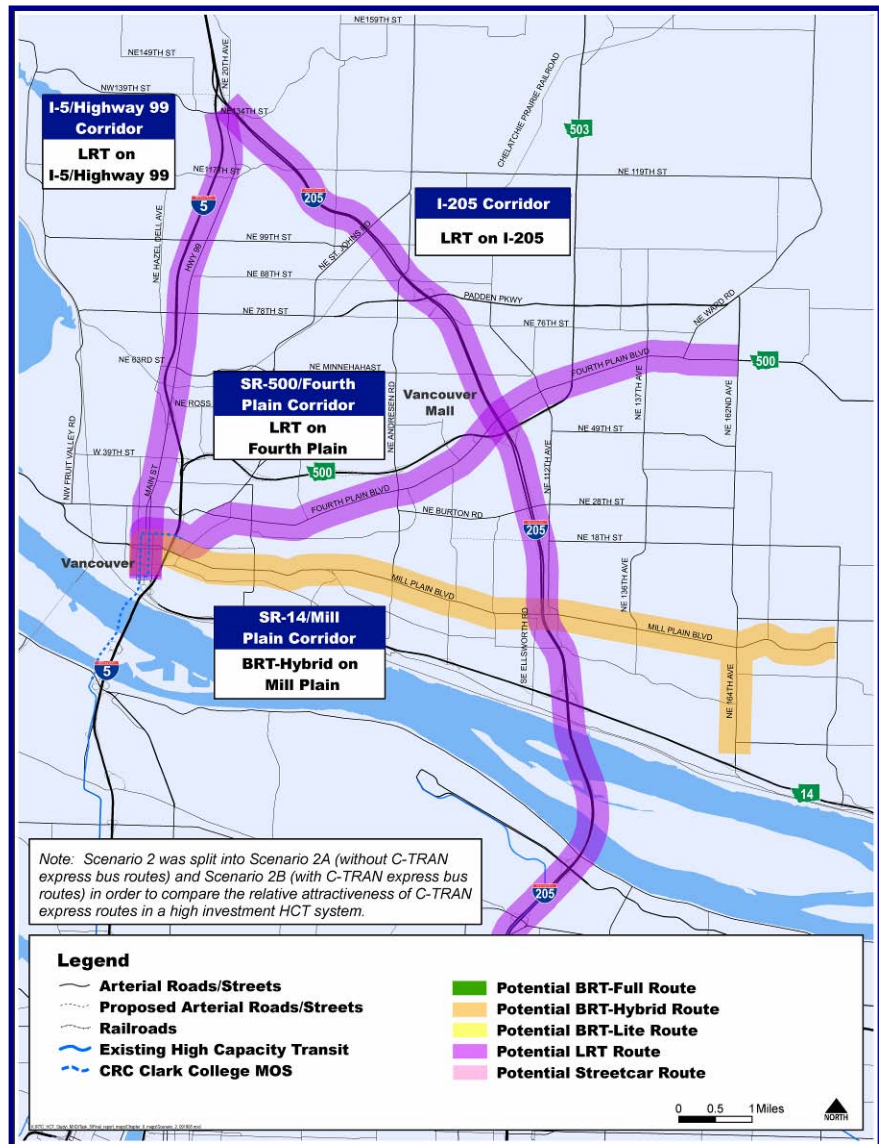
- LRT on I-5/Highway 99
- LRT on Fourth Plain
- LRT on I-205
- BRT-Hybrid on Mill Plain

**Scenario 2A**

- Eliminates most C-TRAN express bus service in I-5 and I-205 corridors

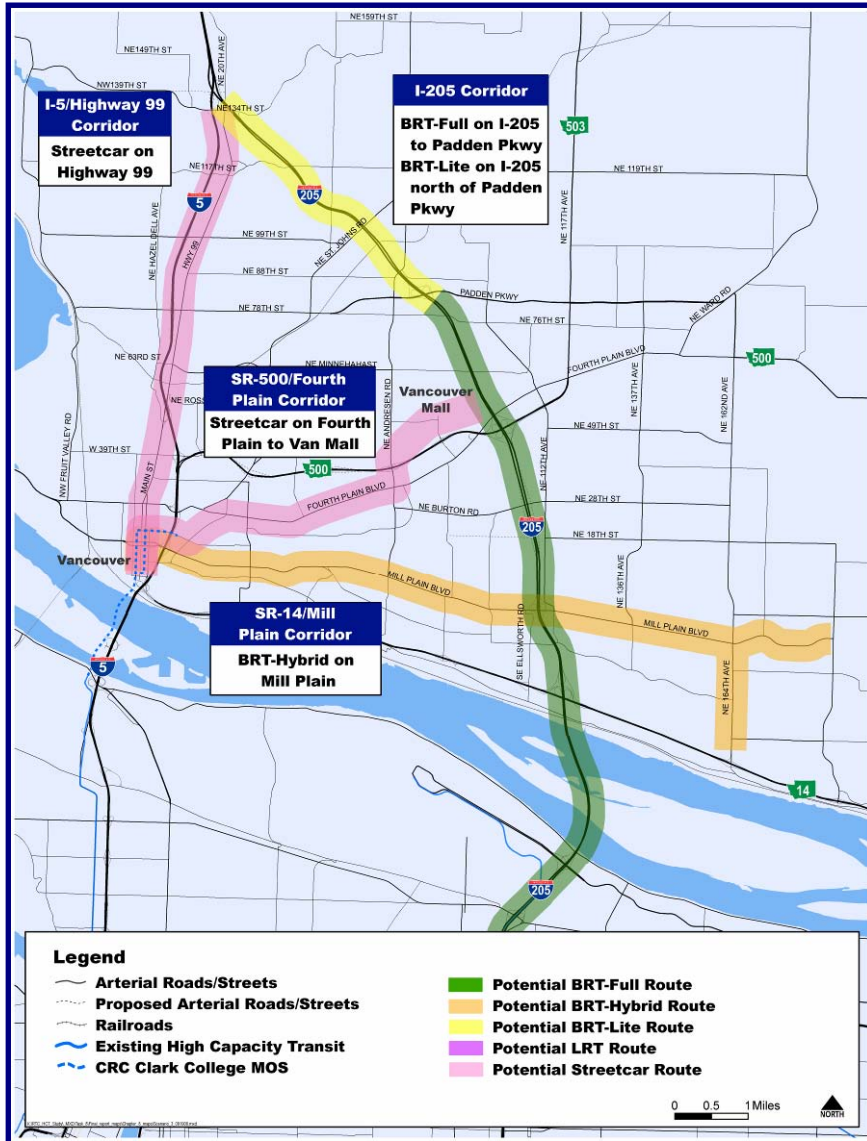
**Scenario 2B**

- Maintains C-TRAN express bus service in I-5 and I-205 corridors



**Scenario 3**, shown in Figure 8-3, was developed to test an HCT system that includes streetcars as a key element serving major travel corridors. This scenario includes streetcar on Highway 99 and on Fourth Plain to Vancouver Mall. It also includes BRT-full on I-205 up to Padden Parkway, BRT-lite on I-205 between Padden Parkway and Salmon Creek, and BRT-hybrid on Mill Plain.

**Figure 8-3**  
**Scenario 3: Streetcar Renaissance**



**Scenario 3**  
**Streetcar Renaissance**

- Streetcar on Highway 99
- Streetcar on Fourth Plain to Van Mall
- BRT-Full on I-205 to Padden Pkwy, BRT-Lite north of Padden Pkwy
- BRT-Hybrid on Mill Plain

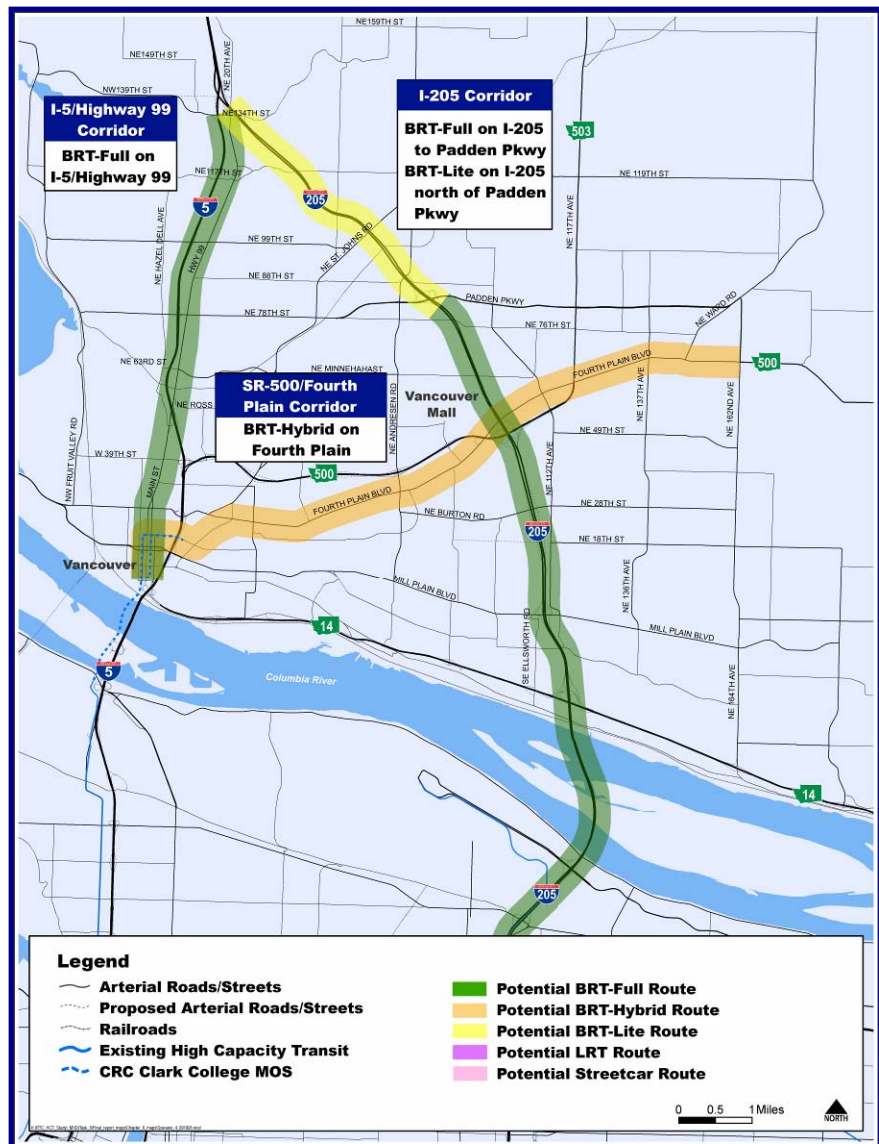


**Scenario 4**, shown in Figure 8-4, was developed to test an HCT system that focuses major capital improvements on the bi-state corridors (I-5 and I-205). This scenario includes BRT-full on I-5/Highway 99, BRT-hybrid on Fourth Plain, BRT-full on I-205 up to Padden Parkway and BRT-lite on I-205 between Padden Parkway and Salmon Creek. It does not include any capital improvements in the Mill Plain corridor.

**Figure 8-4**  
**Scenario 4: Limited BRT –**  
**Commuter Emphasis**

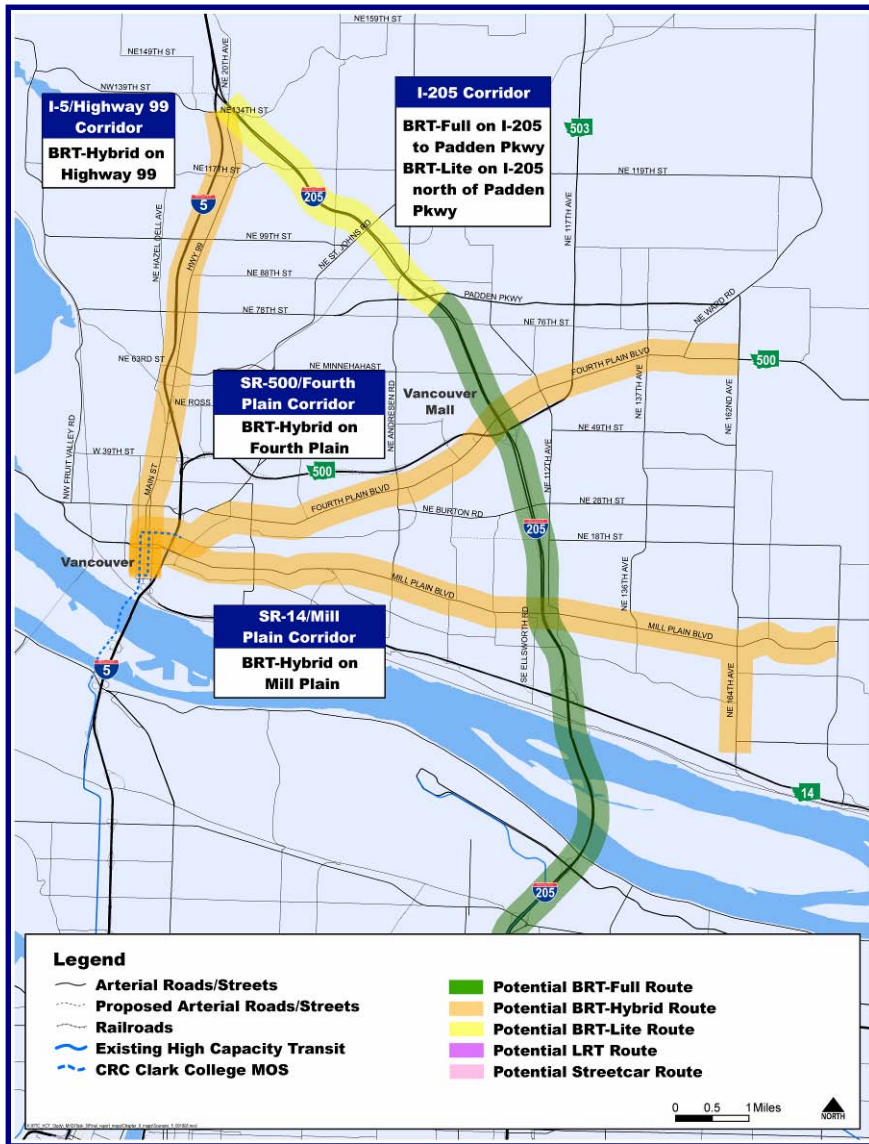
**Scenario 4**  
**Limited BRT**  
**Commuter Emphasis**

- BRT-Full on I-5/Highway 99
- BRT-Hybrid on Fourth Plain
- BRT-Full on I-205 to Padden Pkwy, BRT-Lite north of Padden Pkwy



**Scenario 5**, shown in Figure 8-5, was developed to test an HCT system that includes BRT capital improvements in each of the four major corridors. It includes BRT-hybrid on Highway 99, Fourth Plain, and Mill Plain, BRT-full on I-205 up to Padden Parkway and BRT-lite on I-205 north of Padden Parkway and Salmon Creek.

**Figure 8-5**  
**Scenario 5: BRT Everywhere**



**Scenario 5**  
**BRT Everywhere**

- BRT-Hybrid on Highway 99
- BRT-Hybrid on Fourth Plain
- BRT-Full on I-205 to Padden Pkwy, BRT-Lite north of Padden Pkwy
- BRT-Hybrid on Mill Plain

## 8.2 System Plan Scenario Findings

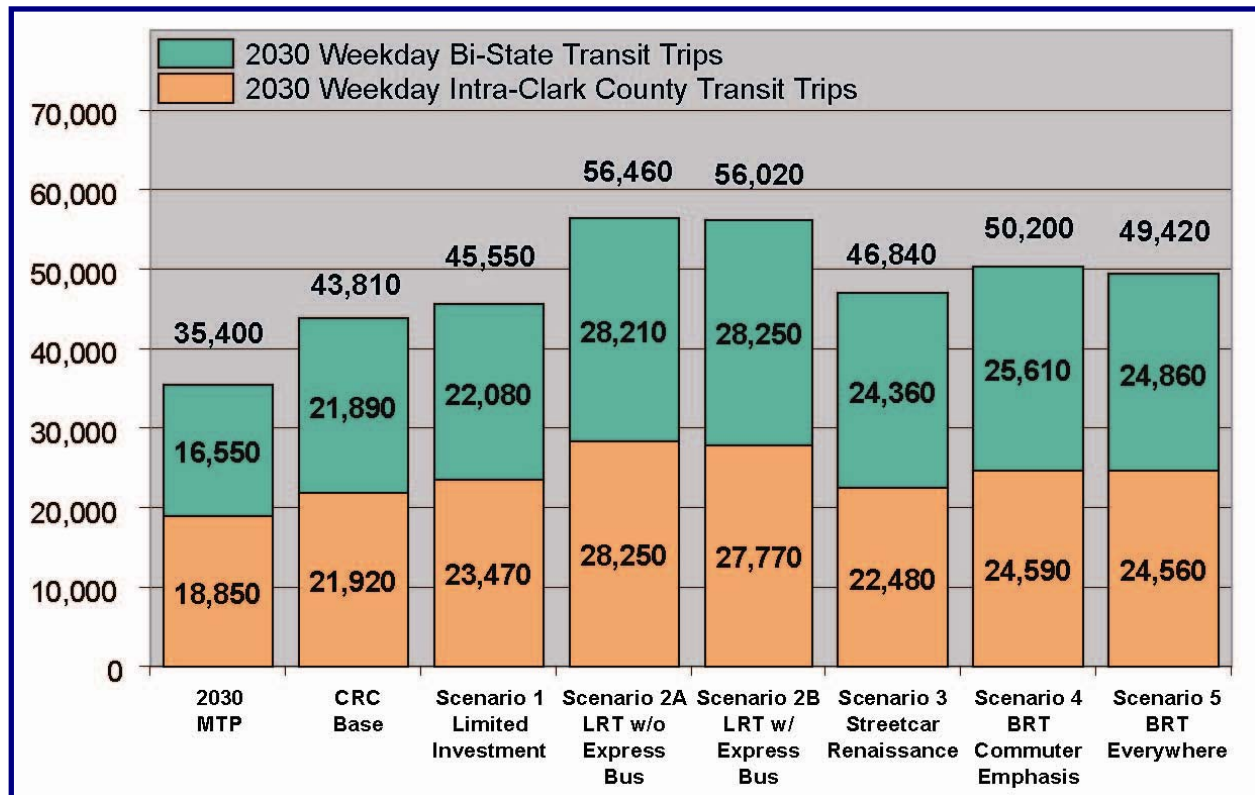
As structured, the scenarios allow for the comparison of system-level ridership and costs in order to evaluate which system elements and structure would be best for Clark County. The following sections present findings for system ridership, order-of-magnitude capital costs and operating costs.

The scenario modeling was based on the same modeled networks and assumptions used for the corridor analysis described earlier. However, in this instance, HCT improvements were included in multiple corridors at the same time.

System ridership is the number of daily trips to, from and within Clark County that use a transit vehicle for all or part of their journey. These include trips that drive to a park-and-ride to access transit, trips that transfer between transit routes and trips that use just a single transit route. Each of these transit trips is counted as only a single transit trip. In evaluating New Start and Small Start project proposals, the FTA looks at improvements in total system transit trips as a key indicator of a project's effectiveness.

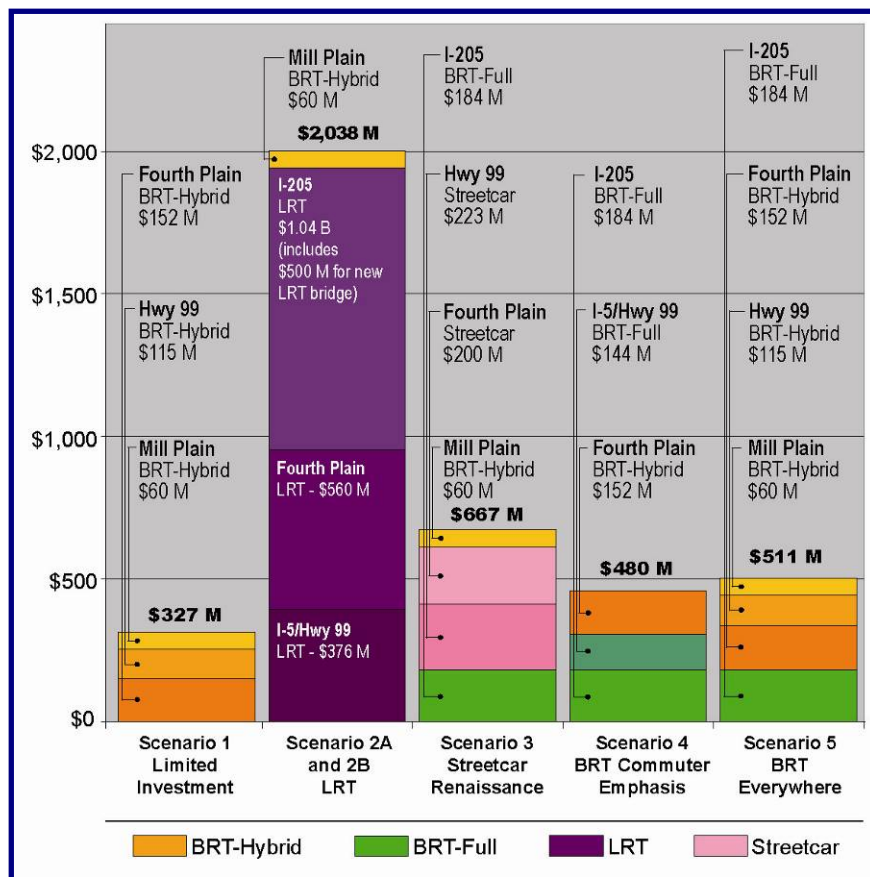
Figure 8-6 shows the system transit ridership in 2030 for each scenario compared with the base 2030 MTP network (does not include CRC transit improvements) and the CRC base network (consistent with the CRC DEIS analysis). The chart shows total Clark County average weekday transit trips for both bi-state and intra-Clark County trips for a 2030 transit system including each of the five system scenarios modeled.

**Figure 8-6**  
**Transit System Ridership**  
**by System Plan Scenario**



Order-of-magnitude capital cost estimates were prepared for each of the system plan scenarios. The total costs for each corridor have been calculated and packaged together to include all HCT elements that were included in each scenario. Figure 8-7 shows the total order-of-magnitude cost for each system plan scenario. The chart shows the individual capital cost for each scenario element (BRT-hybrid on Fourth Plain, BRT-Full on I-205, etc.) stacked together to show the total cost for each scenario.

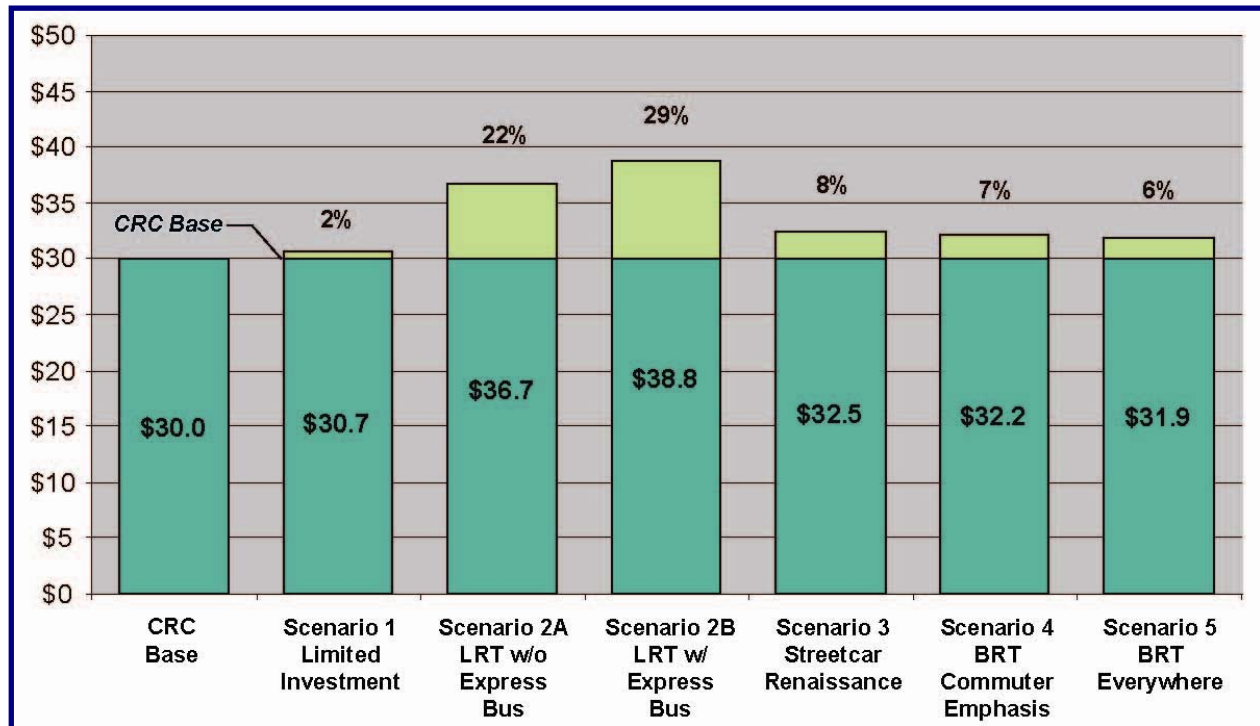
**Figure 8-7**  
**Capital Costs by System Plan Scenario**  
 (In Millions, 2008 Dollars)



The annual operating cost for each system plan scenario was estimated using the results from the travel demand modeling. This operating cost assessment takes into account any changes to the base C-TRAN bus system. Bus system changes were made where appropriate to avoid service duplication or excess capacity. Figure 8-8 shows the range of annual operating cost associated with each scenario and the percent change from the CRC base transit network.



**Figure 8-8**  
**Operating Costs by System Plan Scenario**  
(In Millions, 2008 Dollars)



### Milestone

The Steering Committee developed the Draft HCT System Plan and the RTC Board concurred with the findings.

## 8.3 Draft HCT System Plan

Based on the earlier corridor-level analysis and the updated cost and ridership information prepared for the system plan scenarios, the Steering Committee selected the following to be included as elements of the Draft Clark County HCT System Plan. The RTC Board concurred with the Steering Committee's recommendation.

**I-5/Highway 99 Corridor** – HCT in this corridor needs to serve both intra-Clark County trips and bi-state trips and serve to support redevelopment plans along Highway 99. The Steering Committee recommended the following:

- The focus for HCT improvements should be along a Highway 99 alignment rather than along an I-5 alignment.
- Maintain express bus service via I-5 to downtown Portland from park-and-ride lots at 99th and Salmon Creek.
- HCT service on Highway 99 should use the BRT-hybrid concept with sections of exclusive right-of-way where practical and other sections operating in mixed traffic.

**Fourth Plain Corridor** – HCT in this corridor should focus on serving intra-Clark County trips with the ability to accommodate some bi-state trips. Most bi-state trips would be accommodated with the park-and-ride system in the I-205 or I-5 corridors. HCT on

Fourth Plain should be designed to support redevelopment plans along Fourth Plain Boulevard. The Steering Committee recommended the following:

- HCT service on Fourth Plain should use the BRT-hybrid concept with sections of exclusive right-of-way where practical and other sections operating in mixed traffic.
- Eliminate existing local and limited bus services on Fourth Plain Boulevard and completely replace with the BRT-hybrid service.

**I-205 Corridor** – There is currently only a limited amount of transit service in the I-205 corridor. HCT concepts analyzed in the corridor showed the ability to attract significant ridership if good travel times and access could be provided. Due to the absence of transit service in the corridor today, the Steering Committee recommended the following strategy for the I-205 corridor:

- Develop incremental improvements to bus service, park-and-ride facilities and access to activity centers.
- Implement all-day service in mixed traffic along I-205 between Salmon Creek and Gateway with access improvements where needed and practical to avoid areas with out-of-direction or congested travel.
- Develop new park-and-ride lots at 18th Street (replacing Evergreen P&R) and at the Central County site and add new express bus service to both lots.
- Maintain express service to Fisher’s Landing Park-and-Ride.
- Maintain the freeway median for future use by high-capacity transit.

**Mill Plain Corridor** – The Mill Plain corridor was shown to be a good transit corridor that functions somewhat independently of the rest of the system. Overall the Mill Plain corridor had lower transit ridership than the other HCT corridors with a large proportion of intra-county trips. The Steering Committee recommended the following:

- Implement a BRT-lite concept primarily operating in mixed traffic.
- Develop a transit-only lane between approximately 104th Avenue and 120th Avenue in order to avoid the congested area in the vicinity of the I-205 interchange.

## 8.4 Final Draft HCT System Plan

The draft system plan described above includes BRT elements in the Highway 99, Fourth Plain and Mill Plain corridors. These BRT

elements were analyzed as part of Scenarios 1, 4 and 5. In addition to these BRT elements, the proposed system plan includes incremental bus service improvements in the I-205 corridor. These would include limited stops with freeway flyer stations, direct access ramps where appropriate, and allowing buses to operate on the shoulders when the freeway is congested. An additional scenario (Scenario 6) was developed to test these proposed transit elements in each corridor.

## System Plan Scenario

### (Scenario 6)

- BRT-Hybrid on Highway 99
- BRT-Hybrid on Fourth Plain
- Incremental bus improvements on I-205
- BRT-Hybrid on Mill Plain

The system plan scenario (Scenario 6) is similar to Scenario 5, but makes the following changes:

- All day BRT service in I-205 (Scenario 5) was replaced by the incremental improvements described above.
- Peak-period express service at Central County Park-and-Ride, 18th Street Park-and-Ride and Fisher's Landing Park-and-Ride was included in Scenario 6 but was not included in Scenario 5.
- Express service in the I-5 corridor was included in Scenario 6 but was not included in Scenario 5.

Scenario 6 includes representative concepts for BRT on Highway 99, Fourth Plain and Mill Plain and incremental bus service improvements on I-205. The ridership and costs associated with this system plan scenario are summarized below:

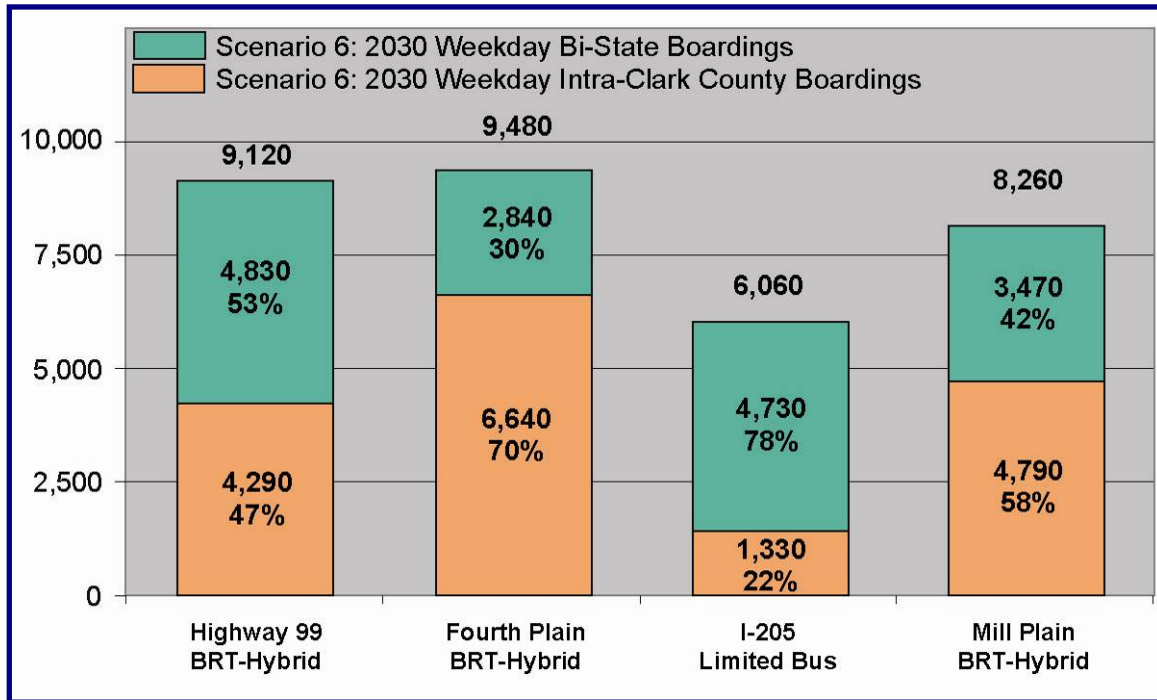
**Daily HCT Boardings** – Daily boardings on each of the HCT lines included in Scenario 6 are shown in Figure 8-9. Fourth Plain BRT-hybrid and Highway 99 BRT-hybrid are projected to carry to highest number of daily boardings with 9,480 and 9,120, respectively. Mill Plain BRT-hybrid would carry 8,260 daily boardings. The limited-stop, all-day service on I-205 would carry 6,060 daily boardings.

**System Ridership** – Total transit trips in Clark County would be 47,670, approximately nine percent higher than the CRC Base scenario and 35 percent higher than the 2030 MTP. Total trips for Scenario 6 would be approximately 4 percent lower than with Scenario 5. This small trip reduction is due to the transit service in the I-205 corridor which is less frequent and somewhat slower when compared with the I-205 BRT service included in Scenario 5.

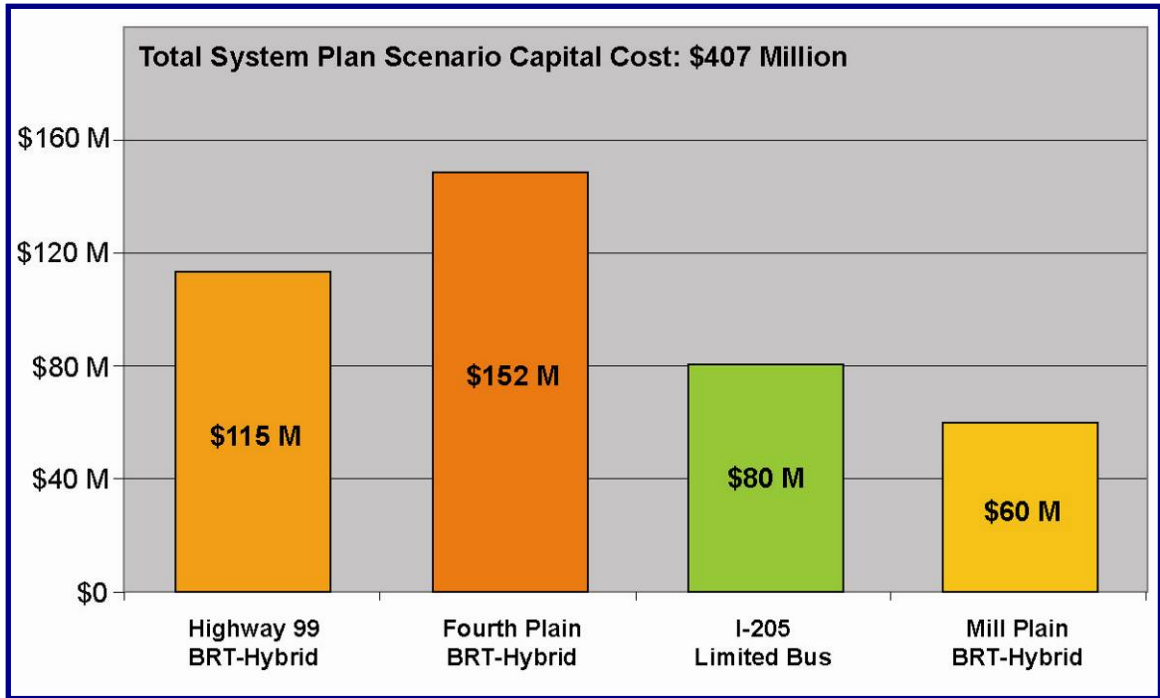
**Order-of-Magnitude Capital Cost** – Scenario 6 includes the same transit capital improvements in the Highway 99, Fourth Plain and Mill Plain corridors as are included in Scenario 5. In the I-205 corridor, the capital cost estimate for the incremental bus improvements is \$80 million, just over \$100 million less than the I-205 BRT included in Scenario 5. Figure 8-10 shows the capital costs for each of the elements included in the system plan scenario.

**Operating Cost** – The annual operating cost estimate for Scenario 6 is \$33.4 million, 11 percent higher (\$3.4 million) than the CRC Base transit network and 5 percent higher than Scenario 5. Scenario 6 includes significantly more express bus services to Portland than Scenario 5, which leads to a higher overall operating cost.

**Figure 8-9**  
**Daily HCT Transit Line Boardings in 2030**  
**System Plan Scenario (Scenario 6)**



**Figure 8-10**  
**System Plan Scenario Capital Costs (Scenario 6)**  
(In Millions, 2008 Dollars)



# HCT Policies



## Chapter 9

### 9.1 Introduction

This chapter provides background information and discussion of land use and transportation plans and policies that support an HCT system. Section 9.1 describes the existing policy framework for each agency and jurisdiction, Section 9.2 describes transit-supportive land use and development, Section 9.3 provides land use and policy evaluations of each corridor and Section 9.4 describes jurisdiction and agency actions that would support implementing the HCT System Plan.

Existing city and county plans provide a solid foundation to build on to support HCT in Clark County. Many of the necessary tools are in place. This chapter provides some guidance on how these tools can best be applied to maximize the benefits of an HCT system.

### 9.2 Existing Policy Framework

This section presents background information on the planning and policy responsibilities of the HCT study partner jurisdictions and agencies.

#### Southwest Washington Region Transportation Council

The Southwest Washington Regional Transportation Council (RTC) is Clark County's metropolitan planning organization (MPO) for federal transportation planning purposes and the Washington State Regional Transportation Planning Organization (RTPO) for regional transportation planning purposes.

The *Metropolitan Transportation Plan* (MTP) is the long-range regional transportation plan for Clark County. The current MTP



Metropolitan  
Transportation Plan (MTP),  
Amended July 2008



was adopted by RTC in 2007 and amended in July 2008 to include the CRC project's locally preferred alternative. It is coordinated with the Comprehensive Growth Management Plans for the county and cities. The MTP aspires to a regional transportation system that will achieve the land use vision presented in the local comprehensive plans. It calls for a balanced multi-modal transportation system, including high-capacity transit, and supports increasing density in significant transit corridors.

### Clark County

Clark County adopted their first comprehensive land use plan in 1979 as a long-range plan for growth in the county. Following the passage of the Growth Management Act in 1990, the county embarked on a community process to develop a vision of how the county should accommodate growth. This process led to the adoption of the *Community Framework Plan* in 1993. The purpose of the Framework Plan was to provide a vision of which lands would eventually be committed to urban uses and which lands would remain rural in character.

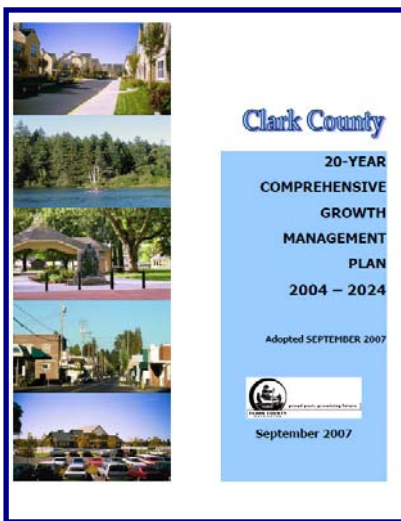
Clark County's 20-year *Comprehensive Growth Management Plan* and map, adopted September 2007, identifies appropriate levels of development on all lands in the county. In rural areas, the plan identifies lands for forest, agriculture and mining, as well as various densities for rural residential areas. The plan also identifies areas for urban intensity housing, commercial and industrial development. The transportation policies support a balanced regional transportation system that reduces reliance on single-occupant vehicles by promoting transit, bicycle and pedestrian improvements.

The county is currently working with the community to prepare the *Highway 99 Sub-Area Plan*. The emerging vision for the area includes a focus on revitalization and a transition to a higher-density, mixed-use style of development. The plan is expected to be adopted in late 2008.

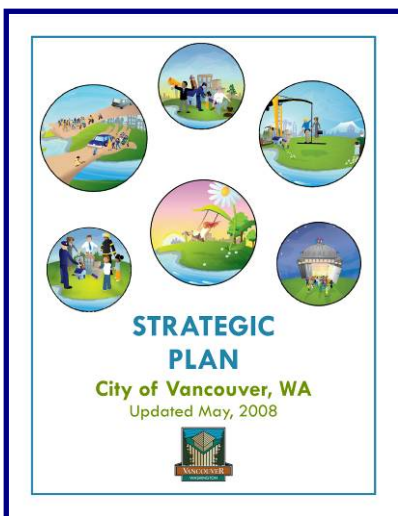
The *Clark County Code* includes the broad set of county land use and other regulations. These are included in Title 40: Unified Development Code.

### City of Vancouver

The *Vancouver Strategic Plan*, adopted May 2008, is a roadmap to help guide the community's future. In concert with other planning and policy documents, the strategic plan provides the tools to achieve the community's vision.



Clark County 20-Year  
Comprehensive Growth  
Management Plan 2004-2024,  
September 2007



Vancouver Strategic Plan,  
May 2008



The *Vancouver Comprehensive Plan 2003-2023* is the city's 20-year growth plan. The plan promotes efficient development patterns that can be served by a range of transportation options.

The comprehensive plan is implemented through sub-area plans and provisions in the *Vancouver Municipal Code*. Title 20 of the code is the *Land Use and Development Code*. It includes many provisions relevant to the HCT study such as those that regulate land use and development including:

- Chapter 20.250 Development Agreements
- Chapter 20.420 Higher Density Residential Districts
- Chapter 20.430 Commercial and Mixed Use Districts
- Chapter 20.550 Transit Overlay District
- Chapter 20.580 Fourth Plain Corridor Overlay District
- Chapter 20.630 Downtown District
- Chapter 20.945 Parking and Loading

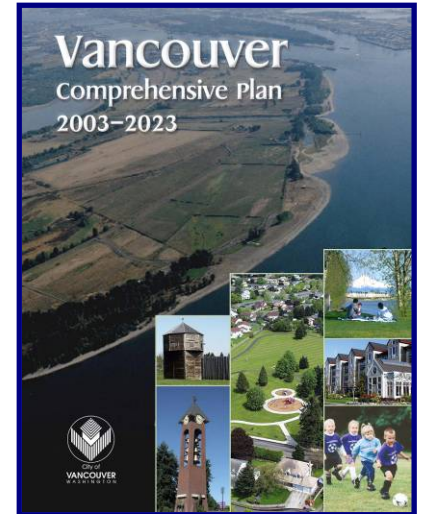
The City of Vancouver's 20-year *Transportation Plan* provides a long-range assessment of future mobility needs and identifies solutions that direct the city's future transportation investments. The plan focuses not only on roadway solutions, but considers solutions that include signal system upgrades, walking and bicycling enhancements, transit-supportive and highway-supportive investments.

The *Vancouver City Center Vision & Sub-Area Plan* identifies guiding principles and policies that support a dynamic and rich mix of residential, civic, retail and entertainment places in downtown Vancouver.

The *Fourth Plain Corridor Sub-Area Plan* was adopted in spring 2007. This sub-area plan calls for the revitalization of the Fourth Plain Boulevard corridor and surrounding neighborhoods between St. John's Boulevard and Burton Road. The sub-area plan contains policy goals and implementing measures addressing future land use, housing, transportation, public safety and economic development issues, and includes maps of potential future development at key intersections in the corridor.

## C-TRAN

C-TRAN is the transit provider for Clark County. As a transit service provider, C-TRAN participates in regional planning activities. C-TRAN has developed a *50-Year Vision*. The vision is a one page statement in which C-TRAN aspires to be a leading transit provider that connects cities and communities through providing safe transit service, is flexible and accountable and



**Vancouver Comprehensive Plan, 2003-2023**



**Fourth Plain Corridor Sub-Area Plan, January 2007**

proactive in land-use and transportation planning activities and connects with other regional transit systems.

The *20-Year Transit Development Plan* summarizes the current service provided and identifies the goals for the next 20 years. It identifies the CRC project planning and the RTC HCT System Study as current significant efforts for C-TRAN. This plan is currently being updated.

### **State of Washington Transportation and Land Use Planning Regulatory Framework**

The *Washington State Growth Management Act* (GMA) was adopted in 1990 and it requires local governments to develop land use and transportation plans and regulations. The GMA includes 13 goals to guide the development and adoption of comprehensive plans. The goals discourage sprawling development, encourage development in urban areas with adequate public facilities, encourage economic development throughout the state consistent with comprehensive plans, encourage efficient multimodal transportation systems, provide for the protection of property rights, and require that adequate public facilities and services necessary to support development be available when new development is ready for occupancy (transportation conformity).

### **Federal Land Use Regulatory Environment Related to Transit**

The federal government does not directly regulate land use and transportation planning at the local jurisdiction level. However, HCT projects that plan to apply for federal Section 5309 capital funding grants (New Starts) must follow FTA guidance and provide a report on land use plans and policies and transit-supportive developments.

A brief summary of some of the federal transit project planning and land use requirements include:

#### **System Planning Requirements**

- Development of a transit system plan and a Regional Transportation Plan.
- Inclusion of the project in the adopted Financially Constrained Regional Transportation Plan.
- Inclusion of the project in the Transportation Improvement Program.
- Inclusion of the project in the regional Air Quality Conformity determination.

## Project Planning Requirements

- Project sponsor must follow the FTA Project Development Process (Alternatives Analysis, Locally Preferred Alternative, Preliminary Engineering, etc).
- The project must comply with the National Environmental Policy Act (NEPA) and other federal environmental regulations (Section 106, ESA, Clean Water Act, etc.).
- The project development process must comply with federal transportation planning requirements in SAFTEA-LU, the most current federal transportation legislation.
- The project sponsors must prepare a New Starts or Small Starts Report, and the project must be rated based on FTA's evaluation of the report, and the project must have a rating high enough to compete for federal funds.
- The project must be on the list of projects authorized by congress or receive an earmark

## 9.3 Transit-Supportive Land Use and Development

This section presents key features of transit-supportive land use, transit-oriented development, corridors and centers.

The term transit-oriented development (TOD) is widely used to describe a style of development and redevelopment that emphasizes pedestrian amenities and access to high quality transit service. TOD principles can be implemented broadly in an activity center or applied to a linear corridor or a specific location such as a large parcel.

Transit-supportive land use and development can include many features. Among the most important are:

- Transit-supportive land use densities
- A mix of uses
- Transit-oriented pedestrian environment
- Parking management strategy
- Transit-oriented urban design

Implementation of TOD principles can be accomplished through multiple types of planning efforts such as: incorporation into comprehensive plan updates; inclusion in zoning code provisions; development of special area plans for a center or corridor; development of site specific master plans. Transit-oriented development is typically associated with a specific transit facility such as a transit center and involves development or redevelopment of a significant parcel or group of parcels in the

vicinity of the transit facility. TOD principles can be applied to a specific site development proposal where the site is designed to relate well to the surrounding uses.

### **TOD Corridors and Centers**

Transit-oriented development is most typically found either along a major transit corridor or in an activity center. Healthy centers and corridors include: a mix of uses, pedestrian amenities and activities, secure environment, open space, attractive housing, diverse activity mix, positive customer perception, marketing and management structure, good retail sales, 18-hour environment, accessibility, effective and managed parking, and continues to evolve over time.

Transit-supportive corridors are generally linear transportation routes that often connect centers and often include main street types of development. Transit-supportive corridor characteristics include:

- BRT, streetcar or frequent bus service.
- A focus on corridors helps to preserve single family neighborhoods behind the corridors.
- Focused investment where it is needed most, and would be most visible.
- Improved transit service to existing neighborhoods and centers.
- Non-retail uses such as housing and office.

Transit-supportive centers can include any size of center, from a small neighborhood commercial center to a large central business district. The hierarchy of centers can include large metropolitan centers, regional centers, business districts, major and minor malls, community-level commercial centers, and neighborhood centers. Centers typically:

- Have diverse transit service that can include commuter rail, light rail, streetcars, BRT, frequent bus, transit centers, and others such as inter-city transit connections.
- Serve as anchors to major corridors.
- Allow for a range of potential implementation approaches such as urban renewal.
- Have a broad mix of uses from housing, retail and office to entertainment, government centers, etc.

Implementation of transit-supportive land use can further many community goals such as growth management and revitalization of underutilized areas. It can serve as a focal point for public

investment, and provide a catalyst for redevelopment in blighted areas. Also, transit-supportive land use can help to improve transit mode share and reduce growth in vehicle miles traveled (VMT).

There is a broad set of plan and policy actions that could be adopted and implemented by the city and county to support the HCT System Plan. Governmental actions are discussed in the following sections both for the specific HCT corridors in Clark County and for each major agency and jurisdiction.

## 9.4 HCT Corridor Evaluations

Clark County is a rapidly growing community. Some areas are developing for the first time, while other areas are experiencing infill and/or redevelopment. Current land uses include a broad mix of residential, commercial, employment, open space, agricultural and forest.

This section describes the existing land use and policy framework in the potential HCT corridors. The existing land use varies, with some areas being more transit-supportive than others. Following, for each HCT study corridor, is:

- An overview of the existing land use,
- A discussion about the jurisdictional planning responsibility,
- An overview of the existing planning framework, and
- An overview of policy changes that could help maximize return on an HCT investment.

Appendix J includes maps showing existing land uses and comprehensive plan land use designations. These maps include each of the alignment concepts and a half-mile buffer around each alignment, indicating the existing and proposed land uses that would be within a half-mile of the proposed HCT concepts.

### Highway 99 Corridor

**Existing Land Use** – Much of the land in this corridor is committed to public right-of-way for both I-5 and Highway 99, and various arterials and local streets. The corridor is anchored on the south end by downtown Vancouver which includes a mix of medium- and high-density office, retail and housing. The Highway 99 portion is dominated by strip commercial development, much of which presents opportunities for redevelopment to support an HCT corridor.

**Land Use Planning Responsibility** – The southern portion of this corridor is within the City of Vancouver, and the northern portion



Commercial land use on Highway 99



is within Clark County. The city limit line is near the point where Main Street/Highway 99 crosses I-5. The area north of the city limit is in the unincorporated portion of the county but within the Vancouver Urban Growth Area (VUGA).

**Current Planning Framework** – This corridor is influenced by multiple plans and planning efforts. The planning efforts that would most directly influence land uses in this corridor are:

- Columbia River Crossing Project
- Vancouver City Center Vision & Sub-area Plan
- Highway 99 Sub-area Plan

**Policy Recommendations to Support HCT** – The plans in place in this corridor provide a solid foundation to support an HCT improvement in the corridor. There are TOD opportunities in downtown Vancouver, the upper Main Street area and along Highway 99. Additional planning efforts would be helpful to focus on station locations and significantly underutilized sites/groups of parcels that could be redeveloped.

**City of Vancouver** implementation strategies could include:

- A review of the plans and policies in the upper Main Street area.
- Review the progress and successes of the Downtown District and prepare an update based on the CRC LPA and HCT plan decisions.
- Review the Transit Overlay District provisions.
- Update the existing parking management strategy for the downtown and upper Main Street areas.

**Clark County** implementation strategies could include:

- Complete the Highway 99 Sub-area Plan.
- Apply transit-supportive design standards in the corridor.

### Fourth Plain Corridor

**Existing Land Use** – This corridor has strong land use anchors in both downtown Vancouver and the Vancouver Mall area. Downtown Vancouver includes a mix of medium- and high-density office, retail and housing, and a good pedestrian environment. East of I-5, the Fourth Plain corridor includes a lower-density mix of land uses including a few large blocks of parks/open space, generally low- to medium-density residential, and auto-oriented retail. In the vicinity of Vancouver Mall and east of I-205 there are larger-lot retail establishments with large parking lots and low- and medium-density residential behind the retail.



Legacy Salmon Creek Hospital



Commercial land use on Fourth Plain



There are some large-lot industrial lands near the east end of the corridor.

**Planning Responsibility** – Generally the portion of the corridor south of SR-500 is in the City of Vancouver. The portion of the corridor north of SR-500 is in the city west of I-205 and predominantly in unincorporated Clark County east of I-205. The whole corridor is within the Vancouver Urban Growth Area.

**Current Planning Framework** – This corridor has two relatively strong planning assets in the Vancouver City Center Vision and Sub-Area Plan and the Fourth Plain Corridor Sub-Area Plan.

**City of Vancouver** plans and policies applicable in the corridor include:

- Vancouver Comprehensive Plan 2003-2023
- Vancouver Transportation System Plan
- Vancouver City Center Vision & Sub-Area Plan
- Fourth Plain Corridor Sub-Area Plan
- Vancouver Municipal Code, Title 20 Land Use and Development Code

**Clark County** plans and policies for the north/east portion of the corridor include:

- Clark County Community Framework Plan
- Clark County 20-Year Comprehensive Growth Management Plan
- Mixed-Use District and Mixed-Use Design Standards

**Policy Recommendations to Support HCT** – Overall, the Fourth Plain corridor is further ahead and better poised to be developed as a transit-supportive corridor than most other corridors, due to the Fourth Plain Corridor Sub-area Plan. Identification of a few key centers along the corridor and focused TOD implementation in those areas could result in large HCT system benefits. Several locations, such as at major cross streets, would be logical places to apply transit-supportive design standards.

**City of Vancouver** implementation strategies could include:

- Implementation of the Fourth Plain Corridor Sub-Area Plan strategies.
- Apply and implement transit-supportive design standards in the corridor.
- Focus initial implementation efforts on a few key centers along the corridor.



Office complex near Vancouver Mall

**Clark County** implementation strategies could include:

- Work with the City of Vancouver to develop a sub-area plan for the northeast portion of the Fourth Plain corridor.

### **I-205 Corridor**

**Existing Land Use** – A significant portion of the land in this corridor is committed to public right-of way uses for I-205 and the arterials that cross it. The primary land uses in the corridor are accessed from the east-west arterials, such as Mill Plain, SR-500, Fourth Plain, St. Johns Road, and 134th.

**Planning Responsibility** – Generally the portion of the corridor south of SR-500 is in the City of Vancouver and the area north of SR-500 is in unincorporated Clark County. The Clark County portion of the corridor is also in the Vancouver Urban Growth Area.

### **Current Planning Framework –**

The **City of Vancouver** plans and policies relevant to the southern part of this corridor include:

- Vancouver Comprehensive Plan 2003-2023
- Vancouver Transportation System Plan 2004
- Vancouver Municipal Code, Title 20 Land Use and Development Code

**Clark County** plans and policies for the northern portion of the corridor include:

- Clark County Community Framework Plan
- Clark County 20-Year Comprehensive Growth Management Plan

### **Policy Recommendations to Support HCT –**

**City of Vancouver** implementation strategies could include:

- A review of the plans and polices in the corridor.
- Apply the Transit Overlay District to the corridor.

**Clark County** implementation strategies could include:

- A general update of the zoning map.
- Apply transit-supportive design standards in the corridor.

### **Mill Plain Corridor**

**Existing Land Use** – This corridor is anchored on the west by downtown Vancouver which includes a mix of medium- and high-density office, retail and housing, and a relatively complete sidewalk network. East of I-5, the Mill Plain corridor is generally a lower-density corridor with a mix of land uses including large



I-205 near Burton Road

blocks of parks/open space, a mix of high-, medium- and low-density residential, the medical complex associated with the SW Washington Medical Center and auto-oriented retail (between I-5 and I-205).

**Planning Responsibility** – This corridor is entirely within the city of Vancouver.

**Current Planning Framework** – This corridor has a strong planning asset in the downtown Vancouver area, but it does not have a focused area planning effort for the area east of I-5.

The **City of Vancouver** plans and policies applicable to the Mill Plain corridor include:

- Vancouver Comprehensive Plan 2003-2023
- Vancouver Transportation System Plan 2004
- Vancouver City Center Vision & Sub-Area Plan 2007
- Vancouver Municipal Code, Title 20 Land Use and Development Code

#### **Policy Recommendations to Support HCT –**

**City of Vancouver** implementation strategies could include the following.

- A review of the plans and policies in the Mill Plain corridor.
- Several points along the corridor could be logical locations for use of transit-supportive design standards.
- Identify a few key centers along the corridor and focus initial implementation in those areas.

## **9.5 Jurisdiction and Agency Actions to Implement the Clark County HCT System Plan**

This section describes general actions for each jurisdiction that could support and help to implement the Clark County HCT System Plan. In order for the Clark County HCT System Plan to be successful, it will require a focused and collaborative effort on the part of all agencies (RTC, C-TRAN, Clark County, City of Vancouver and WSDOT). Successful implementation will require support at each agency at the political and staff levels.

There are many creative strategies that could be used to implement the Clark County HCT System Plan. The following list is organized by agency, but most tasks will require the support and involvement of every agency. This list is intended as a menu of strategies for each of the involved public agencies. Some actions are necessary, such as transportation plan updates, and others are



Mill Plain near Chkalov

suggestions that would help make the Clark County HCT System Plan more successful.

### **RTC**

- RTC Board adoption of the Clark County High Capacity Transit System Plan (adopted December 2008).
  - Amend the Metropolitan Transportation Plan (MTP).
- Other Strategies:
  - Work with partner agencies on an Alternatives Analysis for the priority corridor.
  - Identify early elements of the priority corridor implementation strategies.
  - Consider further analysis and/or improvements in the other HCT corridors.
  - HCT corridors should be given funding priority for pedestrian access, roadway design, lighting and ITS improvements.
  - Define metrics for evaluation of progress.
- Prioritize plan implementation.

### **C-TRAN**

- 50-Year Vision – Review the 50-Year Vision.
- 20-Year Transit Development Plan (TDP):
  - Update to reflect the adoption of the Clark County HCT System Plan.
  - Select a priority corridor and define an implementation strategy.
  - Implement the priority corridor strategy.
- Prepare a strategic marketing plan to “brand” BRT routes in the county.
- Advocate TOD-supportive plans and zoning codes in the HCT corridors.
- Develop a comprehensive park and ride strategy.
- Define a strategy for each HCT corridor.
- Develop design criteria for transit streets in cooperation with the county and cities.
- Develop an HCT implementation and finance strategy.

### **Clark County**

- Consider an update to the Community Framework Plan or define a new long-range vision that incorporates the Clark County HCT System Plan.

- Review the 20-year Comprehensive Growth Management Plan (including transportation plan) and determine if updates are needed to implement the Clark County HCT System Plan.
- Review the Clark County Code and zoning map and update as needed to support HCT corridors.

### **City of Vancouver**

- Review the Vancouver Strategic Plan and update as needed.
- Review the Vancouver Comprehensive Plan 2003-2023 and update as needed.
- Review the Vancouver Transportation Plan and update as needed.
- Review the Vancouver Municipal Code, Title 20 Land Use and Development Code and Zoning Map and update as needed.
- Review the City Center Vision and Sub-Area Plan and update as needed.
- Consider development of a sub-area plan and high-capacity transit-supportive policies for the upper Main Street and Mill Plain corridors.

### **WSDOT**

- Coordinate with C-TRAN on an overall park-and-ride strategy for the county.
- Work with C-TRAN on Clark County HCT System Plan corridor implementation for areas within WSDOT right-of-way.
- Make ITS improvements for HCT corridors a high priority on WSDOT facilities.





# High-Capacity Transit Recommendations



## Chapter 10

### 10.1 Introduction

The Clark County community continues to grow and evolve. Along with this evolution comes a growing recognition that high-capacity transit can serve a significant role in helping to shape the community in ways that are efficient and sustainable.

The Clark County High Capacity Transit System Study was initiated through the support and energy of the Regional Transportation Council Board of Directors. The Board recognized that this study needed to focus on identifying solutions that could serve intra-county trips as well as meeting the needs of residents commuting across the Columbia River. By developing a system that could serve intra-county trips, the HCT plan could help foster job growth in key activity centers and along transit corridors where the ability to attract trips to transit is greater.

As the study progressed, information was developed to support specific direction on the development of HCT improvements in the study corridors and on the policies and plans that could support HCT implementation in the county. This chapter presents recommended HCT concepts in each study corridor, and plan and policy improvements that could be instrumental in providing a transit-supportive environment for HCT. As decisions are made to move forward with further HCT development, these recommended concepts should not be viewed as prescriptive but rather as a starting point for further refinement and more detailed analysis.

## 10.2 HCT System Plan and Policy Context

One of the study's underlying findings is that while the design of a good HCT system is critical, it is not enough to ensure successful HCT project implementation. A well designed set of HCT facilities needs to be complimented by the following:

- Transit-supportive land use strategies
- Collaboration among public agencies
- Commitment to the project at both political and staff levels
- Continued public engagement and support
- Actions by public agencies to amend and implement HCT policies

## 10.3 HCT System Plan Recommendations

The Clark County High Capacity Transit System Plan recommendations are shown as Figure 10-1. The following describes these recommendations by corridor.

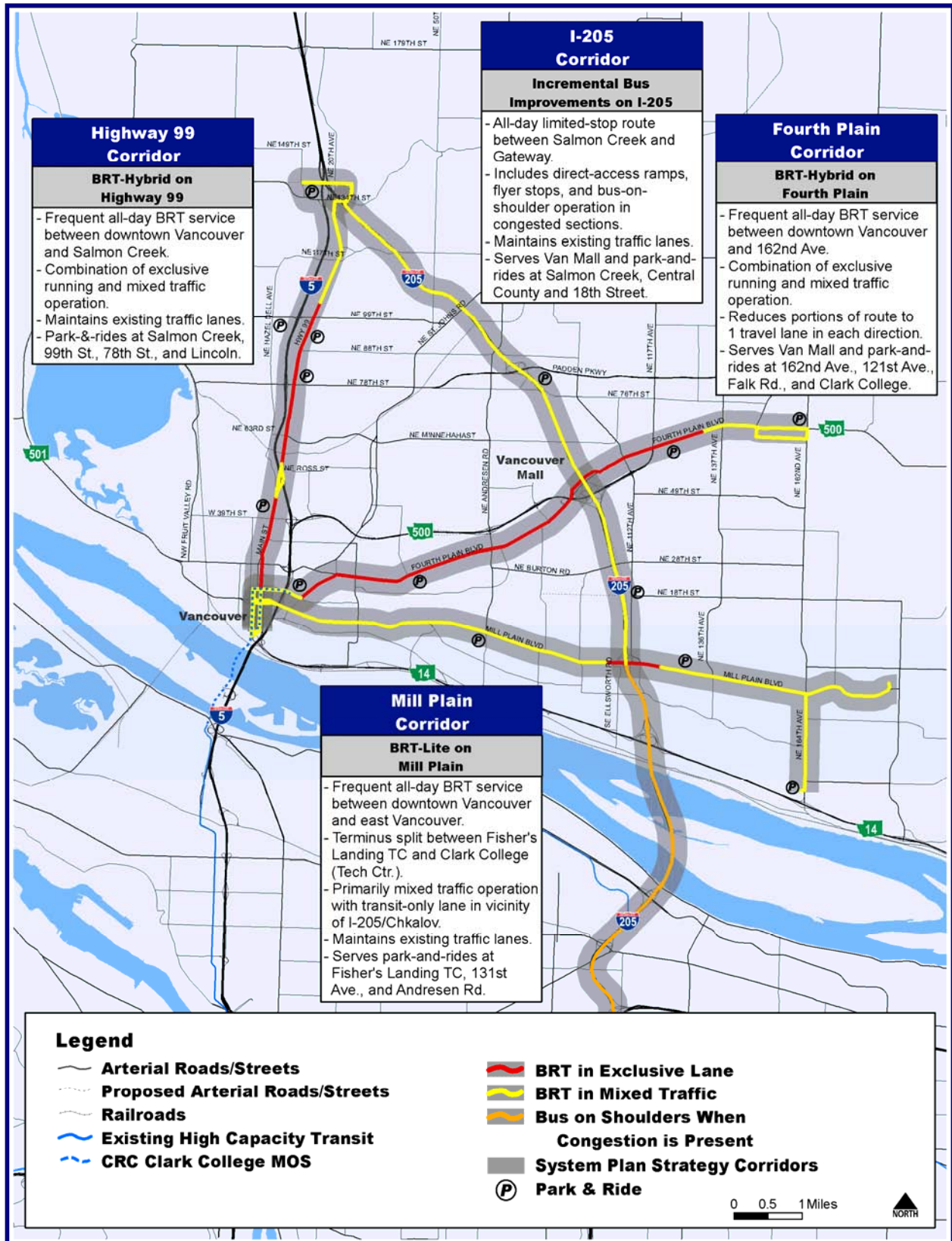
**Highway 99 Corridor** – HCT in this corridor needs to serve both intra-Clark County trips and bi-state trips. Recommendations in this corridor include the following:

- Frequent all-day BRT service on Highway 99 between downtown Vancouver and Salmon Creek
- Combination of exclusive and mixed traffic operation
- Maintain existing traffic lanes
- Park-and-rides at Salmon Creek and in the vicinity of 99th Street, 78th Street and Lincoln

**Fourth Plain Corridor** – HCT in this corridor should focus on serving intra-Clark County trips with the ability to accommodate some bi-state trips. Recommendations in this corridor include the following:

- Frequent all-day BRT service between downtown Vancouver and 162nd Avenue
- Combination of exclusive and mixed traffic operation
- Reduce portions of route to one travel lane in each direction
- Serve Vancouver Mall and park-and-rides at Clark College and in the vicinity of Falk Road, 121st Avenue and 162nd Avenue

**Figure 10-1  
Clark County HCT System Plan**



**I-205 Corridor** – HCT in this corridor needs to serve both intra-Clark County trips and bi-state trips. Recommendations in this corridor include the following:

- All-day limited-stop route between Salmon Creek and Gateway
- Includes direct-access ramps, flyer stops, and bus-on-shoulder operations
- Maintain existing traffic lanes
- Serve Vancouver Mall and park-and-rides at Salmon Creek, Central County and 18th Street

**Mill Plain Corridor** – HCT in this corridor should focus on serving intra-Clark County trips with the ability to accommodate some bi-state trips. Recommendations in this corridor include the following:

- Frequent all-day BRT service between downtown Vancouver and east Vancouver
- Terminus split between Fisher’s Landing Transit Center and Clark College (Tech Center)
- Primarily mixed traffic operation with transit-only lane in vicinity of I-205/Chkalov
- Maintain existing traffic lanes
- Serve park-and-rides at Fisher’s Landing Transit Center and in the vicinity of 131st Avenue and Andresen Road

Table 10-1 summarizes the daily HCT ridership and order-of-magnitude capital cost for the recommended System.

**Table 10-1**  
**HCT Corridors Summary**

HCT Corridor	Daily Boardings	Capital Cost
Highway 99	9,120	\$115 million
Fourth Plain	9,480	\$152 million
I-205	6,109	\$80 million
Mill Plain	8,260	\$60 million

## 10.4 HCT System Policy Recommendations

Listed below are the central HCT policies that apply across the system and to individual projects:

### Overall Policies

These policies guided the development and analysis of HCT concepts in each corridor and provided grounding for the evaluation and recommendations.

- HCT needs to maximize ridership by serving both intra-county and bi-state transit trips
- HCT system needs to move transit vehicles through corridors faster than conventional bus
- Maximize access to the HCT system by locating stations within walking distance of major activity centers and park and rides
- Balance the trade-offs between ridership and cost

### HCT Land Use Policies

Listed below are land use strategies that can support the development of HCT corridors by fostering a pedestrian-friendly environment that can lead to easier transit access and higher ridership.

- Transit-supportive densities
- A mix of land use
- Transit-oriented pedestrian environment
- Parking management strategies
- Transit-oriented urban design

## 10.5 Next Steps

Completing this plan and amending the MTP to include the Clark County High Capacity Transit System Plan represents the conclusion of an extensive planning effort, but only the beginning of the steps needed to provide Clark County residents with an HCT system that meets their travel needs.

This plan includes analysis and research that helps to clarify the HCT strategies that are available to C-TRAN and Clark County as the region considers how to move forward. C-TRAN and the region should build upon the groundwork and momentum provided by this study to determine a priority corridor for HCT and develop a funding and implementation strategy.

The next steps in developing an HCT system for Clark County should include:

**Selection of a Priority Corridor** – C-TRAN will lead the effort to determine which HCT corridor should be the first corridor in which to develop and implement HCT. This process could also include identifying the priority for all of the HCT corridor improvements included in this plan.

**Prepare a New Starts/Small Starts Strategy for HCT Corridors in Clark County** – A New Starts/Small Starts strategy will help to position the Clark County region to compete for federal funding under the appropriate funding category. An element of this strategy should address the advantages and disadvantages of moving forward with incremental improvements in a corridor versus packaging a corridor as a complete project.

**Alternatives Analysis for Priority Corridor** – If a determination is made to develop a corridor as a potential New Starts/Small Starts application, an FTA-approved Alternatives Analysis (AA) will be required. An AA will build upon the analysis and design concepts prepared for this plan, but will need to at least reconsider the range of mode and alignment alternatives in the corridor.

**Prepare an HCT Funding Strategy** – Evaluate HCT funding opportunities in conjunction with the C-TRAN 20-Year Plan and the Columbia River Crossing Project.





## Glossary

**Alternatives Analysis (AA)** – A process by which project alternatives are compared to determine the alternative that best meets the project goals and objectives and the needs of the community. Alternatives in a transit project can include mode (bus rapid transit, light rail, streetcar), alignment (which streets or corridors the project will be built in), and type of service (exclusive right-of-way, exclusive lanes, or mixed traffic). The Federal Transit Administration requires that projects applying for a New Starts (Section 5309) capital improvement grant, prepare a thorough Alternatives Analysis leading to the selection of a Locally Preferred Alternative (LPA) to move forward into a NEPA process.

**Bus Rapid Transit (BRT)** – BRT is a term used to describe a wide range of transit capital and operational improvements. BRT usually attempts to combine qualities of rail transit (e.g. stations, fare collection equipment, traffic signal priority, etc.) with the flexibility of buses. A BRT system will often combine intelligent transportation system technology, priority for transit, cleaner and quieter vehicles, rapid and convenient fare collection, and integration with land use policy. This study initially defined two styles of BRT that served to bracket the spectrum of potential BRT treatments:

**BRT-Full** – Bus rapid transit-full is a BRT line that uses primarily exclusive right-of-way.

**BRT-Lite** – Bus rapid transit-lite is a BRT line that primarily operates in mixed traffic.

**BRT-Hybrid** – Bus rapid transit-hybrid is an effort to identify which mix of exclusive guideway and mixed traffic operations is most appropriate in each corridor taking into account congestion, cost, etc.

**Busway** – A vehicle travel way exclusively for buses. This is often an element in BRT systems, and allows a bus line to operate completely separated from adjacent automobile traffic.

**Boardings** – A trip that boards a transit vehicle. The count of daily boardings can be derived from existing ridership counts or for a future year from ridership projections using a travel demand model. A trip that includes a transfer would incur multiple boardings.



**Capital Costs** – Costs associated with designing and constructing a transportation project, including construction of roadways or rail lines, acquisition of right-of-way, and purchase of transit vehicles.

**Commuter Rail** – Commuter Rail is a heavy rail technology that can offer passenger capacity and high speed. It typically operates on tracks with existing freight railroads and, as a result, will usually need to meet FRA safety regulations. Most commuter rail services in the U.S. operate with peak-period-only service, but midday service is provided in some high ridership corridors. There are two primary types of commuter rail technology – locomotive-hauled trains (similar to Amtrak) and Diesel Multiple Units (DMU). DMUs are bi-directional passenger railcars with drive motors located beneath the passenger compartment.

**Comprehensive Plan** – The Growth Management Act requires that local jurisdictions (cities and counties) prepare a comprehensive plan to direct where growth will occur within the next 20 years based on population and employment growth forecasts. A comprehensive plan designates urban growth areas, land uses, and strategies to accommodate future growth and comply with statewide growth management goals.

**Design Concept** – A general design for a transportation facility. A design concept will typically consider engineering details such as mode, character of available ROW, and cross-section but are not thoroughly engineered concepts.

**Environmental Assessment (EA)** – An environmental analysis required by the National Environmental Policy Act (NEPA) for projects that are using federal funding. An EA represents a moderate level of analysis for projects where there is not expected to be any significant impacts.

**Environmental Impact Statement (EIS)** – An EIS provides more detailed environmental analysis than an EA and is required by NEPA for projects where significant environmental impacts are anticipated. A typical EIS analysis details the economic, social, and environmental effects of all reasonable alternatives of a proposed transportation project for which federal funding is being sought.

**Evaluation Criteria** – Criteria that are used to compare the alternatives in a transportation study. The evaluation criteria are derived from community values and the goals and objectives of the project.

**Federal Railroad Administration (FRA)** – The Federal Railroad Administration (FRA) enforces rail safety regulations and administers railroad funding assistance programs. The FRA is one of ten agencies within the U.S. Department of Transportation concerned with intermodal transportation.

**Federal Transit Administration (FTA)** – The Federal Transit Administration's (FTA) mission is to improve public transportation for America's communities. FTA administers a national program of capital and operating assistance for transit agencies, and the FTA Office of Planning administers a national program of planning assistance that provides funding, guidance and technical support to state and local transportation agencies for planning efforts.

**Goals and Objectives** – Goals and objectives define what agencies and the community wish to accomplish with a transportation project. The goals and objectives of a transportation project provide the basis for preparing evaluation criteria.

**Grade Separation** – Grade separation refers to providing a bridge, tunnel or other structure that allows a transportation facility to avoid contact with other transportation facilities. Grade separations can entail an elevated structure, such as a freeway overpass or interchange, or a tunnel, such as a subway.

**Growth Management Act** – The Growth Management Act (GMA) was adopted by the Washington State Legislature in 1990 to respond to unplanned and uncoordinated growth. The GMA requires state and local governments to manage Washington’s growth by designating urban growth areas, preparing comprehensive plans and implementing them through capital investments and development regulations.

**Guideway** – A generic term used for a transit running way. It can refer to a rail line or a busway.

**High-Capacity Transit (HCT)** – High-capacity transit refers to transit service that can carry significantly more people, at relatively high speeds, than a standard bus line. Capacity can be increased through increasing the number of vehicles, vehicle size (trains or articulated buses), vehicle frequency, or increasing travel speed (grade separating or reducing number of stations).

**High Occupancy Vehicle (HOV) Lanes** – Specially designated roadway lanes that are limited to use by high occupancy vehicles either during a peak period or for a full day. HOVs are usually defined as vehicles carrying at least two or three passengers.

**Light Rail Transit (LRT)** – Light rail is an electric railway powered by an overhead wire that typically provides intra-city transit service with stations spaced approximately ½ to 2 miles apart. It typically uses an exclusive right-of-way but often has frequent at-grade crossings and it can have some portions of shared traffic operation. Light rail vehicles are bi-directional, and can be coupled, resulting in flexibility in passenger capacity that conventional buses and BRT do not have.

**Locally Preferred Alternative (LPA)** – The outcome of an Alternatives Analysis, this is the alternative chosen by the decision makers to move forward into the NEPA process for more detailed analysis.

**Metropolitan Planning Organization (MPO)** – Federal transportation funding requires that metropolitan areas with greater than 50,000 in population establish a regional transportation planning body to ensure that transportation projects are planned in a cooperative manner. RTC functions as the MPO for the Washington portion of the Portland/Vancouver metropolitan area.

**Metropolitan Transportation Plan (MTP)** – A Metropolitan Transportation Plan is the long-range plan for the transportation needs of a metropolitan region. Generally, they use a 20-year forecast horizon to develop transportation projects to best meet the region’s future needs. MTPs are developed through a coordinated process with local jurisdictions, agencies, and the public. Clark County’s MTP is prepared by RTC and uses the year 2030 for analysis of future transportation needs.

**Minimum Operable Segment (MOS)** – Often the first phase of a transportation project is a shortened version of the full Locally Preferred Alternative. An MOS is the minimum length of a proposed transportation project that can be built as a stand-alone project while still providing transportation benefit.

**National Environmental Policy Act (NEPA)** – NEPA requires that any project that receives federal funding undergo an evaluation of potential environmental impacts. The evaluation typically covers a broad range of environmental issues including, wetlands, air quality, water quality, noise, traffic, etc. The level of analysis can range from a Documented Categorical Exclusion (DCE – least amount of detail) to an Environmental Assessment (EA – moderate level of detail) or to an Environmental Impact Statement (EIS – highest level of detail).

**New Starts Program** – A federal program available to provide capital funding for high capacity transit projects. It is a discretionary and competitive grant program and over the years FTA has established guidance for applications that include extensive requirements regarding technical analysis that is aimed at demonstrating the merits of the various projects.

**Operating Cost** – The annual cost to operate a transit system. This includes driver’s salaries, vehicle maintenance, and maintenance of the travel way and stations/stops.

**Opportunities and Constraints** – The advantages and disadvantages of a particular alternative in a transportation project. Assessing opportunities and constraints helps in the decision making process in an alternatives analysis.

**Order-of-Magnitude Capital Cost Estimate** – A rough estimate of capital cost usually based on a minimal level of design. Typically based on recently completed similar projects and used to compare alternatives in a planning-level analysis.

**Planning-Level Analysis** – A planning-level analysis uses a relatively general level of detail to analyze and compare among alternatives. It is typically concerned with defining the modes and locations for a transportation project that best serve the needs of the community. More detailed analysis occurs at a later stage, once the preferred alternative has been selected.

**Regional Transportation Council (RTC)** – The Southwest Washington Regional Transportation Council is the Metropolitan Planning Organization for the Clark County region. RTC is responsible for coordinated transportation planning for the region.

**Right-of-Way (ROW)** – Land available for construction and operation of transportation facilities (roadways or transit lines). The land is typically government-owned (local, state, or federal). A transportation facility may occupy all or a portion of the right-of-way.

**Exclusive ROW** – A right-of-way that is used only by transit vehicles; it is not shared with general traffic. It may or may not be grade separated.

**Shared ROW** – A ROW that a transit line shares with other traffic.

**Small Starts** – A subset of the FTA New Starts program for projects with a total capital cost of less than \$250 million and no more than \$75 million is requested in federal New Starts funding.

**Streetcar** – Modern streetcars are similar to light rail, but smaller and generally operate in shared traffic lanes. They are designed for lower speed service with more frequent stations than a light rail line. They are typically used as circulators in high-density urban centers.

**System Ridership** – This is the count of the number of trips (from origin to destination) that would use the overall transit system in a region. Each origin to destination trip is counted just once regardless of how many transit vehicles would be required to complete the trip.

**Transit-Oriented Development (TOD)** – A mixed-use residential or commercial area designed to maximize access to public transportation. Designed around a transit station, a TOD incorporates features, such as higher-density, good pedestrian connections and a mix of uses, to encourage transit ridership.

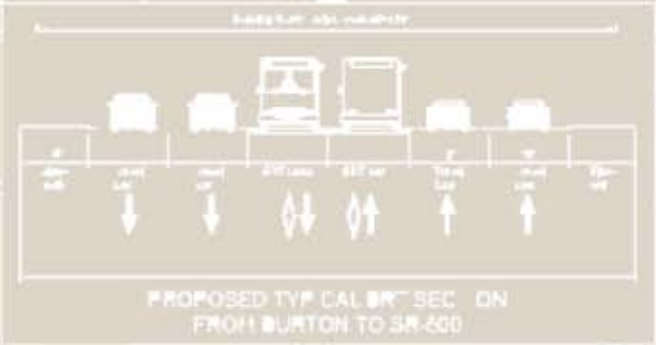
**Urban Growth Area (UGA)** – Required by the Growth Management Act, local and county jurisdictions designate boundaries around cities where urban growth will be permitted within a 20-year planning horizon. These areas are designated based on population and employment projections, availability and suitability of land for development, and environmental and traffic impacts.

**Very Small Starts** – A subset of the FTA New Starts program for projects with total capital cost of less than \$50 million and less than \$3 million per mile (excluding vehicles).









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