Washington State
Department of Transportation

Strategic Planning and Programming Division
Urban Planning Office

SOUTHEAST KING COUNTY COMMUTER RAIL FEASIBILITY STUDY

Final Report

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Washington State Department of Transportation
Strategic Planning and Programming Division
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SOUTHEAST KING COUNTY COMMUTER RAIL FEASIBILITY STUDY

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In Association With
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TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

Introduction..... 1
Study Objectives and Approach..... 2
Study Area..... 3
Ridership Forecasts and Modeling 4
DMU Commuter Service Plan..... 6
Development of Project Costs 8
Enhanced Bus Service Plan 18
Primary Findings.....19

CHAPTER 1: INTRODUCTION.....23

1.1 Study Objective.....24
1.2 Study Approach 24
1.3 Commuter Rail, Service Description 25

CHAPTER 2: EXISTING CONDITIONS 29

2.1 Study Area Description 29
2.2 Population Characteristics Affecting Traffic and Congestion 29
2.3 Land Use Trends 30
2.4 Transportation Network.....31
2.5 Freight Railroad Network and Train Operations 35

CHAPTER 3: SCENARIO DEFINITIONS.....41

3.1 Baseline Scenario.....41
3.2 Commuter Rail (DMU) Scenario.....44
3.3 Enhanced Bus Scenario 44
3.4 Service Options 47
3.5 Commuter Rail Station Location Options 48
3.6 Connecting Transit Service Options.....50

CHAPTER 4: DMU RIDERSHIP FORECASTING, MODEL METHODOLOGY 51

4.1 Travel Demand Model Selection 51

4.2 Travel Demand Model Updates....51
4.3 2006 Model Base Year Comparison....57
4.4 2030 Model Forecasts....57

CHAPTER 5: RAIL OPERATIONS ANALYSIS....65

5.1 Introduction....65
5.2 Development of Conceptual Train Schedules....70
5.3 Train-Control Systems....79
5.4 Track Infrastructure Development....80
5.5 Freight Service Coordination and Capacity....87
5.6 Summary of Service Plan Analysis....90
5.7 Potential Service Plans....97
5.8 Infrastructure Requirement Summary....101
5.9 Benefit-Cost Assessment....103

CHAPTER 6: DMU SERVICE BUSINESS AND FINANCIAL PLAN....105

6.1 Railroad Access....105
6.2 Federal Regulatory Issues....113
6.3 Provision of Passenger Rail Service....114
6.4 Capital Costs....115
6.5 Operating Costs....121
6.6 Funding Sources Studied Elsewhere....125
6.7 Governance and Funding Examples....152
6.8 Potential Governance Structures and Funding Options Available in the Southern King County Region....162

CHAPTER 7: INITIAL ENVIRONMENTAL SCREENING....171

7.1 Methodology....171
7.2 Existing Conditions....172
7.3 Summary of Initial Findings....176

CHAPTER 8: STUDY FINDINGS....179

8.1 Summary of Findings....179
8.2 Next Steps....182

LIST OF EXHIBITS

Exhibit ES-1 Study Area 4
Exhibit ES-2 2030 DMU Ridership Forecast – 30-Minute Headways 5
Exhibit ES-3 Assumed Station Locations 6
Exhibit ES-4 Example of Connections at Auburn – Full Service (2 trainsets) 8
Exhibit ES-5 SE King County Commuter Rail Capital Cost Estimates 10
Exhibit ES-6 SE King County Commuter Fixed Operating and Maintenance Costs 11
Exhibit ES-7 SE King County Commuter Variable Operating and Maintenance Costs 12
Exhibit ES-8 Hypothetical Cost-Reduction from Cost Sharing (50%) of Operating and Maintenance Costs 13
Exhibit ES-9 Funding Options 17
Exhibit ES-10 2030 SR 18 Express Ridership Forecast – 30-Minute Headways 19

Exhibit 1-1 Characteristics of Commuter Rail versus Bus Mass Transit 25
Exhibit 2-1 Population Growth 29
Exhibit 2-2 Study Area 30
Exhibit 2-3 Major Highways and Arterials 31
Exhibit 2-4 2010 King County Metro Bus Routes 32
Exhibit 2-5 Puget Sound Regional Transit District Map 34
Exhibit 2-6 Washington State Rail Lines 36
Exhibit 2-7 Alternative Rail Routes between Spokane and Seattle 37
Exhibit 3-1 Sounder Scheduled Weekday Service at Auburn Station 41
Exhibit 3-2 Existing Transit Service in the Study Area 43
Exhibit 3-3 Proposed Station Locations 49
Exhibit 4-1 Model Study Area 52
Exhibit 4-2 PSRC Zone System 54
Exhibit 4-3 Refined Zone System 54
Exhibit 4-4 4-Step Travel Demand Model Process 55
Exhibit 4-5 Regional Changes in Land Use Assumptions 56
Exhibit 4-6 Study Area Changes in Land Use Assumptions 56
Exhibit 4-7 Base Year Transit Ridership Comparison 57
Exhibit 4-8 2030 Highway Network Assumptions 58
Exhibit 4-9 DMU Corridor 59
Exhibit 4-10 2030 DMU Ridership Forecast – 15-Minute Headways 60
Exhibit 4-11 2030 DMU Ridership Forecast – 30-Minute Headways 61
Exhibit 4-12 SR 18 Express 62
Exhibit 4-13 2030 SR 18 Express Ridership Forecast – 15-Minute Headways 63
Exhibit 4-14 2030 SR 18 Express Ridership Forecast – 30-Minute Headways 63

Exhibit 5-1 Drivers and Driven of Operation Plan Development 72
Exhibit 5-2 Driver and Driven of Operations Plan Development 73
Exhibit 5-3 Curve Speed Limits used as Data in Train Performance Calculator (TPC) 76
Exhibit 5-4 Schedule Running Time for a DMU Set 78
Exhibit 5-5 Sounder Schedule 82
Exhibit 5-6 Auburn Transit Center: Morning Bus/DMU Commute Connections.....83
Exhibit 5-7 Daily Freight Traffic 89
Exhibit 5-8 Scenario 1 91
Exhibit 5-9 Scenario 2 92
Exhibit 5-10 Scenario 3 93
Exhibit 5-11 Scenario 4 94
Exhibit 5-12 Scenario 5 95
Exhibit 5-13 Scenario 6 96
Exhibit 5-14 Scenario 7 97
Exhibit 6-1 SE King County Commuter Rail Capital Costs (in 2010 dollars)) 121
Exhibit 6-2 Summary of Funding Options 141
Exhibit 6-3. Transit Systems Surveyed and Local Funding Sources.....152
Exhibit 6-4 Local Jurisdiction Tax Revenue Summary.....169
Exhibit 7-1 Summary of Potential Environmental Constraints.....177

LIST OF APPENDICES

Appendix A – BNSF Guidance Principles
Appendix B – FRA Passenger Rail Safety Manual Table of Contents
Appendix C – Stringline Diagrams
Appendix D – Environmental Overview Data
Appendix E – Track Schematics and Exhibits
Appendix F – Detailed Cost Estimates
Appendix G – SE King County Connector Project

ACRONYMS

ADA	Americans with Disabilities Act
ADT	average daily traffic
BN	Burlington Northern Railroad
BNSF	BNSF Railway Company
CB&Q	Chicago, Burlington & Quincy Railroad Co.
CCTV	closed circuit television
CFR	Code of Federal Regulations
CTC	Centralized Traffic Control
CWR	continuous welded-rail
DAHP	Washington State Department of Archaeology and Historic Preservation
DMU	Diesel-Multiple Unit
EMU	Electric Multiple-Unit vehicle
ETMS	Electronic Train Management System
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GN	Great Northern Railway Co.
HDR	HDR Engineering, Inc.
HOV	high-occupancy vehicle
I	Interstate
ICC	Interstate Commerce Commission
LOS	Level of Service
MP	Milepost
MPO	Metropolitan Planning Organization
NP	Northern Pacific Railway Co.
NRHP	National Register of Historic Places
PHS	Priority Habitat and Species
PRESS	Passenger Rail Equipment Safety Standards
PSRC	Puget Sound Regional Council

PTC	Positive Train Control
RCW	Revised Code of Washington
RFP	Request for Proposal
RTC	Rail Traffic Controller
SP&S	Portland and Seattle Railway Co.
SR	State Route
ST	Sound Transit
ST2	Sound Transit Phase II
STB	Surface Transportation Board
TPC	Train Performance Calculator
TSM	Transit Safety Management
TWC	Track Warrant Control
UGA	urban growth area
WES	Westside Commuter Express
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WTC	Washington State Transportation Commission

Executive Summary

Introduction

The 2009–2011 transportation budget passed by the Washington State Legislature included a proviso requesting a feasibility study of a Diesel-Multiple Unit (DMU) commuter rail service from Maple Valley/Black Diamond to Auburn via Covington on the BNSF Railway Company's (BNSF) Stampede Pass line. In the 2010 legislative session, the language was revised in ESSB 6381, Section 220 (2), and states the following:

$400,000 of the ((motor vehicle account)) multimodal transportation account--state appropriation is provided solely for a diesel multiple unit feasibility and initial planning study. The study must evaluate potential service on the Stampede Pass line from Maple Valley to Auburn via Covington. The study must evaluate the potential demand for service, the business model and capital needs for launching and running the line, and the need for improvements in switching, signaling, and tracking. The study must also consider the interconnectivity benefits of, and potential for, future Amtrak Cascades stops in south King county and north Pierce county. As part of its consideration, the department shall conduct a thorough market analysis of the potential for adding or changing stops on the Amtrak Cascades route. The department shall amend the scope, schedule, and budget of the current study process to accommodate the market analysis. A report on the study must be submitted to the legislature by September 30, 2010.

Portland Westside Express Single DMU Car

The underlined text is the amended proviso language that authorizes the Washington State Department of Transportation (WSDOT) to also perform a market analysis of potential Amtrak *Cascades* stops in south King County or north Pierce county, but provides no additional funding and only three months additional time. The original study used all available resources, and a meaningful market analysis would likely require at least six months of working with AMTRAK, BNSF and affected stakeholders. Therefore the additional *Cascades* market analysis was not performed.
However, WSDOT has applied for a Federal Railroad Administration (FRA) grant to fund the additional tasks requested by the legislature. The city of Auburn has agreed to provide the required local funds match. The FRA should make a determination of which applications will actuially receive grants by early fall of 2010.

WSDOT's Urban Planning Office is serving as the lead agency for the "Southeast King County Commuter Rail Feasibility Study" in partnership with the cities of Auburn, Black Diamond, Covington, and Maple Valley. The feasibility study included the participation of the BNSF Railway, King County, and Sound Transit.

HDR Engineering, Inc. (HDR), in association with Transit Safety Management (TSM), Hendricks – Bennett PLLC, and Lonnie Blaydes Consulting, was selected by WSDOT to provide rail planning and technical design support for the feasibility study. The State managed the feasibility study and performed other items of work with specialized-expertise staff; this work included performing travel-demand forecast modeling, collecting environmental data, and providing oversight of the rail planning/technical work to be delivered by the Consultant team. WSDOT's Rail Office also assisted with this work.

Study Objectives and Approach

The objective of this study is to assess the feasibility of commuter rail service between Maple Valley / Black Diamond and Auburn, via Covington on the BNSF Railway Stampede Pass line. This assessment analyzes service using self propelled diesel-multiple unit (DMU) rail cars.

This analysis includes an estimation of the expected capital and operating costs, projections of ridership and an analysis of institutional issues.

Portland Westside Express Single DMU Car

In order to achieve this objective, the study team began by identifying key issues and potential solutions. This was done in cooperation with local and regional government entities. Meetings were held jointly with representatives of each community and interested organizations including the cities of Auburn, Covington, and Maple Valley; WSDOT; Puget Sound Regional Council[1] ; King County Metro[2] ; and BNSF. These meetings were held to explain the study and to seek input and guidance from each participant at clearly defined stages of the study. This "Final Report" is a summary of five technical memoranda prepared for this study:

- Scenarios Development

[1] The designated Metropolitan Planning Organization or MPO
[2] The major mass transit provider in the region

- Travel Demand Forecasts (by WSDOT)
- Rail Operations Analysis
- Rail Business Model and Institutional Issues
- Environmental Screening

As work progressed, each technical memorandum was shared with the project partners and other entities in order to seek their input and address issues. These technical memoranda ultimately formed the basis of this report, which is to be presented to the Washington State Legislature.

Study Area

The project study area, as shown in Exhibit ES-1, is defined as the BNSF Railway Company's Stampede Pass rail corridor in southeast King County from Auburn east to the unincorporated community of Ravensdale. The rail corridor is approximately 13 miles long and encompasses the incorporated areas of the cities of Covington, Maple Valley, and Black Diamond, as well the adjacent unincorporated areas of King County.

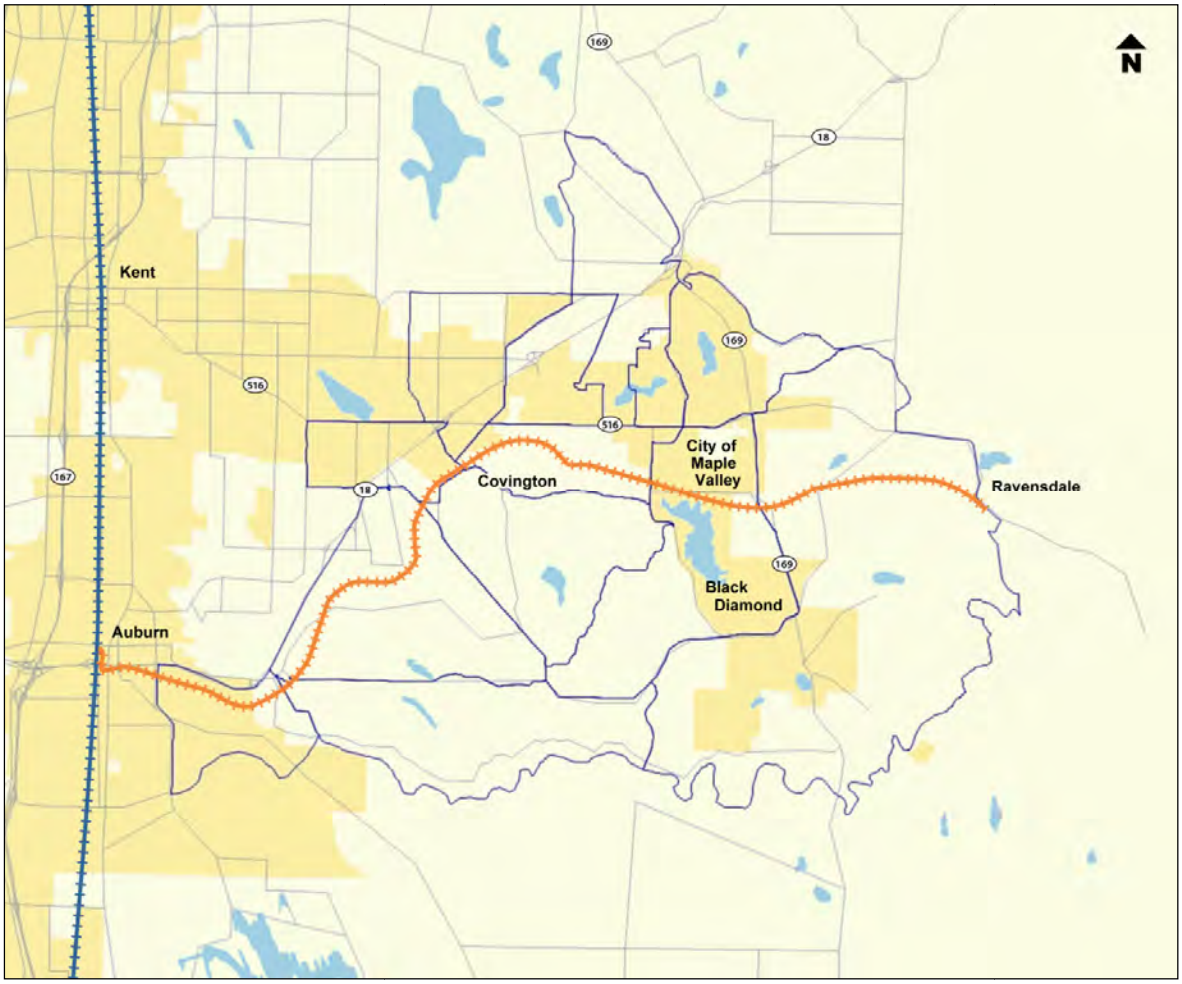


Exhibit ES-1
Study Area

Ridership Forecasts and Modeling

The Puget Sound Regional Council's (PSRC's) travel demand model was chosen to forecast the potential DMU ridership because it contains a mode choice component and the ability to forecast ridership with land uses that differ from the base year. The PSRC Transportation 2040 Plan model was further refined to match the recent traffic counts, future local land use, and disaggregated model analysis zones within the study area. The forecasting effort established a 2006 base year and a forecast year of 2030.

2030 DMU Ridership Forecasts

The DMU commuter rail line was initially assumed to run from the Ravensdale station area east of SR 169 to the Sounder commuter rail station in Auburn. Four stations were initially considered for the proposed DMU rail corridor including a station at Ravensdale. The Ravensdale station was later eliminated from the study due to low ridership and rail operations issues that created longer travel times on the corridor. The elimination of the Ravensdale station site did not result in a significant reduction in ridership. Each DMU station was assumed to have sufficient park-and-ride capacity to meet unconstrained demand.

Exhibit ES-2 shows daily ridership projections for 30-minute headways (frequency). The daily ridership forecast for this scenario is approximately 1,200 daily riders. As a point of reference, fourth quarter 2009 ridership on Sounder from Everett to Downtown Seattle is approximately 1200 riders per day, and 7,500 riders per day between Tacoma and Seattle.

Exhibit ES-2
2030 DMU Ridership Forecast – 30-Minute Headways

Transit Route	2030 Model 30-minute Peak Headway for DMU				
	Peak Headway	Peak Ridership (AM + PM) (1)	Off Peak Headway	Off Peak Ridership (Rest of Day)	2030 Projected Daily Ridership
Metro 149	~ 45	220	> 60	310	530
Metro 168	60	630	60	590	1,220
DMU	30	820	30	320	1,140
Total	**-**	**1,670**	**-**	**1,220**	**2,890**

1. AM peak ridership modeled, PM peak assumed to match AM peak. Volumes represent combined AM and PM peaks.

At 15-minute headways, the ridership potential for the DMU corridor was approximately twice that of 30-minute headways. Operational analysis has determined that 15-minute headways would not be practical on the route and would lead to severe impacts on freight rail movements on the corridor. It was also determined that 33-minute headways versus 30-minute headways would optimize equipment utilization and minimize capital cost, resulting in a more reliable and economical service from a rail operations point of view.

DMU Commuter Service Plan

The existing freight rail operations and potential commuter rail service plans have been analyzed as part of this study. The commuter rail operations plan has assumed a station at Auburn just south of the existing Sounder station; Covington just east of Covington Way; and Maple Valley just west of SR 169. Exhibit ES-3 shows the assumed station locations that were identified in collaboration with the local jurisdictions. However, no formal station planning, design, or permitting has been undertaken for this study. The station facilities were assumed to include level boarding, 300-foot long platforms with canopies, ticket vending machines, closed circuit television (CCTV), and information signing on the platform. The station sites at Covington and Maple Valley were also assumed to include 200 to 250 parking stalls, lighting, minor landscaping, and bus transfer parking. No other station amenities, such as staffed ticketing, station buildings, or public restrooms, were assumed. Station costs were based on the recently constructed Amtrak Stanwood station. The Maple Valley station would include additional retaining wall construction needed to access the site.

Exhibit ES-3
Assumed Station Locations

Rail commuter service would be provided by self-propelled, diesel-powered passenger cars, known as DMUs. They are operated by a two-person crew consisting of engineer and conductor. At this early phase of project development it is assumed that the DMUs would meet all current Federal Railroad Administration (FRA) safety standards and would be considered "FRA-compliant vehicles." Each trainset was assumed to consist of three cars seating 225 to 250 passengers with a top operating speed of 80 mph. The three-car configuration was selected for this early feasibility study in order to comply with BNSF's operating rules, which require all trains to have a minimum of 12 axles to properly activate the railroad's signal systems.

The draft operating plan assumes that a service agreement would be negotiated with BNSF to share right-of-way, track, and train-control systems infrastructure with BNSF Railway, and that commuter rail operation would be coordinated with BNSF freight trains in the same corridor. Running times on the corridor of 20 minutes and an average speed of 39 mph were developed using a train performance calculator and scheduling software. Various service levels were analyzed including 15-, 20-, 30-, and 60-minute headways. Two service plans were selected for development of a rail business plan, which includes both capital improvements and operating costs. These plans are as follows:

1. The **Startup Service Plan:** This scenario would operate one 3-car trainset once per hour (60 minutes).
2. The **Full Service Plan** This scenario would operate two 3-car trainsets on a once every 33 minutes schedule. The selection of a 33-minute headway versus a 30-minute headway significantly reduces the infrastructure and operating cost. Potential connections with current Sounder schedules at Auburn are shown in Exhibit ES-4. The trip time from Maple Valley to Seattle's King Street Station can be as little as 60 minutes.

Exhibit ES-4
Example of Connections at Auburn – Full Service (2 trainsets)

Connections at Auburn to Seattle, Tacoma, and Bellevue							
DMU Service Leave Maple Valley	**Arrive Auburn**	**Sounder North Service Leave Auburn**	**Arrive Seattle**	**Sounder South Service Leave Auburn**	**Arrive Tacoma**	**ST Express Bus Service Leave Auburn**	**Arrive Bellevue**
4:34 AM	**4:54 AM**	5:20 AM	5:54 AM			*5:00 AM*	*5:52 AM*
5:07 AM	**5:27 AM**	6:01 AM	6:34 AM	*5:57 AM*	*6:38 AM*		
5:40 AM	**6:00 AM**	6:26 AM	6:59 AM			*6:27 AM*	*7:22 AM*
6:13 AM	**6:33 AM**	6:51 AM	7:24 AM	6:36 AM	7:08 AM	*6:53 AM*	*7:52 AM*
6:46 AM	**7:06 AM**	7:16 AM	7:49 AM	7:16 AM	7:48 AM	*7:23 AM*	*8:22 AM*
7:19 AM	**7:39 AM**	7:45 AM	8:19 AM	*7:57 AM*	*8:38 AM*	*7:53 AM*	*8:52 AM*
7:52 AM	**8:12 AM**	8:25 AM	8:59 AM			*8:23 AM*	*9:22 AM*
8:25 AM	**8:45 AM**					*9:02 AM*	*10:02 AM*
3:10 PM	**3:30 PM**			3:41 PM	4:14 PM	*4:00 PM*	*4:33 PM*
3:43 PM	**4:03 PM**	*4:11 PM*	*5:00 PM*	4:16 PM	4:49 PM	*4:33 PM*	*5:03 PM*
4:16 PM	**4:36 PM**	4:50 PM	5:23 PM	4:46 PM	5:19 PM	*5:00 PM*	*6:03 PM*
4:49 PM	**5:09 PM**	5:25 PM	5:58 PM			*5:33 PM*	*6:33 PM*
5:22 PM	**5:42 PM**	*6:06 PM*	*6:55 PM*	5:11 PM	5:44 PM	*6:03 PM*	*7:03 PM*
5:55 PM	**6:15 PM**	*6:33 PM*	*7:22 PM*	5:38 PM	6:11 PM	*6:35 PM*	*7:31 PM*
6:28 PM	**6:48 PM**	*7:08 PM*	*7:57 PM*	6:41 PM	7:14 PM	*7:07 PM*	*7:59 PM*
7:01 PM	**7:21 PM**	*7:33 PM*	*8:22 PM*			*7:37 PM*	*8:29 PM*
7:34 PM	**7:54 PM**	*8:03 PM*	*8:52 PM*			*8:36 PM*	*9:28 PM*

Times in italics are Sound Transit express buses.

Development of Project Costs

Capital Improvements

The following is a brief summary of the capital improvement projects identified in the operational analysis. These capital improvements are necessary to support commuter service levels assumed in the analysis and to allow for two freight trains per hour to operate intermixed with commuter trains. This should meet BNSF performance requirements for freight trains and ensure reliable DMU commuter rail passenger service.

Improvement of Main Track Structure to FRA Class 4

Upgrade existing main track from FRA Class 3 to Class 4 and replace existing jointed rail with 141 -lb. continuous welded rail (CWR). The installation of 141-lb. CWR would allow for faster operating speeds and would ensure a smoother ride for DMU commuter trains.

Railway Signal Improvements, Auburn to Kanaskat

Extend Centralized Traffic Control (CTC) from Auburn (MP 102.4) to West Kanaskat (MP 83.9) and install Electronic Train Management System (ETMS) to provide positive train control (PTC). The installation of PTC is required by federal law for all new passenger rail services that operate on existing freight rail lines.

Auburn Platform and Passing Track Improvements

Construct new station track, platform, and support facilities. Also construct a new 10,800-foot siding, replacing the East Auburn siding. This new, longer siding would provide significant operational benefits for eastbound and westbound BNSF freight trains by providing a meet-point adjacent to, but not on, the north–south Seattle-Tacoma BNSF main line. This siding project would also include grade separation of existing grade crossings at "M" Street (project currently underway by the City of Auburn) and at "R" Street/Auburn-Black Diamond Road. Additional track bridges at A Street, Auburn Way S and F Street will be constructed to accommodate the proposed Auburn Siding.

Covington Station Track and Platform

Locate a 300-foot-long Covington platform on the south side of the Stampede Pass main line just east of the Covington-Sawyer Road crossing. The capital work at this location would consist of constructing an approximately 1,000-foot-long station track east of Covington-Sawyer.

Covington Passing Track Improvements

Begin the new Covington Siding at MP 94.8 and then extend the existing east end of the siding to approximately MP 93.0. This would provide over 8,000 feet of siding to mitigate effects on freight train operation.

Maple Valley Station Track and Platform

Construct a 300-foot-long Maple Valley platform to be served by a stub-ended DMU-only siding track 2,000 feet long.

Ravensdale Operations and Maintenance Facility

A layover, storage, and light maintenance facility is planned at Ravensdale to be located off the Ravensdale siding. A small yard of two tracks, each track 600 feet in clear length are to be built to serve the layover and storage areas.

Capital Costs

The estimated project cost including rolling stock to fully implement this project is in the range of $169.5 to $190.4 million. Exhibit ES-5 shows the capital cost estimates. All costs are in 2010 dollars and include engineering, administration, construction management, and a 30% contingency. These planning-level cost estimates are based on the limited information presently available and are subject to refinement.

Exhibit ES-5
SE King County Commuter Rail Capital Cost Estimates

(Year 2010 Dollars)

Project	Service Plan		Cost Range ($Millions)**	
	Startup	Full	Low	High
Rolling Stock – 2 Sets	√	√	$20.0	$24.0
Rolling Stock – 1 Additional Set		√	$10.0	$12.0
Main Track Rehabilitation	√	√	$22.1	$26.1
Railway Signal Improvements	√	√	$8.6	$11.1
Auburn Siding/Station Tracks	√	√	$74.7	$78.4
Covington Station Track	√	√	$9.1	$10.6
Covington Siding		√	$6.1	$7.1
Maple Valley Station Track	√	√	$11.4	$11.5
Operations and Maintenance Facility	√	√	$7.5	$9.6
Total			**$169.5**	**$190.4**

** Includes 30% contingency

Operating and Maintenance Costs

Operating and maintenance costs were developed for the Southeast King County commuter rail service using both fixed and variable costs typical of small commuters rail systems. Typically fixed costs for small systems are at least 50% of the total operations and maintenance costs of larger systems such as Sound Transit's Sounder commuter service. Fixed costs are summarized in Exhibit ES-6 below and are based on either the service being provided by a third party contractor or the host railroad. All costs are in 2010 dollars and include an appropriate level of contingency for each cost category.

Exhibit ES-6
SE King County Commuter Fixed Operating and Maintenance Costs

(Year 2010 Dollars)

Agency Administration	$500,000
Contractor Management Fee	$250,000
Station Maintenance	$100,000
Insurance ($10,000 per $1m)	$2,000,000
Track Maintenance (allocated @ $10,000/mile)	$150,000
Dispatching (estimate of allocated cost)	$75,000
Maintenance Facility Maintenance	$25,000
Vehicle Maintenance (1/2 of total vehicle maintenance)	$175,000
Capital Reserve	$100.000
Total (Per Year) Fixed Costs Estimate	**$3,375,000**

Insurance, agency administration, contractor management fees make up $2.75 million or 81% of the total fixed costs.

The $200 million insurance policy is the most significant portion of these costs. The premium for this coverage, in all likelihood will be a "minimum" premium, i.e., based on the level of insurance coverage, not dependent on level of service. As with other fixed costs, the premium will not vary significantly whether the Authority operates 10 or 50 trains a day.

Agency administrative costs are related to the basic oversight of the operation by the rail authority, including contract management, supervision, security, customer information, etc.).

Management fees relate to the costs incurred by the contractor regardless of the level of service offered. For example, the Authority will need to pay for the contractor's general manager, transportation supervisor, and chief mechanical officer whether the Authority operates 10 trains or 50 trains.

Some of the fixed costs identified above would be negotiated with BNSF under the likely assumption they will maintain and dispatch the corridor as well as staff the trains. Ultimately these costs may not all be expressed as fixed costs for this service.

Variable cost elements associated with the service would be train operations (crew costs), fuel, and some vehicle maintenance. Variable costs were estimated for both the start-up and full services scenarios and are shown in Exhibit ES-7.

Exhibit ES-7
SE King County Commuter Variable Operating and Maintenance Costs

(Year 2010 Dollars)

	Start-up Service		Full Service	
Variable Costs	Assumptions	Costs	Assumptions	Costs
Train Operations	Two 2-person crews	$400,000	Four 2-person crews	$800,000
Fuel ($4.00/gal, 0.5 miles per train mile)	14 trips/day, 255 annual service days	$215,000	22 trips/day, 255 annual service days	$350,000
Vehicle Maintenance	Scheduled	$90,000	Scheduled	$175,000
Total Variable Costs		**$705,000**		**$1,325,000**

The total estimated operating and maintenance costs range from $4.08 million to $4.7 million for the full service scenario.

These estimates do not include either the capital or operating costs for bus or other circulation systems at the rail stations.

Farebox Revenues

For farebox revenues, a $5.00 average round-trip fare was assumed for the ridership estimate. This is comparable with early 2010 existing base fares around the country (Sounder's one-way base fare is $2.55). Based on 255 revenue days per year, the annual farebox revenue would be $765,000 (1,200 x $2.50 x 255) expressed in 2010 dollars or approximately 16% of annual operation cost for the full service scenario. An annual subsidy of just under $4 million in 2010 dollars would be required and there could still be a potential deficit.

Two factors are clear from the information above. First, the variable costs are a relatively small portion (a little more than 25% for the full service) of the overall costs. Second, there is not a large difference between the costs for the starter service and full service levels. Because the incremental operating and maintenance costs of adding service are low, increasing service levels (until additional capital infrastructure is necessary) may be the most cost-effective service to pursue.

These cost estimates could be reduced by a significant amount if the Southeast King County service could be contracted through the existing Sounder commuter rail service. If it is, many of the fixed costs could be spread across the larger Sounder system. For example, if this service is contracted through the existing Sounder service, the increase in the existing insurance premium for the $200 million policy will likely be minimal, and the allocation of the premium to this service will be only a fraction of a standalone policy premium. However, the DMU service is outside of the Sound Transit district, the DMU service would be outside of the ST2 plan and the modal technology is different, ST vs. DMU reducing the potential economies of scale .

The following exhibit (ES-8) demonstrates the effect a sharing of insurance ($2,000,000), agency administration ($500,000), and Contractor Management Fee ($250,000) costs. Assuming a 50% savings in these costs, there would be a net cost reduction of $1,375,000 resulting in a farebox recovery factor of 30%.

Exhibit ES-8
Hypothetical cost-reduction from Cost Sharing (50%) of Operating and Maintenance Costs

(Year 2010 Dollars)

System	Total Costs	Revenue (Remains Constant)	Total Subsidy
Stand Alone System	$4,700,000	$765,000	$3,950,000
Shared System	$3,325,000	$765,000	$2,560,000

An increase of $1 in the average round-trip fare would generate an additional $153,000 in revenues. When combined with cost sharing, farebox recovery factor increases to 36%.

All the assumptions on shared service and costs with Sounder are clearly dependent on agreement and negotiations with Sound Transit. All fare policies would have to be determined by the governing body overseeing the service.

Federal Funding Options

There are several Federal Transit Administration (FTA) and Federal Railroad Administration (FRA) programs that could be used to fund portions of commuter rail operating and capital costs. The two most suitable programs are the FTA discretionary Section 5309 New Starts program and the FTA Small Starts program.

The FTA New Starts program typically fund about 50% of project costs and the remaining 50% comes from local sources. A significant local commitment to the project is necessary to receive New Starts funding. There are multiple steps to be taken in obtaining New Start funding and

New Start projects are required to go through a lengthy evaluation process. New Starts candidate projects are evaluated on criteria which include: Mobility improvements, environmental benefits, cost-effectiveness, operating efficiencies, transit supportive land use and future patterns plus other optional factors based upon the nature of the project.

The Small Starts program, a component of the New Starts, is intended to fund projects with a capital cost under $250 million and with a federal share of under $75 million in year of expenditure dollars. This program provides a method of funding projects using streamlined criteria and a streamlined approval process. A Small Starts project must meet the definition of a fixed guideway for at least 50 percent of the project length, be a new fixed guideway project or be a new corridor-based bus project with all of these minimum criteria to satisfy. The evaluation criteria are basically the same as for the New Starts program.

Both the New Starts Program and the Small Starts programs are highly competitive. The Southeast King County project would be competing against projects with significantly higher ridership levels and lower costs per passenger mile. Without significant reductions in costs or increases in ridership or both, it is doubtful this project could compete favorably for the limited grant funds available.

Potential Governance Structures and Funding Options Available in South East King County

A review of the existing agencies in King County that provide public transportation services was conducted as part of this study. These agencies included King County Metro, Sound Transit, WSDOT, and Amtrak. However each of these agencies has limited ability to deliver commuter rail services in SE King County. For example, WSDOT and Amtrak policy is to provide intercity passenger services such as the Amtrak *Cascades* service as opposed to short-haul commuter services. Sound Transit is a special purpose district specifically created to provide high-capacity transit services; however, for Sound Transit to adopt this project, it would need to annex significant portions of SE King County outside its current boundary. While King County Metro has the legal ability to provide this service, commuter rail service in any form is not part of its adopted service plan or budget.

This review suggests that while DMU operation by existing agencies may be theoretically possible, there is little reason to expect those agencies to pursue the idea. It is also apparent that the governance structure of the existing agencies along with their funding limitations would not be a good fit for the circumstances in the corridor.

In addition to the four existing agencies discussed above, a thorough review of the RCW identifies at least a dozen other agencies that could provide transportation services. Of these,

four types of public entities were identified that could plausibly manage the operation of DMU commuter rail service under current law.

These entities and their relevant characteristics are as follows:

Public Transportation Benefit Area Authority (RCW 36.57A). The PTBA is the most commonly used type of governance structure for public transportation in Washington State. Examples include Pierce Transit, Kitsap Transit and Community Transit. PTBA's have considerable flexibility in setting boundaries, fares, service policies, etc.

1. Created by a transportation improvement conference (RCW 36.57A.020.
2. Governing Board-Nine member Board, consisting of elected officials from the cities and counties within the boundaries of the Area Authority
3. Taxing Possibilities and Limitations:
    a. B&O and Household Tax (35.95.045)
    b. Cannot levy sales and use tax in this instance per RCW 81.14.045
    c. No authority to levy property tax
    d. No authority to levy motor vehicle tax

Cities and Towns though an agreement under the Interlocal Cooperation Act (RCW 39.34). A number of cities including Everett, Yakima, and Pullman operate public transportation services. The Interlocal Cooperation Act gives cities the ability to contract with one another or other agencies for public transportation services including those that cross jurisdictional boundaries.

4. Created by an agreement between the cities and possibly King County
5. Governing Board – Determined by the agreement between the parties to the Interlocal Agreement
6. Taxing Possibilities and Limitations:
    a. May be able to levy a B&O and household tax per RCW 35.95.040
    b. Property tax within the city's current authority
    c. No sales and use tax within King County pursuant to RCW 81.14.045
    d. No authority for a motor vehicle excise tax

County Rail District (RCW Chapter 36.60). It is not entirely clear whether this statute would allow for passenger rail service. RCW 36.60.010 specifies that the boundaries are drawn to include property from which agricultural and other products are shipped. However, in RCW 36.60.010 the statute does refer to passenger service. This statute may need to be amended to clarify that passenger rail service may be allowed.

7. Created by the county council (RCW 36.60.010)
8. Governing Board – The county council (RCW 36.60.010)
9. Taxing Possibilities and Limitations:
    a. Can levy for one year excess property tax, with a limitation of 1% (RCW 36.60.040)
    b. Levy property tax, with a l% limitation, to retire bonds (RCW 36.60.040)
    c. B&O and household tax probably possible
    d. Not authorized to levy retail sales and use tax
    e. Not authorized to levy a motor vehicle excise tax

Transportation Benefit District (RCW Chapter 36.73) provides for the creation of a transportation benefit district for the operation of public transit. TBD's were originally enabled to facilitate a cooperative approach to funding transportation capital projects by local jurisdictions.

10. Created agreement through the Interlocal Cooperation Act (RCW 36.73.020 (2)).
11. Governing Board – Determined by the agreement between the parties to the Interlocal Agreement.
12. Taxing Possibilities and Limitation:
    a. Levy property tax, with a l% limitation, to retire bonds (RCW 36.73.060)
    b. Sales and use tax per RCW 36.73.040(3)(a)
    c. Motor Vehicle Tax per RCW 36.63.040(3)(b)
    d. B&O and household tax per RCW 35.95.045

Authority for each of these entities was written into the RCW to address specific transportation needs or problems, but none of the entities were put in place to address the particular conditions

found in SE King County. Therefore it should come as no surprise that even though it appears feasible to implement and operate DMU commuter rail service under any of these statutes none of them are a perfect fit for the circumstances in the corridor.

The biggest challenge a new entity must overcome is generation of adequate tax revenue to fund the service. It should be noted that of the four plausible types of entities identified, the first three have very limited taxing ability (see Exhibit ES-9) and may have difficulty raising sufficient revenue from the allowed sources. In contrast, Transportation Benefit Districts are much more generously endowed with taxing authority (but are somewhat less well suited to providing ongoing governance for transit operations). Amendments to the RCW that allow greater flexibility in levying sales and use tax, property tax, or MVET would facilitate development of a commuter rail business plan that is a better fit for SE King County.

Exhibit ES-9
Funding Options

Funding Sources	PTBA	Interlocal Cooperation Act	Country Rail District	Transportation Benefit District
Retail Sales and Use Tax (RCW 82.14.045)	No	No	No	Yes
Business and Occupation Tax (RCW 35.95.040)	Yes	Probably	Probably	Yes
Household Tax (RCW 35.95.040)	No	Probably	Probably	Yes
Property Taxes	No	Yes	Yes	Yes
Motor Vehicle Excise Tax (RCW 36.73.040(3)(b)	No	No	No	Yes

Agreement and Consent Requirements

Before any entity operates passenger rail service within either King County or within the boundaries of Sound Transit, that entity would need to have an agreement with either or both King County (RCW 35.58.250) and Sound Transit (RCW 81.112.090). Also, either or both King County (RCW 35.58.260) and Sound Transit (RCW 81.112.110) would need to consent to such rail operations.

Pursuant to RCW Chapter 36.56, King County has assumed all the powers of Seattle Metro which was formed under RCW Chapter 35.58. And, RCW 35.58.250 states, in part, the following in this regard:

> *Except in accordance with an agreement made as provided herein, upon the effective date on which the metropolitan municipal corporation commences to perform the metropolitan transportation function, no person or private corporation shall operate a local public passenger transportation service within the metropolitan area with the exception of taxis, buses owned or operated by a school district or private school, and buses owned or operated by any corporation or organization solely for the purposes of the corporation or organization and for the use of which no fee or fare is charged.*

Also, RCW 35.58.260 specifies that the city or cities would need consent of King County to operate the passenger rail service.

Enhanced Bus Service Plan

The enhanced bus scenario has been developed to provide a point of comparison with the DMU commuter rail scenario, to assess how rail and bus service could provide complementary services, and to illustrate the range of possible transit improvements that could accommodate projected demand in the corridor. The Enhanced Bus Service Plan presented here has been designed to complement DMU commuter rail service in the corridor and could be implemented as a "stand alone" option. The enhanced bus scenario consists of increased service on two existing routes (149 and 168) and one new peak-period-only express service (Maple Valley Park-and-Ride to Auburn Sounder station via SR 18).

The service improvements described in the report have been developed in cooperation with King County Metro; however, the improvements have not been put through Metro's formal service planning process. The service increases would require funding beyond the current Metro budget as well as approval by the County Council. (King County Metro received funding to implement service improvements on the #149 and #168 routes and that schedule improvement has been reflected in Exhibit ES-4. These route enhancements were not included in the study as this was an end of study occurrence. Also, this funding expires in 2013 unless local authorities can develop a funding source. A description of the Southeast King County Connectors Project can be found in Appendix G.)

The bus alternative did not assume any new park-and-ride capacity along the proposed routes; however, it did assume transit signal priority along SR 516 between SR 169 and SR 18 in Covington and between SR 18 and Kent.

Exhibit ES-10 shows bus ridership forecasts with and without DMU commuter rail service operating on the corridor.

The Route 168 ridership forecasts increase from 1,200 riders per day at current service levels to approximately 2,000 riders per day with 30-minute headways, a 60% increase. The Route 149 forecast showed an increase of approximately 400 riders per day at 30-minute headways, an 80% increase. The Route 149 and 168 service improvements were not tested with the DMU line; however, it is highly probable that similar ridership increases could be realized with these service improvements to these routes since they do not directly serve the same markets as the DMU service. Essentially, the service improvements to the Metro 149/168 routes and the proposed express bus service on SR 18 between Maple Valley and Auburn would serve as a predecessor to and complement future DMU commuter rail service. These could be implemented in advance of DMU commuter rail service if sufficient resources were made available.

Exhibit ES-10
2030 Ridership Forecast – 30-Minute Headways

Metro Bus Route	2030 Model 30-minute Peak Headway for SR 18 Express					DMU Daily Bus Ridership
	Peak Headway	Peak Ridership (AM + PM)	Off-Peak Headway	Off-Peak Ridership (Rest of Day)	Daily	Daily (1)
149	30	510	60	450	960	530
168	30	1,250	60	720	1,970	1,220
SR 18 Exp	30	670	60	250	920	**1,140**
Total	**-**	**2,430**	**-**	**1,420**	**3,850**	**2,890**

(1) DMU bus ridership numbers do not include enhanced bus service, but it is highly probable that ridership increases would be similar with enhanced bus service.

Primary Findings

The objective of this study was to assess the feasibility of commuter rail service in Southeast King County. This has been accomplished by analyzing the costs of providing commuter passenger rail service between Maple Valley/Black Diamond and Auburn via Covington. The findings of this study are based on the available data and analyses of the study team as defined by the scope of services. In the next phase of project development, more rigorous planning, environmental, and engineering analyses would be required to verify and refine the findings of this study. The key findings of this study are summarized as follows:

A. Future growth and ridership:

The communities of Covington, Maple Valley and Black Diamond have experienced significant growth over the last ten years adding almost 20,000 residents which is approximately 33% growth.

Southeast King County is projected to grow at a significantly faster rate than King County as a whole. There are projected to be 18,600 new households, 42,600 additional residents, and 5,500 new jobs in Southeast King County by 2030.

The DMU Commuter Rail Ridership forecasts project approximately 1,200 daily riders in 2030 under a full service plan (33-minute headways).

Other factors that have not been accounted for in this study may influence transit demand. Sound Transit is studying the possibility of collecting parking fees at their existing stations on the Seattle-Tacoma corridor.

B. Operational feasibility:

DMU commuter rail service in the corridor is feasible. The DMU service could be operated without precluding continued freight service; however, extensive track and signal upgrades and other improvements will be needed, along with construction of rail sidings, stations, station amenities/parking, etc. Some of these improvements could also yield benefits to BNSF and its freight rail franchise.

Proposed enhancements to Metro routes #149 and #168 could serve existing needs for transit service in Southeast King County in the near ter. Potentially a DMU commuter rail service on the BNSF Stampede Pass line could serve transit needs in the longer term.

C. Environmental feasibility:

A preliminary screening identified no fatal flaws; however, the rail line runs along a river and the required right-of-way improvements would have impacts on the environment. Additional analysis would be needed to determine if the environmental impacts are significant.

D. Institutional feasibility:

The project could be implemented and operated by agencies enabled under existing law, however DMU rail service in this corridor is not included in Puget Sound Regional Council's long-range regional transportation plan (MTP) Transportation 2040. Neither Sound Transit nor King County Metro, agencies that are authorized to provide rail services expressed interest in providing this service, though no formal inquiry was made in this feasibility study.

The Revised Code of Washington (RCW) enables a number of other types of authorities that could undertake the project, but none of those entities are perfectly suited to the circumstances found in SE King County. Amendments to the RCW would facilitate implementation.

Under current Washington State law, a public vote would probably be required to approve taxing authority for a new transit entity.

Local jurisdictions or a new entity would have the ability to contract with existing agencies for transit and support services under the Interlocal Cooperation Act (RCW 39.34).

E. Business case feasibility:

It appears that the requirements of BNSF can be met, but an operating agreement would need to be negotiated with the railroad.

The substantial upfront capital costs ($170 – $190 million) are a significant challenge. A number of grant programs exist that this project might be eligible for, but future funding levels and the competitive environment cannot be reliably foreseen. There are a number of other commuter rail projects nationwide that may compete for these grant funding sources.

Other entities are interested in improvements to the Stampede Pass line. Any infrastructure improvements on the line and subsequent increased freight traffic levels may have impacts on the upfront capital costs estimated in this study. Two studies that have considered improvements to the Stampede line but are not incorporated within this study are shown below:

1. *Statewide Rail Capacity and System Needs Study*, Prepared for Washington State Transportation Commission by Cambridge Systematics, December 2006
2. *East-West Passenger Rail Feasibility Study: A preliminary Analysis* – Prepared for the WSDOT by HDR Engineering, June 2001.

The forecasted ridership of about 1,200 per day at full implementation in 2030 would produce farebox revenue equal to about 16% annual operating costs (estimated at $4.7 million per year). This gap between expected operating revenue and operating cost would necessitate an ongoing source subsidy of the service.

Fixed insurance, administration, and contract management fees ($2.7 million) are a significant part of the estimated $4.7 million annual operating and maintenance costs. If a 50% cost sharing agreement could be reached with Sound Transit for insurance, administration and contract

management services a net cost reduction of approximately $1,375,000 could be achieved. These savings would result in a farebox recovery factor of 30% versus 16%.

Washington State
Department of Transportation

Chapter 1: Introduction

The 2009–2011 transportation budget passed by the Washington State Legislature included a proviso requesting a feasibility study of a Diesel-Multiple Unit (DMU) commuter rail service from Maple Valley/Black Diamond to Auburn via Covington on BNSF Railway Company's (BNSF) Stampede Pass line. In the 2010 legislative session, the language was revised in ESSB 6381, Section 220 (2), and states the following:

$400,000 of the ((motor vehicle account)) multimodal transportation account--state appropriation is provided solely for a diesel multiple unit feasibility and initial planning study. The study must evaluate potential service on the Stampede Pass line from Maple Valley to Auburn via Covington. The study must evaluate the potential demand for service, the business model and capital needs for launching and running the line, and the need for improvements in switching, signaling, and tracking. <u>The study must also consider the interconnectivity benefits of, and potential for, future Amtrak Cascades stops in south King county and north Pierce county. As part of its consideration, the department shall conduct a thorough market analysis of the potential for adding or changing stops on the Amtrak Cascades route. The department shall amend the scope, schedule, and budget of the current study process to accommodate the market analysis. A report on the study must be submitted to the legislature by September 30, 2010.</u>

The underlined text is the amended appropriation language that authorizes the Washington State Department of Transportation (WSDOT) to perform a market analysis of potential Amtrak *Cascades* stops in south King county and north Pierce county. The Amtrak *Cascades* market analysis was not incorporated into this report because of schedule and budget constraints. WSDOT has applied for a Federal Railroad Administration grant to fund the additional tasks requested by the legislature. The city of Auburn has agreed to provide the required local funds match.

WSDOT's Urban Planning Office is serving as the lead agency for the "Southeast King County Commuter Rail Feasibility Study" in partnership with project partners, which include the cities of Auburn, Black Diamond, Covington, and Maple Valley. The feasibility study also involved other participants including BNSF, King County, and Sound Transit.

HDR Engineering, Inc. (HDR), in association with Transit Safety Management (TSM), Hendricks – Bennett PLLC, and Lonnie Blaydes Consulting, was selected by WSDOT to provide rail planning and technical design support services for the feasibility study. The State managed the feasibility study performed other items of work with specialized-expertise staff; this work included performing travel-demand forecast modeling, collecting environmental data, and

providing oversight of the rail planning/technical work to be delivered by the Consultant team. The State's Rail Office also assisted with this work.

1.1 Study Objective

The objective of this study is to develop and analyze the potential costs and merits of providing commuter passenger rail service between Maple Valley/Black Diamond and Auburn via Covington, Washington, utilizing self-propelled DMU passenger railcars. Once the costs and merits are clearly presented, then decisions can be made by the appropriate policy makers/stakeholders concerning the next steps to be taken.

1.2 Study Approach

In order to achieve this objective, the study team began by identifying key issues and potential solutions. This was done in cooperation with local and regional government entities. Meetings were held jointly with representatives of each community and interested organizations including the cities of Auburn, Covington, and Maple Valley; WSDOT; Puget Sound Regional Council[3]; King County Metro[4] ; and BNSF. These meetings were held to explain the study and to seek input and guidance from each participant at clearly defined stages of the study. The "Final Report" was based on the five technical memorandums prepared for this study, as follows:

- Scenarios Development
- Travel Demand Forecasts (by WSDOT)
- Rail Operations Analysis
- Rail Business Model and Institutional Issues
- Environmental Screening

As work progressed, each technical memorandum was shared with the project partners and other entities in order to seek their input and address issues. These technical memoranda ultimately formed the basis of this report that is to be presented to the Washington State Legislature.

[3] The designated Metropolitan Planning Organization or MPO
[4] The major mass transit provider in the region

1.3 Commuter Rail, Service Description

Commuter rail is the term generally used to describe passenger train service provided between city centers and suburban areas typically on existing railroad tracks shared with freight trains. These tracks may be privately owned, as is the case with the Sounder commuter service, or publicly owned, as is the case with the New Mexico Railrunner commuter service. Commuter rail rolling stock equipment is required to meet the same safety standards as freight railroad equipment, plus the additional Passenger Rail Equipment Safety Standards (PRESS)[5]. Other mass transit technologies include Bus Mass Transit, Light Rail, and Heavy Rail. Each technology has appropriate applications, and each technology application is most successful when its characteristics address the needs of the travelling public. Regional experience gained in development of rail-based transit in the Puget Sound Region shows that in the case of the Southeast King County Commuter Rail Feasibility Study, only Bus Mass Transit and Commuter Rail are appropriate to consider; using existing transportation corridors, eliminating extensive study, environmental analysis, design, and construction for new light or heavy rail options and corridors.

Commuter rail service is typically for customers with longer travel distances than customers using high-capacity transit, and has higher average speeds. Exhibit 1-1 lists some of the relevant characteristics of commuter rail compared with bus transit on a nationwide basis and in Washington State. Historically, commuter rail linked the suburbs of a major metropolitan area with remotely located cities, villages, and towns, which allowed for more rural living for city workers. Typically, trains were full of passengers in the morning travelling to work, and full in the late afternoon and early evening carrying workers to their homes. However, changes in growth patterns have made commuter rail more bi-directional and more of a regional service than a highly directional, peak-oriented commuter service.

Exhibit 1-1
Characteristics of Commuter Rail versus Bus Mass Transit

	Average Trip Length (miles)	Average Speed (miles per hour)	Average Farebox Recovery Ratio
Nationwide			
Commuter Rail	24	31	49%
Bus Mass Transit	5	14	27%
State of Washington			
Commuter Rail	25	38	27%
Bus Mass Transit	6	14	19%

Source: 2007 National Transit Database – computations by HDR

[5] http://www.access.gpo.gov/nara/cfr/waisidx_03/49cfr238_03.html.

1.3.1 Service Options Analyzed

To help assess the feasibility of DMU commuter rail service on the BNSF Stampede Pass line in southeast King County, three analysis scenarios were developed. These scenarios are as follows:

1. Baseline (Existing Conditions)
2. DMU Commuter Rail
3. Enhanced Bus

For the DMU and Enhanced Bus scenarios, a wide range of service levels and investments could be imagined. Because this is a feasibility study, an effort was made to define scenarios that are both realistic and reasonably optimized. The guiding principles for developing scenarios were the practicality of implementation and cost effectiveness. The intent of this approach was to enable comparison of realistic DMU and Enhanced Bus scenarios against baseline conditions. The same assumptions for population, employment, and travel demand were used for modeling all scenarios.

The passenger rail service feasibility study identifies capital costs for likely infrastructure improvements, rolling stock (DMUs), stations, and likely other ancillary support facilities. In virtually all public transportation operations, supplemental operating support is needed to augment the actual revenue from operations (fares, advertising, etc.). The study team identified, documented, and quantified the capital cost, potential fare structure, annual operating cost, and potential range of revenue sources that would likely be needed to subsidize the service.

1.3.2 BNSF Railway Coordination

The proposed rail passenger service would use the western portion of the privately-owned BNSF Stampede Pass line; thus, understanding and detailing BNSF's position is a key issue. BNSF uses a set of principles[6] as guidelines for development of commuter services by others. These principles address maintenance and growth of freight service, compensation, liability, and control of operations. BNSF reactivated the Stampede Pass line in 1996 to provide additional freight capacity for the Pacific Northwest. As of the fall of 2009, BNSF is not operating significant service on the line due to slow national economic activity. Passenger service would consume some of the available capacity of the line for current and future freight use. Construction of additional rail infrastructure is one way to offset the potential consumption of freight capacity. The outright purchase of capacity, known as train slots, is another method of compensating BNSF for the loss of capacity. The Rail Operations Analysis and Rail Business

[6] The BNSF document is in Appendix A.

Model and Institutional Issues technical memoranda address this issue as well as other BNSF requirements for the development of commuter rail services on its lines.

For this proposed service, the connection at Auburn for passengers destined to locations other than Auburn was assumed to be to Sound Transit's commuter trains and to bus services provided by Sound Transit and King County Metro.

Washington State
Department of Transportation

Chapter 2: Existing Conditions

2.1 Study Area Description

The project study area, as shown in Exhibit 2-2, is defined as the BNSF Railway Company's Stampede Pass rail corridor in southeast King County from Auburn east to the unincorporated community of Ravensdale. The studies rail corridor is approximately 13 miles long and runs through the incorporated areas of the cities of Covington, and Maple Valley. The study also encompassed Black Diamond and other adjacent unincorporated areas of King County.

Physical and environmental conditions within approximately one mile of the corridor were considered; passengers who would use the line might come from farther away, but impacts (noise, vibration, changes in air quality, etc.) from the proposed service would likely not extend more than 1,000 feet from the line.

2.2 Population Characteristics Affecting Traffic and Congestion

The communities of Covington, Maple Valley, and Black Diamond have experienced significant growth since the 2000 Census (see Exhibit 2-1), adding over 10,000 residents. This represents an increase of approximately 33%. Based on information from the cities' comprehensive plans and from the Washington Office of Financial Management, area population is expected to increase by an additional 42,580 residents by 2025. This is an overall increase in population of 74%, versus a countywide increase of 26% by 2025.

Exhibit 2-1
Population Growth

City/County	2006 (Actual)	2030 (Projected Growth)	Absolute Growth	Percent Change
PSRC Region	3,507,603	4,560,444	1,052,841	30%
Study Area	57,789	100,369	42,580	74%

Source: Washington State Department of Transportation

Exhibit 2-2
Study Area

2.3 Land Use Trends

The cities of Covington and Maple Valley are running out of developable land within their city limits. They also have very limited room to expand within the designated urban growth area (UGA) outside their current boundaries. Therefore, population growth in these communities will need to be accommodated through denser development within these communities.

The City of Black Diamond has the greatest potential for significant growth. Two large mixed-use developments have been proposed within its boundaries. The proposed Villages development could add 4,400 dwellings and 775,000 square feet of commercial/office space. The proposed Lawson Hills developments could add 1,250 dwellings and 390,000 square feet of commercial/office space. A substantial increase in traffic is expected to result from this growth.

2.4 Transportation Network

2.4.1 Highway Network

The communities of Covington, Maple Valley, and Black Diamond are served by a limited network of highways and major arterials. SR 18 is a limited access, four-lane divided highway extending from I-90 near Snoqualmie, southwest through the cities of Covington, Maple Valley, and Auburn to I-5 at Federal Way. SR 169 is the primary north–south route connecting Black Diamond to Maple Valley (SR 18) and SR 516. SR 516 is the primary east–west route connecting Maple Valley and Black Diamond via Covington to I-5 at Kent. Kent Black Diamond Road SE and Covington Way SE are rural, two-lane feeder roads connecting to SR 18 and SR 516. Exhibit 2-3 indicates that this roadway network is currently nearing capacity and will be over capacity by 2030.

Exhibit 2-3
Major Highways and Arterials

Arterial	ADT (LOS) 2008	ADT (LOS) 2030
SR 18 (MP 9.56)	44,000 (C)	64,200 (E)
SR 169 (MP 11.44)	16,000 (C)	25,700 (E)
SR 516 (MP 12.12)	25,000 (E)	28,300 (F)
Kent Black Diamond Rd SE	6,700 (D)	7,300 (D)
Covington Way SE	5,300 (C)	9,300 (E)

ADT = average daily traffic
LOS = Level of Service

2.4.2 Transit Operators

Transit service is provided in and to the study area by King County Metro, Sound Transit, and Pierce Transit. See Exhibit 2-4 for 2010 KC Metro bus routes:

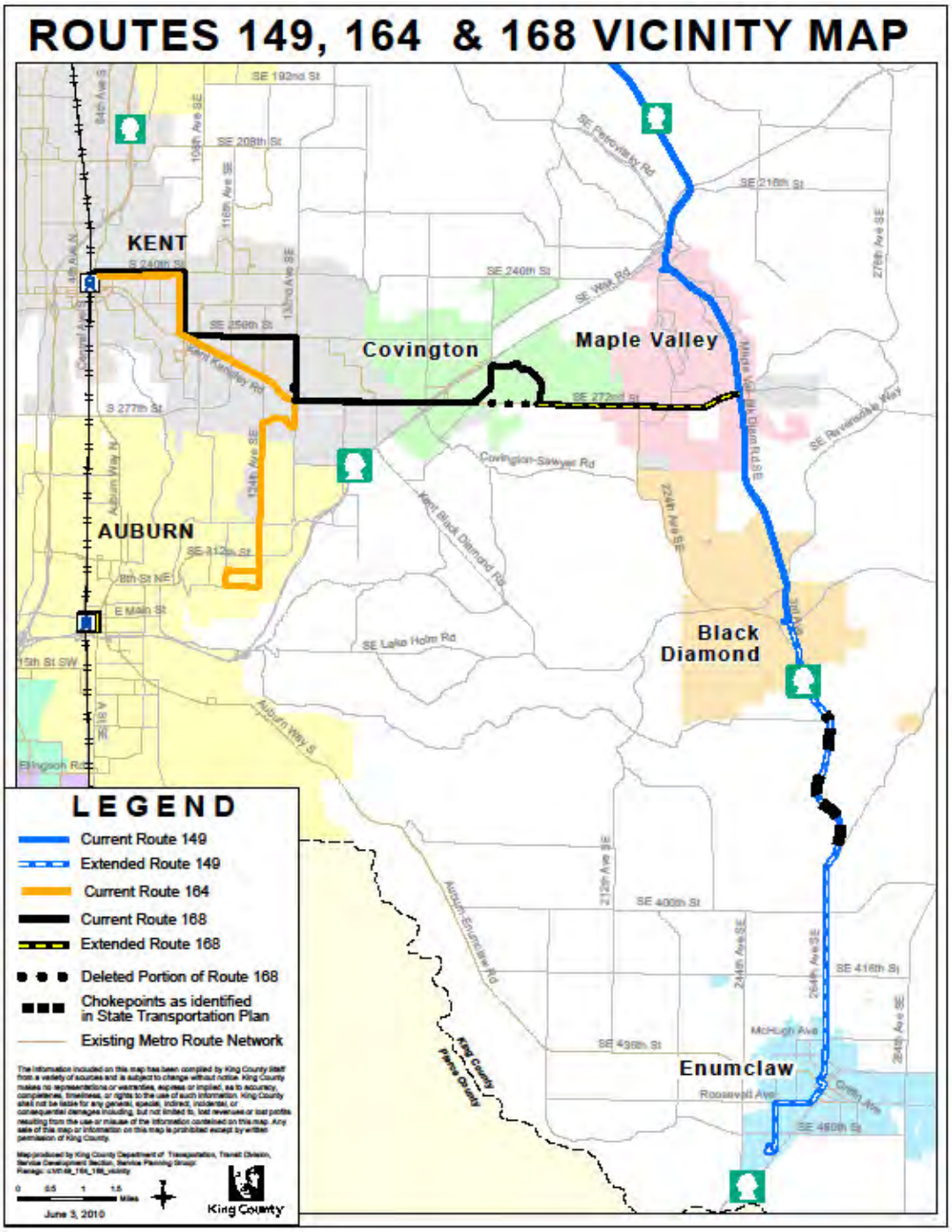


Exhibit 2-4
2010 King County Metro Bus Routes

King County Metro

Seattle Metro was created by a local referendum in 1958. After two ballot measures that would have built a rapid-transit system in King County failed to gain voter approval, it was authorized to operate a bus system in 1972. The Metro bus system began operations in 1973. Its operations took over Seattle Transit, formerly operated by the City of Seattle, and the Metropolitan Transit Corporation, a private company serving suburban cities in King County. Metro was overseen by a board of elected officials in King County. After its representation structure was ruled unconstitutional in1990 and after a popular vote in 1992, Metro's roles and authorities were assumed by King County government.

King County Metro is a division of the King County government's Department of Transportation.[7] Metro operates a fleet of about 1,300 vehicles including standard and articulated coaches, electric trolleys, dual-powered buses, hybrid diesel-electric buses, and streetcars; these serve an annual ridership of 100 million within the county's 2,134-square-mile area. Metro serves riders who are disabled with accessible fixed route service (all Metro buses have wheelchair lifts or ramps and all routes and trips are accessible), as well as paratransit van service and a taxi scrip program.

Sound Transit

Sound Transit (ST) was created by the Washington State Legislature to build and operate a high-capacity transit system that would connect the major regional centers in King, Pierce, and Snohomish counties. In 1996, voters approved a tax to fund the first phase of that system – regional express buses, commuter rail, and light rail. In 2009, Sound Transit carried nearly 14 million riders.

The Sound Transit District encompasses most of the urbanized areas of Pierce, King, and Snohomish counties including the cities of Auburn and Kent (see Exhibit 2-5). The cities of Covington, Maple Valley, and Black Diamond lie just outside the Sound Transit district. The voters of Covington opted out of the Sound Transit taxing district 1996. Of the 13 miles of the SE King County commuter rail alignment analyzed in this study *approximat*ely 12 miles lie outside the Sound Transit district.

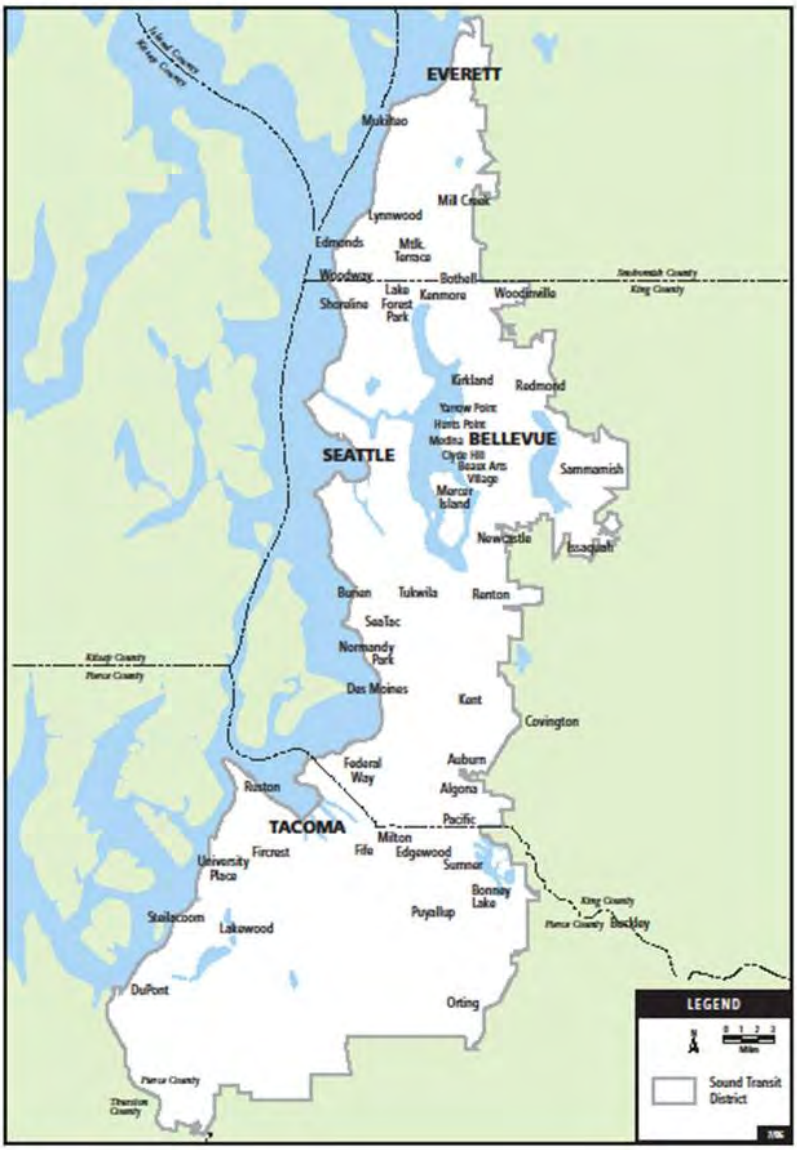
ST Express bus service connects regional centers in the Sound Transit district. Sound Transit has built new transit centers, park-and-ride lots, and high-occupancy vehicle (HOV) access projects to improve transit speed, reliability, and access throughout the region.

ST Sounder commuter trains operate every weekday from Everett and Tacoma to downtown

[7] http://metro.kingcounty.gov/am/metro.html

Seattle. The Sounder commuter rail corridor is 74 miles long. On the north line, four round-trips connect Everett, Mukilteo, and Edmonds with downtown Seattle. On the south line, nine round-trips run between Tacoma, Puyallup, Sumner, Auburn, Kent, Tukwila, and downtown Seattle; a future extension south to Lakewood is under development and will be completed in 2012.

Exhibit 2-5
Puget Sound Regional Transit District Map



Tacoma Link, a 1.3-mile-long streetcar line, began running in downtown Tacoma in 2003. Central Link, a 14-mile-long light rail line, opened in July 2009 between downtown Seattle and Tukwila International Station. A short extension between Tukwila and Sea-Tac International Airport opened in December 2009. The light rail extension north to the University of Washington is scheduled to begin service in 2016. An extension north to Northgate is scheduled for completion in 2020 and to Lynnwood in 2023. An extension east to downtown Bellevue is planned for completion in 2020 and to the Overlake Transit Center by 2021. The line to Sea-Tac is planned for extension south to the Redondo/Star Lake area by 2023. Sound Transit's adopted Phase II plan also calls for a modest expansion of express bus service and incremental increases in Sounder commuter rail service.

Pierce Transit

The Pierce County Public Transportation Benefit Area Corporation, also known as *Pierce Transit*, was formed in 1979 when local voters passed a 0.3% sales tax to fund public transportation. By authorizing this taxing authority, a municipal corporation (Pierce Transit) was formed under Chapter 36.57A of the Revised Code of Washington (RCW). In 2002, voters passed an additional 0.3% sales tax to replace revenue lost when Initiative 695 cut off the Motor Vehicle Excise Tax as a source of funding for public transportation. At present, Pierce Transit is the second-largest transit agency in Washington State.

A nine-member Board of Commissioners oversees Pierce Transit. The Board is comprised of elected officials representing Pierce County; the cities of Tacoma, Lakewood, and University Place/Puyallup (a rotating appointment); and the smaller towns and cities of Pierce Transit's service area.

2.5 Freight Railroad Network and Train Operations

2.5.1 State Rail Network

Exhibit 2-6 illustrates the state rail network with a highlight shown on the Stampede line, the BNSF main line between Pasco and Auburn, the former Northern Pacific. East–west rail traffic flows to and from Washington through Spokane. The Cascade route is the shortest, most direct route between Seattle and Spokane is the former Great Northern line through Wenatchee and Everett. That route has capacity limitations because of the 8-mile-long Cascade Tunnel. The other alternative routes, the Stampede Pass and Columbia River, are longer, as shown in Exhibit 2-6.

Source: http://www.wsdot.wa.gov/Freight/Rail/default.htm

Exhibit 2-6
Washington State Rail Lines

Exhibit 2-7
Alternative Rail Routes between Spokane and Seattle

BNSF Subdivision	Between	And	Length (miles)	Maximum Elevation (feet)	Nominal Speed (mph)	Signal System
Spokane	Sunset Jct	Latah Jct	0.8	2,200	60	CTC
Colombia River	Latah Jct	Wenatchee	169.6	2,400	60	CTC
Scenic	Wenatchee	Seattle	155.7	2,900	50	CTC
Total Route – Cascade			**326.1**	**2,900**		
Lakeside	Sunset Jct	SP&S Jct	149.4	2,400	60	CTC
Yakima Valley	SP&S Jct	Ellensburg	124.5	1,500	49	TWC
Stampede	Ellensburg	Rainier	102.9	2,800	49	TWC
Seattle	Rainer	Seattle	21.6	100	60	CTC
Total Route – Stampede			**398.4**	**2,800**		
Lakeside	Sunset Jct	SP&S Jct	149.4	2,400	60	CTC
Fallbridge	SP&S Jct	Vancouver	222.8	400	60	CTC
Seattle	Vancouver	Seattle	176.6	500	50	CTC
Total Route - Columbia River			**548.8**	**2,400**		

CTC = Centralized Traffic Control

Source: BNSF Timetable No 3 April 26, 2006

The Burlington Northern Railroad (BN) was created on March 2, 1970, by the merger of four primary railroads: Chicago, Burlington & Quincy Railroad Co. (CB&Q); Northern Pacific Railway Co. (NP); Great Northern Railway Co. (GN); and the Spokane, Portland and Seattle Railway Co. (SP&S). BN merged with the Atchison, Topeka, and Santa Fe Railway in 1995 and the name of the company was changed to BNSF Railway Company. Three of the predecessor companies – NP, GN, and SP&S – had lines across Washington connecting Spokane and Seattle.

For the purpose of this study, only a brief discussion of the Stampede route's history is presented. The Stampede Pass line was deemed redundant in 1983 and deactivated. A portion of the line was subsequently sold, then repurchased when BN decided to reactivate the line in 1995. The Stampede Pass line was reactivated by BNSF on December 5, 1996. Rehabilitation required a substantial amount of work, with the total cost in excess of $250 million. Also, the 1996 rehabilitation lengthened only a few of the sidings on the line to accommodate a 1990s-era freight train. Rehabilitation brought the line to the standards of a secondary freight line (light traffic but not a branch line) of the 1990s.

The line is currently maintained to Federal Railroad Administration (FRA) Class 3 standards, which allows freight operations at speeds up to 49 mph. The BNSF Stampede Pass line is predominantly a single-track line with few passing sidings where opposing trains can pass. This presents significant limitations on rail operations. Correcting this shortcoming to accommodate commuter rail service could require substantial improvements and upgrades.

2.5.2 Train Operating Characteristics

The current capacity of the Stampede Pass line is considerably less (about 12 to 14 trains per day) than its pre-1980s era capacity. The line also has lower speed limits. Before the 1970s, this line was used by as many as 10 passenger trains per day and numerous freight trains. In that era, a typical freight train was half the length of today's trains and the railcars weighed substantially less. Passenger trains were operated on set timetables whereas the freight trains were run between the scheduled passenger trains.

The type of freight traffic is also limited by the vertical dimensions of the Stampede Tunnel at the summit of the Cascade Mountains, between Stampede and Martin. Double-stack container railcars and tri-level automobile railcars cannot pass through the tunnel. There has been recent discussion about enlarging the tunnel to accommodate these freight car types, but that would change only the type of freight that can be accommodated, not the number of trains the line can accommodate.

In the pre-1980s era, this line had automatic block signals. Automatic block signals warn the train engineers about other trains ahead and conditions such as broken rails or rockslides. Traffic was controlled by a system of written instructions (train orders) given to trains as they passed stations (handed off without the train having to stop). At the time the line was rehabilitated, the automatic block signal system, which was approaching 70 years old, had deteriorated beyond economic repair and was subsequently removed. The line is now operated using written instructions called Track Warrant Control (TWC). Federal regulations[8] limit passenger train speed to 59 mph on a line that does not have block signals. As a concession to modern operations, BNSF installed remote control switches at the sidings that were rehabilitated. Trains still require written instructions to leave each siding location, but are remotely directed into the sidings by BNSF's Centralized Traffic Control (CTC) dispatch center in Fort Worth, Texas[9]. Under many conditions, trains are delayed while receiving the written instructions verbally by radio to proceed to the next block of track. A modern signal system would allow passenger

[8] 49 CFR 236
[9] Centralized Traffic Control

trains to operate at a maximum speed of 79 mph if the track is maintained to FRA Class 4 standards.

Since the reopening of the line in 1996, typical freight traffic on the line has been 2 to 5 trains per day with a peak of 8 to 10 trains per day. These trains were operated 7 days a week at whatever time of day was needed based on traffic demand. Railroad traffic is substantially lower currently because of the general decline in rail freight business during the recent economic recession.

The current Stampede Pass track alignment is suitable for today's freight trains; however, for passenger service, the track geometry would need to be modified to achieve optimal performance. Freight-only track is managed with the objective of optimizing revenue while minimizing operating and maintenance costs. This generally means longer, heavier trains operated at lower speeds. Passenger-only track is optimized to reduce travel time and provide a smooth, high-quality ride. Passenger trains typically operate at much higher speeds, which can result in higher operating and maintenance costs. Mixed-use track is configured to take into account the requirements of both types of services with the goal of balancing the need for higher speed against increased operating and maintenance costs.

The Stampede Pass line is in good condition for its current purpose, which is serving a limited volume of freight rail operations. However, the portions of the line that might be proposed for passenger service would need to be optimized for both passenger and freight trains. These improvements generally include the following:

- Increased super-elevations of curves to allow for increased speeds.
- Lengthened spirals (the transition between tangent and curved track) to provide for a smoother ride around curves.
- Eliminate jointed rail in track to improve passenger ride quality and reduce future maintenance costs.
- Stricter track inspection and maintenance requirements to operate trains at higher speeds.
- Improved train control systems, including positive train control to prevent accidents.
- Capacity improvements to replace freight capacity lost to passenger trains.
- Increase FRA track classification from Class 3 track to Class 4 track to allow passenger operations at speeds up to 79 mph and provide improved rider comfort.

Washington State
Department of Transportation

Chapter 3: Scenario Definitions

3.1 Baseline Scenario

The baseline scenario defines the current conditions, specifically the current conditions with whatever fiscally-constrained changes are planned and likely to be executed. Presently the Auburn Sounder station is the primary hub for regional transit services in the study area.

Sounder Commuter Rail Service

Sounder service (see Exhibit 3-1) is focused on AM peak period northbound trips toward Seattle – seven trains stop at the Auburn station in the AM peak period and two southbound trains stop in the AM peak period 40 minutes apart. In the PM peak period, the pattern is reversed, with seven trains southbound toward Tacoma and two northbound trains to Seattle 35 minutes apart.

Exhibit 3-1
Sounder Scheduled Weekday Service at Auburn Station

Northbound		Southbound	
Train No.	Time	Timed	Train No.
1500	5:20 a.m.	6:45 a.m.	1501
1502	6:01 a.m.	7:25 a.m.	1503
1504	6:26 a.m.	3:50 p.m.	1505
1506	6:51 a.m.	4:25 p.m.	1507
1508	7:16 a.m.	4:56 p.m.	1509
1510	7:45 a.m.	5:21 p.m.	1511
1512	8:25 a.m.	5:48 p.m.	1513
1514	4:50 p.m.	6:16 p.m.	1515
1516	5:25 p.m.	6:50 p.m.	1517

Bus Service

Pierce Transit: Pierce Transit Route 497 connects with Sounder trains serving Auburn and the Lakeland Hills Park-and-Ride during peak periods.

Metro Transit: Service on King County Metro Route 152 connects the Auburn Sounder station with downtown Seattle only during peak periods, with 30-minute headways.

Service on King County Metro Route 180 connects Sea-Tac International Airport with the Kent and Auburn Sounder stations with 30-minute headways.

King County Metro provides service on Route 181 on 30-minute headways between Federal Way and the Twin Lakes Park-and-Ride and Green River Community College, and passes through the Auburn Sounder station.

Metro Route 915 provides service between the Auburn Sounder station and Enumclaw on approximately 1 hour/20-minute headways, with focused connections to Sounder train arrivals and departures.

Metro Route 917 provides service between the Auburn Sounder station and White River Junction via the Auburn Super Mall on 1-hour headways.

Metro Route 919 provides service through the Auburn Sounder station between North Auburn (Auburn Court and Fred Meyer) and southeast Auburn during non-peak periods on 1-hour headways.

King County Metro also provides bus service in the study area that does not pass through the Auburn Sounder station. Metro Routes 143 and 149 provide peak period service on approximately 40-minute headways between Black Diamond and Seattle and Renton, respectively. Route 149 between Renton and Black Diamond also provides mid-day service on approximately 2-hour headways.

Metro routes 158 and 159 provide Peak Period service connecting Covington and Lake Meridian with the Kent Sounder station and Seattle.

Metro route 168 provides hourly service connecting Maple Valley with the Kent Sounder station.

Metro route 912 provides service between Covington and Enumclaw on approximately 1 hour/40-minute headways.

Sound Transit: Sound Transit Route 566 provides express service between South Hill/Federal Way and Overlake on approximately 30-minute headways (north of the Auburn Sounder station). In February 2010, Sound Transit will discontinue Routes 564/565, with replacement service provided by new Route 566, operating between Auburn Station and Overlake via the same routing and with the same approximate headway as 564/565.

Ridership information for selected routes is listed in Exhibit 3-2.

Exhibit 3-2
Existing Transit Service in the Study Area

Operator	Route	Service Type	Typical Headway	Average Riders Per Trip	Trips Per Weekday	Annual Weekday Riders
Metro	143 Black Diamond – Seattle	Peak	40 minutes	51	10	128,700
Metro	149 Black Diamond – Renton	Local	2 hours	6	18	27,200
Metro	152 Auburn – Seattle	Peak	30 minutes	28	13	
Metro	158 Seattle – Covington	Peak	30 minutes	52	12	157,200
Metro	159 Seattle – Lake Meridian	Peak	30 minutes	50	10	125,500
Metro	168 Maple Valley – Kent	Core	1 hour	27	39	264,500
Metro	912 Covington – Enumclaw	Local	1 hour 40 minutes	5	8	9,100
Metro	915 Auburn - Enumclaw	Local	1 hour 20 minutes	14	30	105,700
Metro	917 Auburn – White River Junction (via Auburn Super Mall)	Local	1 hour	8	28	54,454
Metro	919 North Auburn – Southeast Auburn (via Auburn Sounder Station)	Non-Peak Local	1 hour	7	17	28,508
Pierce Transit	497 Lakeland Hills – Auburn	Peak	40 minutes*	12	18	52,000
Metro	180 Auburn-Kent-SeaTac-Burien	Core	30 minutes	63	57	916,000
Metro	181 Federal Way – Green River CC	Core	30 minutes	34	67	577,000
Sound Transit	564 South Hill – Overlake (via Auburn Sounder Station)	Express	30 minutes	35	42	360,800
Sound Transit	565 Federal Way – Overlake (via Auburn Sounder Station)	Express	30 minutes	40	42	420,900
Sound Transit	577/578 Seattle – Puyallup	Peak Express	20 minutes	45	28	313,500

* Service specifically keyed to Sounder trains at Auburn Sounder station

Note: Information was provided by KC Metro

3.2 Commuter Rail (DMU) Scenario

The commuter rail DMU scenario envisions a new passenger rail service using BNSF's Stampede Pass line between Auburn and a point at Maple Valley just west of SR 169, a distance of approximately 13 miles by rail. The running time between Maple Valley and Auburn is estimated to be approximately 20 minutes, including the intermediate stop at Covington with a maximum speed of 79 mph. The train stations are envisioned to provide basic amenities on the platforms including canopies, benches, trash cans, schedule kiosks, ticket vending machines, lighting, train status information, and a public address system. It is assumed that all stations would include surface parking lots sized to accommodate the projected 2030 ridership. The commuter rail scenario would also include feeder bus services at Auburn, Covington and Maple Valley stations and a commuter rail connection at Auburn.

The commuter rail vehicles are usually a substantial component of the cost of developing a new commuter rail service. An important system development activity involves balancing the number of vehicles and the service that can be provided by those vehicles with the cost and effect on ridership and revenue of the number of vehicles in service. The achievable service level changes with the number of vehicles. The infrastructure required for the various levels of service may also change. Therefore, the commuter rail scenario examines the service that can be provided and the cost of one, two, three, and four sets of equipment.

3.3 Enhanced Bus Scenario

The enhanced bus scenario consists of increased service on two existing routes (149 and 168) and one new peak-period-only express service (Maple Valley Park-and-Ride to Auburn Sounder station via SR 18). The enhanced bus scenario has been developed to provide a comparison with the DMU commuter rail scenario and to illustrate the range of possible transit improvements that could be implemented to accommodate projected demand in the corridor.

The service improvements described in this section of the report have been developed in cooperation with King County Metro; however, the improvements have not been put through Metro's formal service planning process. The service increases would require funding beyond the current Metro budget and approval by the King County Council.

3.3.1 Service Description

As an alternative option to a DMU commuter rail service operating between Maple Valley/Covington and Auburn, enhanced transit service could be implemented with additional service on two existing Metro Routes (149 and 168) along with a new Commuter Express route

that would operate directly between Maple Valley/Covington and Auburn via SR 18. With these improvements, enhanced transit service would be provided along the three major corridors serving the greater Maple Valley/Covington area: SR 169/Maple Valley Highway to/from Renton, SR 516/SE 272nd to/from Kent, and SR 18 to/from Auburn. These routes would roughly parallel and potentially serve as an alternate to a DMU commuter rail service option on the BNSF Stampede Pass line.

Route 149

Route 149 provides service along the SR 169/Maple Valley Highway corridor between Black Diamond and Renton in conjunction with Route 143, which continues to/from downtown Seattle. Service is about every 15 to 30 minutes during the AM/PM peaks (combined with Route 143) and about every 2 hours during the mid-day. Midday service operates with a single bus.

Enhanced service proposed for Route 149 would add a second bus to improve the frequency to every 60 minutes during the mid-day along with improved edge of peak service.

Route 168

In September 2009, weekday service on Route 168 was extended along Kent–Kangley Road from Covington to Maple Valley (4-Corners), operating along the corridor between Maple Valley and downtown Kent and terminating at the Kent station. Service operates hourly from about 4:30 AM to midnight.

Enhanced service proposed for Route 168 would improve the peak period frequency to about every 30 minutes. This enhanced peak service would make it possible to provide improved connections with Sounder commuter rail at the Kent Station.

New Route – Maple Valley-Covington-Auburn Commuter Express

A new, direct Commuter Express route would operate a between Maple Valley, Covington, and Auburn, via SR 18, terminating at the Auburn Sounder station. In Maple Valley, the route would begin/end at a terminal located at SE 231st Street and Maple Valley Highway, close to the Maple Valley Park-and-Ride.

Peak direction service would be provided in the AM to Auburn and in the PM to Covington/Maple Valley about every 25 to 40 minutes, with trips timed to connect with Sounder in Auburn. Service would operate through Maple Valley along Witte Road SE, a corridor with substantial residential development that is currently not serviced by transit.

3.3.2 Required Service Investment

The enhanced bus service scenario for the greater Covington/Maple Valley area, with additional service provided for Routes 149 and 168, along with a new peak direction commuter route operating to/from Auburn, would require approximately 12,900 additional annual platform hours. The estimated additional platform hours for the three routes are as follows:

- Route 149 (upgrade to hourly mid-day service and additional edge of peak trips): +3,000 annual service hours.
- Route 168 (upgrade to 30-minute peak service): +4,900 annual service hours.
- New peak direction Commuter Express route operating between Maple Valley-Covington and Auburn (seven peak trips – AM/inbound to Auburn and PM/outbound to Covington-Maple Valley): +5,000 annual service hours.

3.3.3 Capital Investment for Enhanced Bus Service

The additional service, particularly the proposed new Commuter Express route, would require various capital improvements, including passenger facilities and infrastructure to support transit operations and improve transit speed and reliability. These capital improvements are identified as described below.

Park-and-Rides

Existing park-and-rides in the Covington/Maple Valley area are as follows:

- Maple Valley Park-and-Ride – SR 169/S 231st Street (122 stalls/permanent lot)
- Black Diamond Masonic Temple – SR 169/Baker Street (30 stalls/leased lot)
- Cornerstone United Methodist Church – SE 272nd/208th (20 stalls/leased lot)

Additional park-and-ride space is needed in Maple Valley/Covington to handle the increased commuter demand. The existing Maple Valley Park-and-Ride has seen increased demand in recent years and now averages 90% occupancy. Possible options may include expanding the Maple Valley Park-and-Ride or providing additional space elsewhere along transit corridors in Maple Valley and Covington, including lease agreements with existing uses such as churches.

Bus Zones and Terminals

Additional bus zones should be provided at appropriate locations along transit corridors in Covington and Maple Valley to serve walk-on riders. Some locations require improvements such as bus pullouts, particularly along higher speed segments of SR 169 and SR 516 where

transit buses are required to pull out of the traveled lane. New zones would be needed along Witte Road SE serving the proposed Commuter Express route.

On SR 169/SE 272nd, pullouts and passenger landing pads at new or existing (substandard) bus zones are needed at various locations along the segment between 201st and 208th Avenue SE.

A new terminal/bus zone would be needed at the starting/ending point for the proposed Commuter Express route in the vicinity of SE 231st/Maple Valley Highway, serving the Maple Valley Park-and-Ride. A possible location could be eastbound on 231st on the far side of Maple Valley Highway, adjacent to the fire station.

Transit Speed and Reliability Corridor Improvements

The increasing traffic along the two major corridors in Maple Valley and Covington – SR 169 Maple Valley Highway and SR 515 SE 272nd – adversely impacts Metro bus operations. Various improvements may be needed along these corridors to improve bus speed and reliably, which collectively can provide potential travel time savings for transit and improve speed and reliability. Possible improvements (at specific locations to be identified) could include:

- Transit signal priority at specific intersections or along corridors.
- Traffic signal controller upgrades.
- Queue jumps at specific intersections – may be incorporated with bus pullouts.
- Corner radius improvements and channelization modifications.

3.4 Service Options

The rail operations analysis typically evaluates the following service options:

- **Peak period service:** For this study, peak period service is defined as between 6:00 and 9:00 in the morning and between 4:00 and 7:00 in the evening. Service could be scheduled to leave the stations at set intervals or headways. Alternatively, the schedules could be adjusted so that the service corresponds to the Sounder's scheduled arrival at the Auburn station**.**
- **Mid-day service:** Typically defined as the period between the morning and evening peak periods. Mid-day service might be phased in over time or supplemented with enhanced mid-day bus service.
- **Evening service:** This is service operated for a given period after the evening peak.

- **Reverse commute service:** This service would allow persons living in the Auburn/Kent area to potentially commute to new employment opportunities in Covington, Maple Valley, and Black Diamond.

The feasibility of these different types of service is based on a variety of factors including ridership forecasts, additional capital costs, and increased operating costs. The operating plan analyzes these service options (see Chapter 5 of this document for the rail operations analysis).

3.5 Commuter Rail Station Location Options

There were discussions held with the cities of Covington, Maple Valley, and Black Diamond concerning potential station site options as a part of the feasibility study analysis. A number of factors were considered, including the following:

- Distance from/proximity to city centers.
- Cities' comprehensive plans and supportive zoning.
- Availability of publicly-owned land at the site locations.
- Existing and potential bus service connections.
- Location of future planned developments, including the proposed Villages and Lawson Hills developments in Black Diamond.
- Location of growth management boundaries.
- Capacity of existing roadway networks near proposed stations.
- Access to existing trail systems.

The Stampede Pass line is largely isolated from the roadway network. There are only a limited number of public access points suitable for station development. Exhibit 3-3 shows potential station sites considered and those assumed for this feasibility study. It should be emphasized that the station locations assumed in this analysis have not undergone the permitting and approval process of the local jurisdictions. As more detailed information is developed in future studies, these sites may be modified or new sites adopted.

Exhibit 3-3
Proposed Station Locations

Covington Station

The proposed Covington station site is located just east of the Covington Way SE railroad crossing on the south side of the track. BNSF right-of-way widens to 100 feet at this location, and the adjoining parcel (APN 3622059004) is owned by King County. The site is also near (approximately ¼ to ½ mile) the City of Covington's planned Town Center development.

Maple Valley Station

This site is the City of Maple Valley "Henry's Switch" parcel (APN 3422069016) in the southwest quadrant. The property is separated from SR 169 by an undeveloped regional trail.

An alternate site is located in the southeast crossing of the Maple Valley Black Diamond (SR 169) railroad crossing and is privately owned. The site has good access to SR 169, is on the main road to Black Diamond, and has potential for future development.

Station Sites Considered, but Not Selected

A station location at Kent Black Diamond Road SE was not selected primarily because of its distance from the City of Covington's planned Town Center development. The 216th Avenue SE site in Maple Valley was not selected because of limited access and existing residential land uses. Station locations east of SE Ravensdale grade crossing, Kanaskat, and Palmer Junction were not considered because of increased travel times required to access the sites with no corresponding increase in ridership.

3.6 Connecting Transit Service Options

Connections to other transit services would be possible at the station near Maple Valley-Black Diamond Road SE (WA 169) as Metro's routes 143 and 149 currently operate along SR 169 adjacent to the site. Route 168 could also be extended along SR 169 from Four Corners to serve this station. Because the Covington Way SE station site is not presently served by transit, new local feeder bus service would likely connect to the Town Center, the SE 272nd commercial corridor, and Covington residential neighborhoods.

Chapter 4: DMU Ridership Forecasting, Model Methodology

4.1 Travel Demand Model Selection

To assess the demand for possible DMU service between Maple Valley, Covington, and Auburn, a new set of travel demand forecasts was needed for the area. A review of currently available model platforms was performed to determine which tools would be best suited for this analysis. The three most likely model platforms considered were as follows:

4. Puget Sound Regional Council (PSRC) Travel Demand Model
5. King County Regional Travel Demand Model
6. PSRC's Transit Sketch Planning Tool

The underlying land use forecasts in all three model platforms are similar, but each one contains a different set of network detail. The King County model contains more roadway definition than the PSRC model, but it does not contain a mode choice component and thus was not an option for this analysis. The Transit Sketch Planning Tool is ideal for analysis of market segments; however, it currently lacks the ability to forecast ridership with land uses that differ from the base year. With the rapid growth currently occurring in southeast King County, as well as future forecasts for more growth, it was determined that the Transit Sketch Planning Tool was not applicable for this analysis. For these reasons, WSDOT chose to use the PSRC Travel Demand model as the tool for the DMU ridership forecasting analysis.

To match the availability of traffic counts and future land use inputs, a 2006 base year and a forecast year of 2030 was assumed for this project.

4.2 Travel Demand Model Updates

The PSRC model provides long-range transportation forecasts for all of King, Kitsap, Pierce, and Snohomish counties. Because it is focused on such a large geographic area, the PSRC model does not contain the extensive network detail generally used in corridor-level analysis. To provide the most reasonable travel demand forecasts for the project area, model refinements were performed in the study area.

4.2.1 Model Study Area

Exhibit 4-1 shows the geographic area that was refined in the travel demand model for this project. The study area stretches from Green Valley Road in the south to SR 18 in the north and from SR 18 in the west past SR 169 in the east.

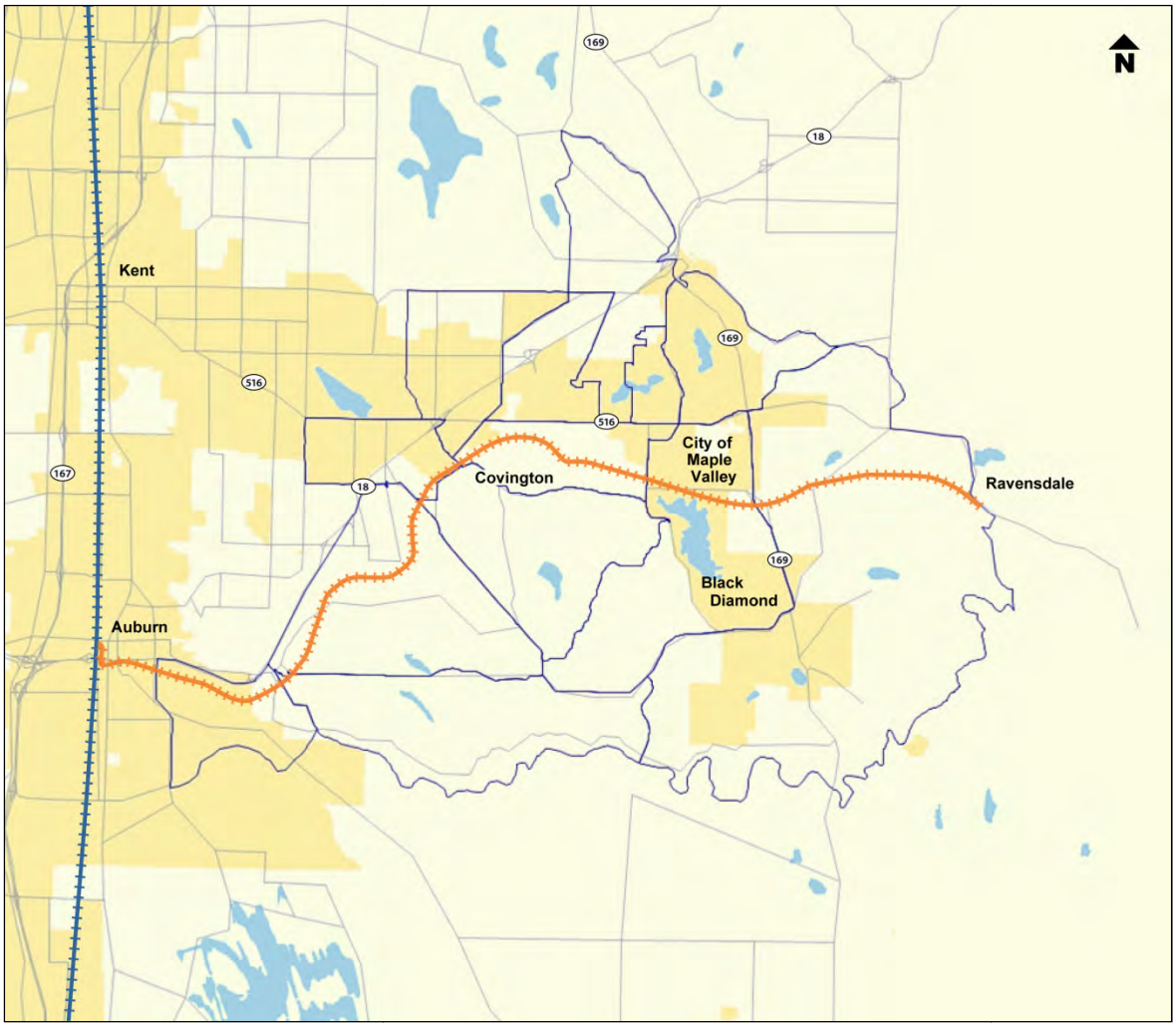


Exhibit 4-1
Model Study Area

The model outside of the study area remains as in the original PSRC Travel Demand Model. Within the study area boundaries, several network updates were performed. These included the following:

- Increased network detail
- Speed and capacity assumptions for roadway network
- Inclusion of freeway interchange ramps in the PSRC Travel Demand Model
- Refinements to centroid connections to better represent traffic loadings in the network
- Addition of 43 traffic analysis zones in the study area

These refinements were made to the 2006 base year model, and a mini-validation for the study area was performed to ensure that the travel demand model adequately reflected the travel demand for the study area. Exhibits 4-2 and 4-3 show before and after looks at the zonal network coding for the project area. By expanding the number of zones from 11, as originally shown in the PSRC model, to 54 in the refined model, the analysts were better able to reflect transit accessibility measures for the individual zones. These accessibility measures can have a major impact on the attractiveness of transit for these zones. In general, larger zones are less attractive to transit and require a much higher level of aggregation of the network data.

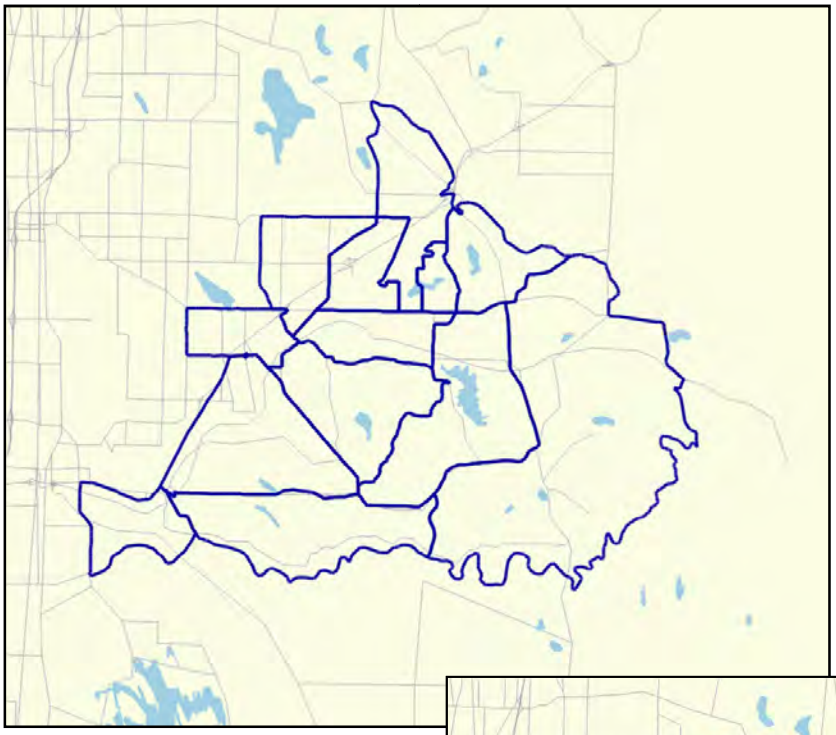


Exhibit 4-2
PSRC Zone System

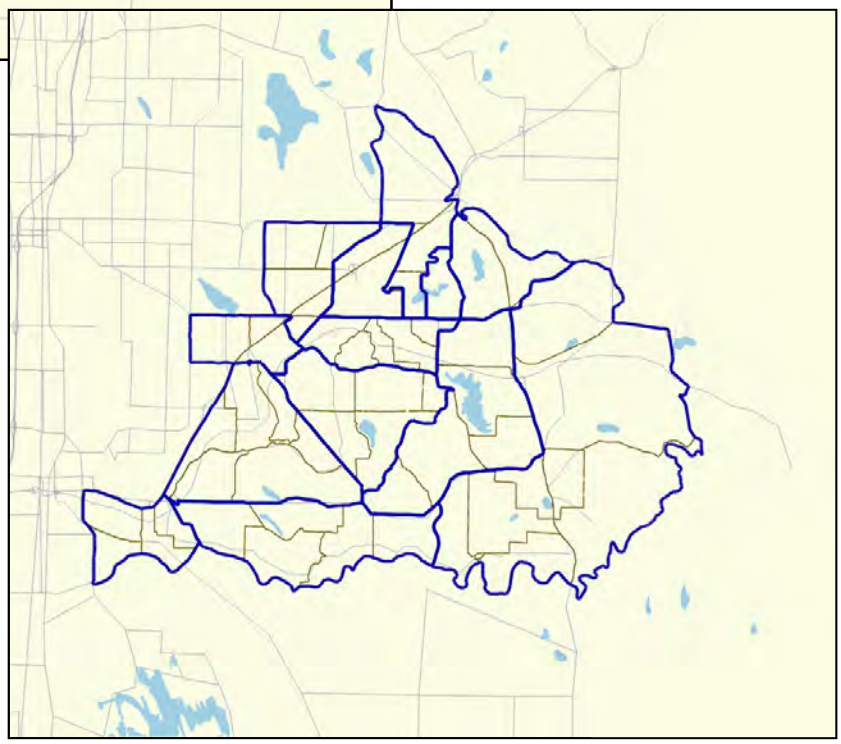


Exhibit 4-3
Refined Zone System

4.2.2 Study Area Land Use

The PSRC model is a traditional 4-step travel demand model. The 4-step input process is highlighted in yellow, Exhibit 4-4.

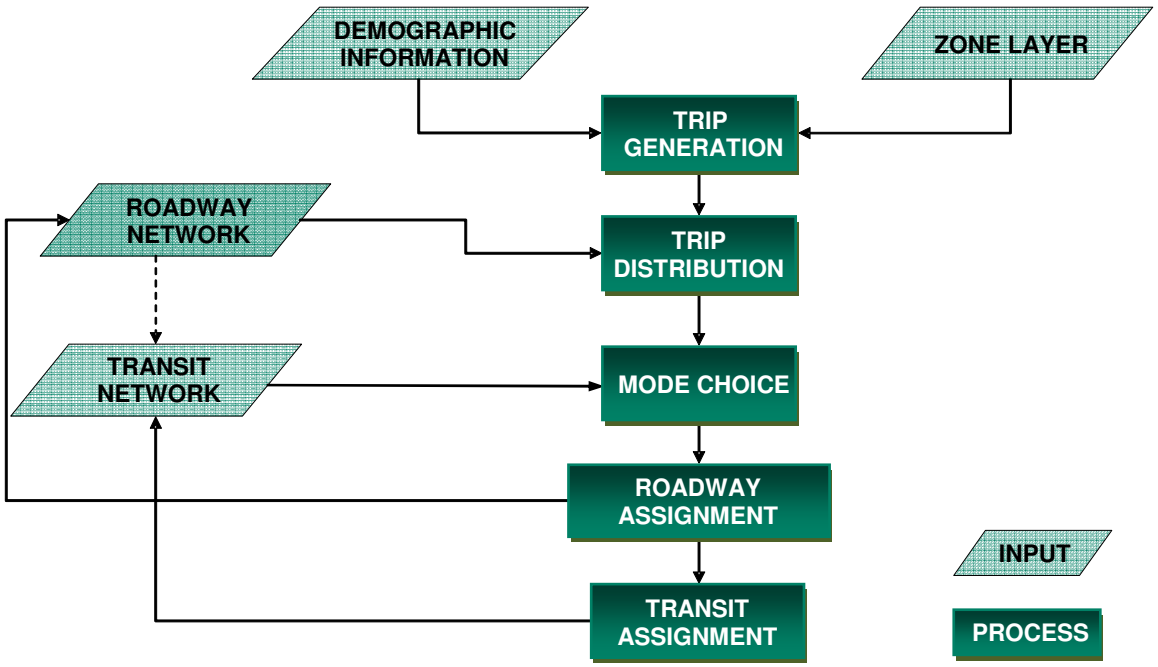


Exhibit 4-4
4-Step Travel Demand Model Process

The key inputs to a travel demand model are the demographic data (households and employment) and the transportation network (both highway and transit facilities). The PSRC relies upon local jurisdictions to provide information about the base and future forecasted land use for their jurisdictions. To ensure that the DMU forecasts used the most recent set of land use assumptions for the cities of Maple Valley, Covington, Auburn, and Black Diamond, the model land uses were sent to the local jurisdictions for review. The only changes suggested for the study area were as a result of planned development in the Black Diamond area. All other land uses provided by PSRC remained unchanged.

Exhibit 4-5 highlights the changes in the land use assumptions for the entire 4-county planning area in the PSRC region. As shown in the exhibit, the region is expected to add approximately 40% more households by 2030 and almost 43% more jobs. Exhibit 4-6 shows the same data for the study area. When compared to the region as a whole, the study area expects to add over 90% more households and about 70% more jobs by 2030. The household totals reflect the approximately 6,000 new households planned for the Black Diamond area. These large forecasted changes are likely to cause further levels of congestion throughout the study area.

Exhibit 4-5
Regional Changes in Land Use Assumptions

Year	Total Population	Total Households	Retail Employment	Office Employment	Industrial Employment	Total Employment
2006	3,507,603	1,386,593	337,567	920,532	417,191	1,675,290
2030	4,560,444	1,941,536	443,775	1,449,092	495,475	2,388,342
Absolute Growth	1,052,841	554,943	106,208	528,560	78,284	713,052
% Change	30%	40%	31%	57%	19%	43%

Exhibit 4-6
Study Area Changes in Land Use Assumptions

Years	Total Population	Total Households	Retail Employment	Office Employment	Industrial Employment	Total Employment
2006	57,789	19,982	2,602	4,348	605	7,555
2030	100,369	38,630	3,230	8,780	1,010	13,020
Absolute Growth	42,580	18,648	628	4,432	405	5,465
% Change	74%	93%	24%	102%	67%	72%

4.3 2006 Model Base Year Comparison

The focus of this modeling effort is on forecasting potential transit demand in the study area. To ensure that there were no inherent model issues related to transit forecasting in the area, existing ridership on all key transit routes in the area was compared with model outputs. This comparison is shown in Exhibit 4-7.

Exhibit 4-7
Base Year Transit Ridership Comparison

Route	Route Type	Spring 2009 Count	Model Estimate	% Difference
143	Peak	510	540	6%
149	Local	110	270	145%
158	Peak	620	600	-3%
159	Peak	500	460	-8%
168	Core	1,040	800	-23%
912	Local	40	30	-25%
Total		**2,820**	**2,700**	**-4%**

In general, for transit routes with less than 1,000 riders per day, a forecasting error of +/- 25% would be considered reasonable. Although there are some variations by route, in general the total difference in transit ridership in the study area is within 4% of actual ridership counts. This is considered a well-validated model for the study area focus.

4.4 2030 Model Forecasts

4.4.1 2030 Network Assumptions

The 2030 model forecast required several assumptions about what the future transportation network would be in the region. As a general rule of thumb, only projects that have some level of secured funding were considered "built" in this analysis. Exhibit 4-8 highlights the key highway projects that were added to the network to create the 2030 baseline network.

No significant capacity projects were assumed on SR 18, SR 164, SR 169, or SR 516 in this analysis.

Exhibit 4-8
2030 Highway Network Assumptions

Route	BARM	EARM	County	Location	Description
005	139.56	144.63	King	Pierce County Line to Tukwila Stage 4	Add 1 HOV lane each direction
005	176.34	177.25	King	NE 175th to NE 205th	Add 1 Northbound Auxiliary lane
005	188.15	188.15	Snohomish	atSouth Everett Freeway Station DA	Add a DA to 112th
005	188.59	193.66	Snohomish	SR526 to SR 2 HOV	Add HOV lane in each direction
005			Pierce	Port of Tacoma Rd to King County Line	Add HOV lane
005			Pierce	Portland Ave to SR 18	Add Hov Lane
009	0.07	1.57	Snohomish	SR522 to SR 524	Add one lane each direction
009			Snohomish	176th to SR 92	Widening Project
016	3.12	8.79	Pierce	from Pearl St to Olympic Dr	add one HOV lane each direction
016			Pierce	I-5 to TNB	Add HOV lane each direction
018	0.93	1.76	King	WB TCL from SR 167 to Weyerhaeuser	Add a truck climing lane in the WB
099	8.25	9.27	King	S 284th to S 272nd	Add 1 HOV lane each direction
161	17.56	21.30	Pierce	from 176th to 234th	add onelane eachdirection and a TWLTL
161	33.72	35.31	King/Pierce	Jovita Blvd to S 360th St.	Widen to 5 lanes
162	31.49	33.27	Pierce	from 36th to Jovita	add onelane eachdirection and a TWLTL
167	15.45	17.40	King	15th St SW to 15th St NW	Add NB HOV lane
167			Pierce	I-5 to SR 512 (Tacoma to Edgewood)	New freeway
405	0.96	3.63	King	from Sr 181 to SR 169	Add one GP lane each direction
405	18.08	20.70	King	from 85th to 124th	Add one GP lane each direction
405	20.76	20.76	King	128th Direct Access Ramps	Add overcrossing and direct access ramp at 128th
405			King	SE 8th to I-90	Add 1 lane each direction
405			King	SR 169 to I-5	Add 1 lane each direction
405			King	I-5 to SR 169	Add a GP lane each direction
410	6.76	8.01	Pierce	from214th to 234th	Add one lane each direction
509			**King**	**From existing South end to I-5**	**New freeway**
518			King	Airport Way to I-5	Add one lane in EB direction
520	7.75	10.25	King	Sahalee Way to SR 520	Add 1 lane each direction
520			King	W Lake Sammamish PKWY to SR 202	Add 2 lane each direction
520			King	I-5 to SR 405	Replace bridge and add HOV lane
522			Snohomish	Snohomish Brg to US 2	Add one lane each direction
900			King	SE 78th to I-90	Add one lane each direction

For the transit networks, the completion of the ST2 was assumed, which will provide light rail transit from Federal Way to Lynnwood, expanded commuter rail and express bus service, and light rail transit from Seattle to Overlake Transit Center. The increased commuter rail service included more peak period, reverse direction trips; however, no new mid-day services were assumed in the modeling. This assumption was confirmed by Sound Transit staff. The

remaining transit network was not significantly altered from the baseline. These assumptions are consistent with many of the projects currently underway in the region.

4.4.2 2030 DMU Ridership Forecasts

It was assumed that the DMU line would run from the Maple Valley Park-and-Ride west of SR 169 to the current commuter rail station in Auburn. In total, three stations were assumed for the proposed DMU rail corridor. The stations are shown in Exhibit 4-9. For travel demand forecasting purposes, each DMU station was assumed to have park-and-ride capacity for up to 1,500 vehicles. This assumption was intended to be viewed as an unconstrained demand and does not necessarily reflect the proposed station layout.

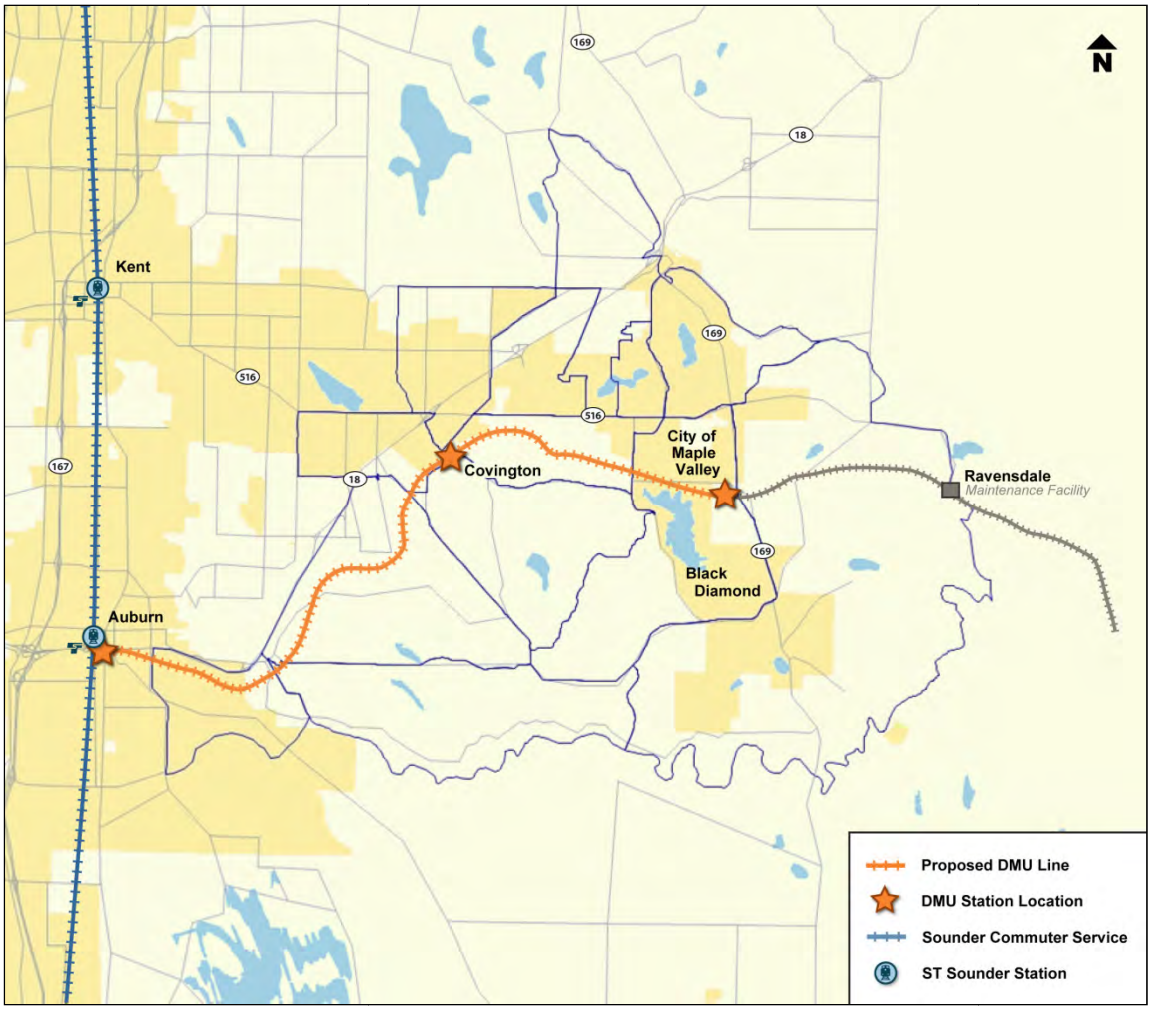


Exhibit 4-9
DMU Corridor

Travel demand modeling of transit projects requires a few key inputs, including the following:

1. Speed of Service
2. Dwell Time at Stops
3. Frequency of Service

For this analysis, it was assumed that the DMU service would operate at 40 mph in each direction. It should be noted that due to the vertical grades in the eastbound direction, the travel speeds of the DMU would likely be less than the assumed 40 mph that was modeled. A sensitivity analysis was run at 30 mph and 35 mph speeds in this direction; however, the modeling did not show a significant difference in ridership, with the changes seen well within the model variation. Due to the reliability of the service, the trains were assumed to dwell at the stations for 1 minute.

The single greatest driver of ridership in a travel demand model is the frequency of service. A variety of service frequencies ranging from every 5 minutes to once per hour were run to help determine the sensitivity of the forecast to the level of service. Exhibits 4-10 and 4-11 highlight the difference in ridership forecasts due to the frequency of service of 15- and 30-minute headways.

Exhibit 4-10
2030 DMU Ridership Forecast – 15-Minute Headways

Route	2030 Model 15-minute Peak Headway for DMU				
	Peak Headway	Peak Ridership (AM + PM)	Off Peak Headway	Off Peak Ridership (Rest of Day)	Daily
149	~ 45	220	> 60	310	530
168	60	600	60	590	1,190
DMU	15	1,630	15	560	2,190
Total	**-**	**2,450**	**-**	**1,460**	**3,910**

Exhibit 4-11
2030 DMU Ridership Forecast – 30-Minute Headways

Route	2030 Model 30-minute Peak Headway for DMU				
	Peak Headway	Peak Ridership (AM + PM)	Off Peak Headway	Off Peak Ridership (Rest of Day)	Daily
149	~ 45	220	> 60	310	530
168	60	630	60	590	1,220
DMU	30	820	30	320	1,140
Total	**-**	**1,670**	**-**	**1,220**	**2,890**

At 15-minute headways, the ridership potential for the DMU corridor was approximately twice that of 30-minute headways. Although these data show that the more frequent service would lead to higher usage, the operations of the corridor also need to be considered before service levels can be assumed. It is highly likely that 15-minute headways would not be practical on the route and would lead to severe impacts on any possible freight movement on the corridor. Thirty minute headways are considered much more practical from a rail operations point of view. With 30-minute headways, the daily ridership was forecasted to be approximately 1,200 riders per day. As a point of reference, fourth quarter 2009 ridership on Sounder from Everett to Downtown Seattle is approximately 1,200 riders per day, and 7,500 riders per day between Tacoma and Seattle.

4.4.3 2030 SR 18 Express Bus Ridership Forecasts

An alternative to the proposed DMU line was also considered and similar levels of ridership forecast were generated. The bus alternative included a new SR 18 express route from the existing park-and-ride lot near SR 169 and SR 18 and the Auburn commuter rail station. The routing is shown in Exhibit 4-12. Current King County Metro routes 149 and 168 were also analyzed for increased bus service levels. Route 149 runs along SR 169 between Black Diamond and downtown Seattle and Route 168 runs between Maple Valley and Kent along the SR 516 corridor.

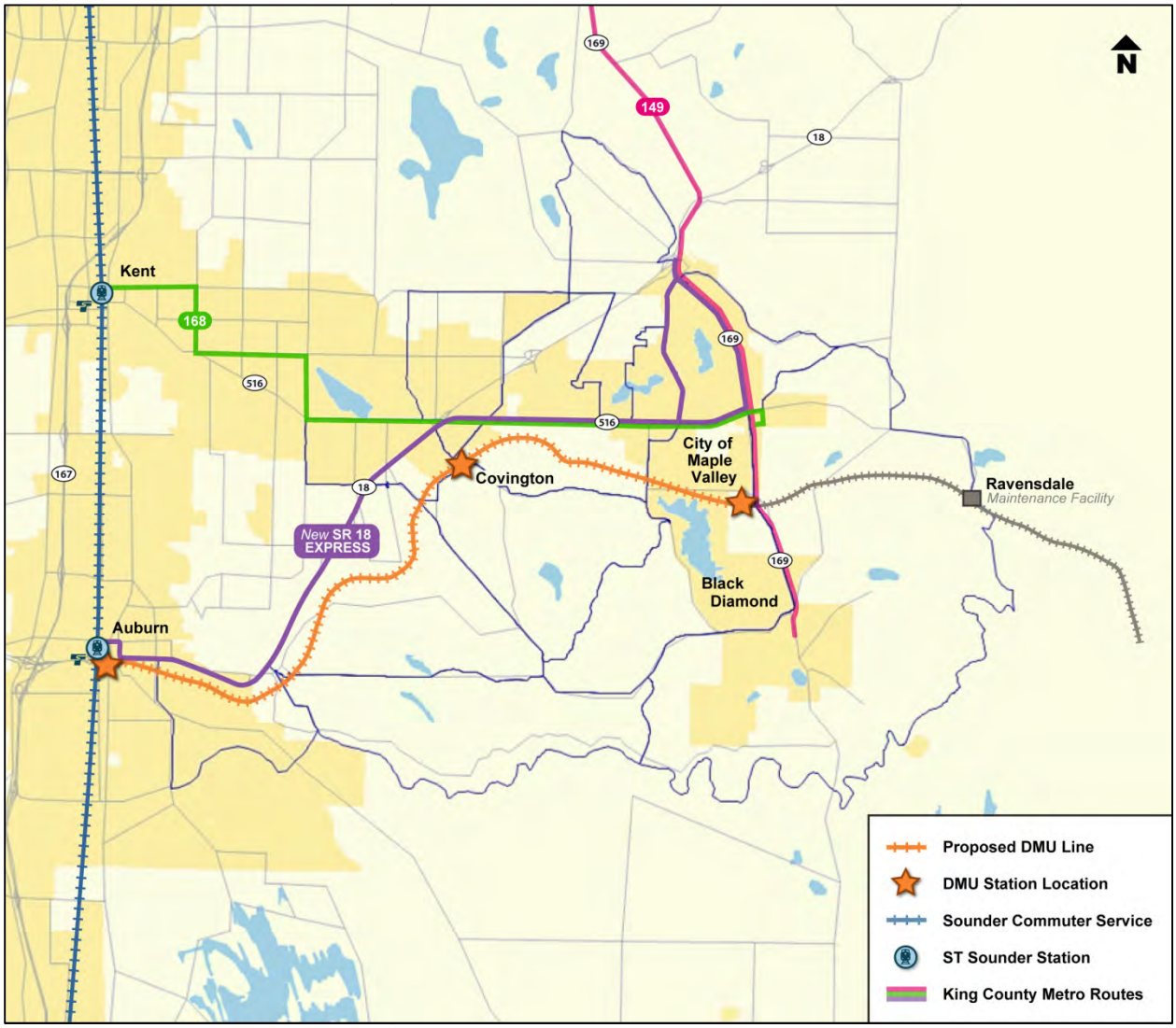


Exhibit 4-12
SR 18 Express

The bus alternative did not assume any new park-and-ride capacity along the proposed routes; however, it did assume transit signal priority along SR 516 between SR 169 and SR 18 in Covington and SR 18 and Kent.

A variety of service frequencies ranging from every 5 minutes to once per hour were run to help determine the sensitivity of the forecast to the level of service, highlighting the difference in ridership forecasts due to the frequency of service of 15- and 30-minute headways. Exhibits 4-13 and 4-14 highlight the differences in ridership forecasts due to the frequency of service of 15- and 30-minute headways.

Exhibit 4-13
2030 SR 18 Express Ridership Forecast – 15-Minute Headways

Route	2030 Model 15-minute Peak Headway for SR 18 Express				
	Peak Headway	Peak Ridership (AM + PM)	Off-Peak Headway	Off-Peak Ridership (Rest of Day)	Daily
149	15	940	60	450	1,390
168	30	1,250	60	720	1,970
SR 18 Exp	15	1,090	30	410	1,500
Total	**-**	**3,280**	**-**	**1,580**	**4,860**

Exhibit 4-14
2030 SR 18 Express Ridership Forecast – 30-Minute Headways

Route	2030 Model 30-minute Peak Headway for SR 18 Express				
	Peak Headway	Peak Ridership (AM + PM)	Off-Peak Headway	Off-Peak Ridership (Rest of Day)	Daily
149	30	510	60	450	960
168	30	1,250	60	720	1,970
SR 18 Exp	30	670	60	250	920
Total	**-**	**2,430**	**-**	**1,420**	**3,850**

At 15-minute headways, the ridership potential for the SR 18 express services was approximately 1,500 riders per day. At 30-minute headways, this ridership potential dropped to approximately 900 riders per day. These ridership estimates are approximately 20% lower than the DMU ridership estimates at 30-minute headways and over 30% different at 15-minute headways.

The Route 168 ridership estimates increased from 1,200 riders per day at current service levels to almost 2,000 riders per day with 30-minute headways, a 60% increase. Route 149 showed an increase of approximately 400 riders per day at 30-minute headways, an 80% increase. The Route 149 and 168 service improvements were not tested with the DMU line; however, it is highly probable that similar ridership increases could be realized with service improvements to these routes because they do not directly serve the same markets as the DMU service.

Chapter 5: Rail Operations Analysis

5.1 Introduction

This chapter describes the manner in which a potential passenger transportation service is delivered through operation of passenger trains, and supporting infrastructure such as track and train-control systems necessary to support the transportation service. Several operational scenarios are described here along with the infrastructure that would be necessary to support them.

Major elements of a passenger transportation service are as follows:

1. *Location* – the rail passenger service corridor and the locations where trains stop for passengers to board or depart from trains.
2. *Equipment* – the nature of the locomotives, passenger cars, or self-propelled passenger cars used to provide the service.
3. *Schedule* – the days and times when passenger services are provided, and the headway between trains.
4. *Speed* – the maximum speed of passenger trains and the total running time between the endpoints of the service.
5. *Reliability* – the anticipated capability of the service to deliver on its schedule, the potential for service disruptions, and the methods of service recovery following a disruption.
6. *Freight Train Effects* – for passenger services that are hosted on freight railroads, the effects of each the passenger service and the freight service upon the capacity, frequency, reliability, and running times of the other.

Each of these elements is described in this section. This section concludes with a summary of the generalized benefit-cost ratios of each of the operational scenarios analyzed.

"Methodology" is the study methods, tools, and data sources used to create this operational analysis. "Assumptions" is the key assumptions used to limit the scope of the study. Some of these assumptions were provided by the study sponsors, while others were selected by the study authors.

Principal methodological tools used in this study to evaluate the rail line and the operational scenarios are typical of engineering/operational initial feasibility studies for the suggested passenger rail services, as follows:

1. Visual evaluation of the subject rail line for its general condition, topography, environmental, geological, and alignment characteristics, and the general nature of land uses immediately adjacent to the line.
2. Railroad-source documentation, both written and oral, about the subject rail line. These included discussions with BNSF, railroad operational and engineering documents such as track charts, and employee timetables.
3. General experience of the study authors with the specific line, the operating and engineering practices of BNSF, commuter passenger-rail operations and co-located passenger/freight rail operations, and with train dispatching practices and typical results of the train-dispatching and prioritization process.
4. Train-performance calculator – a software tool that calculates the best track speed that can be obtained for a train or self-propelled rail vehicle, for a given rail alignment, train-control system, and maximum speeds afforded by the quality of the track structure.
5. Timetabling and traffic modeling software – tools used to combine schedules into a service and operating plan, determine crew and equipment requirements, determine the interactions among the DMU and freight trains, and determine potential infrastructure requirements.

Not used as a methodological tool was the Rail Traffic Controller (RTC) operations simulation model. RTC is a software tool that enables the analysis of the effects of interactions of multiple trains occupying a rail line simultaneously, and can reveal conflicts in a train schedule or insufficiencies of infrastructure arrangement and capacity. RTC modeling is typically conducted in the final phases of operational planning to validate proposed schedules and infrastructure only after there is a high degree of expectation that the schedules and infrastructure are practical.

Assumptions used in this feasibility study are crucial in order to understand, as they help frame and limit the feasibility study so it will be manageable in duration and cost. Furthermore, each assumption has multiple implications that introduce details into the operating scenarios that can have substantial cost and benefit effects. Key assumptions used in this study, and the general rationale for adopting each, are as follows:

1. The Stampede Pass line would continue to be shared with freight trains, existing freight train flexibility and capacity would be maintained, and future freight train capacity growth would

not be unduly constrained. The rationale for this assumption is that diverting existing freight traffic on the rail line to an alternative rail line(s) would (1) likely require creation of new capacity on alternative rail lines; (2) could constrain economic growth potential for the region; and (3) would likely require extensive study of freight and passenger train growth and service models for the Pacific Northwest region.

2. The existing BNSF alignment between Auburn and Ravensdale would be used with no significant changes to the alignment of the main track (other than changes in super-elevation and potentially curve spiral lengths), and excursions of track, structures, or station infrastructure out of the right-of-way would be minimized to the greatest extent possible. The rationale is that land acquisition for a realigned corridor typically incurs significant cost, may require a lengthy public involvement period, and may require extensive environmental, land use, and other permitting actions.

3. Existing or near-term technology only would be considered for equipment, track, and train-control systems. The rationale for this assumption is that future technologies are not understood, numerous cost and benefit assumptions would be required, and the actual practicality of potential new technologies is unproven.

4. Existing and expected new FRA regulations would be complied with. The rationale is that exemptions may not be granted, and failure to achieve exemption may introduce cost, schedule, and technical uncertainties. Specific key regulations required for this rail operation are discussed further in this section.

5. DMU passenger vehicles are expected to be used to provide the passenger train service instead of conventional locomotive-hauled passenger coaches. DMU technology, which became technically and economically successful for North American conditions in the early 1950s, has been broadly employed throughout North America for low-density and moderate-density passenger services. The reasons for this assumption that DMUs are appropriate for a potential service are (a) passenger ridership loads on the corridor are unlikely to require higher-capacity locomotive-hauled conventional passenger trains; (b) DMUs offer a lower cost for acquisition, supporting infrastructure, and maintenance; and (c) DMUs have adequate maximum-speed and acceleration characteristics to support a potential service. The selection of DMUs reduces the length of sidings and support tracks due to the shorter length of DMUs compared with locomotive-hauled passenger trains.

6. Each DMU train will consist of three cars, two powered and one non-powered. A potential drawback of DMUs is their questionable ability to shunt track circuits and activate wayside signal systems. “Shunting” refers to the completion of an electrical circuit between the rails

when rail vehicle occupies a track section. Completing the circuit informs the wayside signal system that the track section is occupied by a train and activates the signal system. Light-weight, low-axle-count rail vehicles might not provide a sufficiently low-resistance electrical pathway to shunt a track circuit under certain conditions. The BNSF Railway Track Shunting Rule states "Train, engine and other such movements consisting of less than 12 axles must approach road crossings at grade equipped with automatic crossing warning devices prepared to stop until it is determined that the warning devices are operating properly." Most DMUs are manufactured as single four-axle vehicles, which can be coupled together to increase capacity while remaining under the control of a single engineer. Compliance with BNSF's 12-axle rule will require the use of at least three DMU vehicles. In order to meet the BNSF rule, each DMU train in this corridor would need to consist of two powered DMUs with a control cab on each end and one unpowered DMU trailer in the middle, thus enabling the train to operate in either direction without turning at either end of its run. Pending signal system technologies may change this requirement; however, it is prudent to base planning on known conditions and requirements.

7. FRA-compliant DMUs are to be employed. "FRA compliant" refers to vehicles that meet applicable Federal Railroad Administration regulations for carbody strength and crash survivability. These regulations increase vehicle weight considerably, with corresponding tradeoffs in vehicle acceleration performance, cost, engine types, and maintainability. FRA compliance is essentially a U.S.-only requirement, which in turn implies that vehicles manufactured in other countries may not be suitable for use on an FRA-compliant rail line. The rationale for this assumption is that rail lines that use non-compliant vehicles require total separation from freight trains either physically or temporally. BNSF will not entertain temporal separation on the Stampede Pass line as the traffic on the line consists of long-distance movements that must fit into traffic patterns and connections a day or two into the future such as making connections at Northwest Ports from Chicago originating trains. Complete physical separation has significant effects on infrastructure cost (to construct a parallel, separate track and train-control system). Pending signal system technologies and perhaps an associated change in FRA safety philosophy and practice may change this requirement; however, it is prudent to base planning on known conditions and requirements.

8. Station platforms will need to be compatible with the Americans with Disabilities Act (ADA). This act requires platforms to be at the same height as car floors, with a minimum gap (3 inches), to reduce difficulties for disabled persons when boarding or alighting from trains. The rationale is that a rail operation that assumes that exemption from the ADA requirement will be granted introduces uncertainty for cost and time, as well as potential loss of overall feasibility if an exemption is not granted.

9. Station platforms will be 300 feet long. Adhesion of the wheels to the rails can vary depending upon atmospheric conditions. In safety-critical-location stopping, such as for signals, trains approach the stopping point slowly to ensure that there is no deviation from the required stopping point. Commuter train schedules are devised with the intention of trains approaching stations at normal speed for the greatest possible length of time and stopping with a full brake application in order to minimize travel time. The normal deviation from the desired stopping point because of this approach is accommodated by platforms that are longer than the train. The additional platform length is not significant to the project cost.

10. Since the rail line is owned and operated by BNSF Railway, the study used BNSF standard practices, technology, design, construction, and maintenance specifications for operation, engineering, and train-control systems. Train-control systems and train management would be under the direction of BNSF for day-to-day operation.

11. Headways between trains would be not less than 20 minutes and not greater than 60 minutes. The rationale is that shorter headways would likely require costly infrastructure and would not generate significantly higher ridership, while longer headways would significantly degrade ridership. The most likely headway scenarios are 30 and 60 minutes, which are likely sufficient given the projected ridership.

12. Days of service are Monday through Friday during the morning and evening commute periods. The rationale is that weekday-only service, concentrated in the morning and evening commute periods, would capture the majority of the ridership potential in communities while significantly reducing operating costs. No mid-day service is contemplated.

13. Train set capacity would be between 225 and 250 persons. This amount of capacity would capture the forecasted ridership potential of the communities within the study area with set headways (see Assumption #8) without either overtaxing vehicle capacity or resulting in excessive increase in vehicle acquisition, operation, and maintenance costs.

14. The service would be operated by full-time employees working short or split shifts. Railroad operation involves extensive technical, procedural, and technical knowledge. Rail employees are continually tested for knowledge and compliance and must pass a written examination biennially. In addition, locomotive engineers must maintain qualification for a federal license. Their activity during the work day, including the time between partial shifts, is restricted by federal safety regulations. While part-time workers are not explicitly prohibited, it is unlikely that a suitable workforce could be found that would work part-time in the railroad environment.

Several assumptions are explained in greater detail below, where they are iterated for their effects on other assumptions and on the operating plan as a whole.

5.2 Development of Conceptual Train Schedules

This section describes the methodology by which a train schedule is developed, and the particulars of the development of the train schedule for this study. Train schedules are developed by iterating the interactions of track geometry, equipment types, and desired service levels against the costs of creating and maintaining infrastructure, and operation and maintenance costs for the trains themselves.

The first step in developing a train schedule is to calculate an accurate end-to-end running time, inclusive of station stops, for a proposed vehicle and track infrastructure combination. This running time is developed first as an "unconstrained running time," i.e., it is as if the train in question has the railroad to itself and is not affected by other trains, weather, or other conditions. This running time enables an apples-to-apples comparison with other vehicle/infrastructure combinations, enabling accurate comparisons to understand the impacts and costs of different potential schedule scenarios.

5.2.1 General Approach

An Operations Plan for a commuter rail service is a combination of the essential elements of the service, integrating the characteristics of the infrastructure as it is to be improved with the vehicle to be procured and other operating parameters to meet the potential customer's service needs. The development of an Operations Plan is an iterative process because as physical elements are added, new opportunities and constraints may arise. There is also the question of determining the most economical manner to provide the service described in the Rail Service Plan. In general, additions are incremental and not scalable. For example:

- If an additional siding is required for efficient train operation at 30-minute headways, it may make additional service possible at 20-minute headways because it adds more capacity than is actually needed; there is no reasonable way to add part of a siding.
- If an additional crew is needed, they will likely be paid for a minimum of 8 hours regardless of the number of hours of actual service performed by the crew.
- If an additional passenger coach is needed to meet demand for a specific train, it adds to the fleet size and overall capacity of the system. However, additional equipment can eventually have impacts on and spur demand for additional shop and personnel resources.

Elements that must be defined, either because they are existing constraints or assumptions include the following:

- Ridership (e.g., origins, destinations, demographics, time of day/direction of travel, and alternative mode choices for transportation).
- Travel times (estimated between stations, dwell times at stations for loading and unloading passengers, turn-around time at terminal stations).
- Train capacity, including the number of cars and the number of passengers per car.
- Train schedules proposed including days of operation, times of operation, and headways (elapsed time between successive trains).
- Crews, specifically number of employees, on and off duty location, required qualifications, and federal hours of service regulations.
- Track characteristics, specifically curves, grades, existing signal systems, speed limits and probable upgrades, track capacity under existing conditions, and additional infrastructure for capacity upgrades to existing infrastructure.
- Stations proposed, including platform length, parking, and amenities.
- Costs including estimated capital costs, projected operating costs for several years, and projections of farebox revenue under potential pricing scenarios.

The interrelationships between and among these elements is shown graphically in Exhibit 5-1 and in tabular form in Exhibit 5-2.

Exhibit 5-1
Drivers and Driven of Operation Plan Development

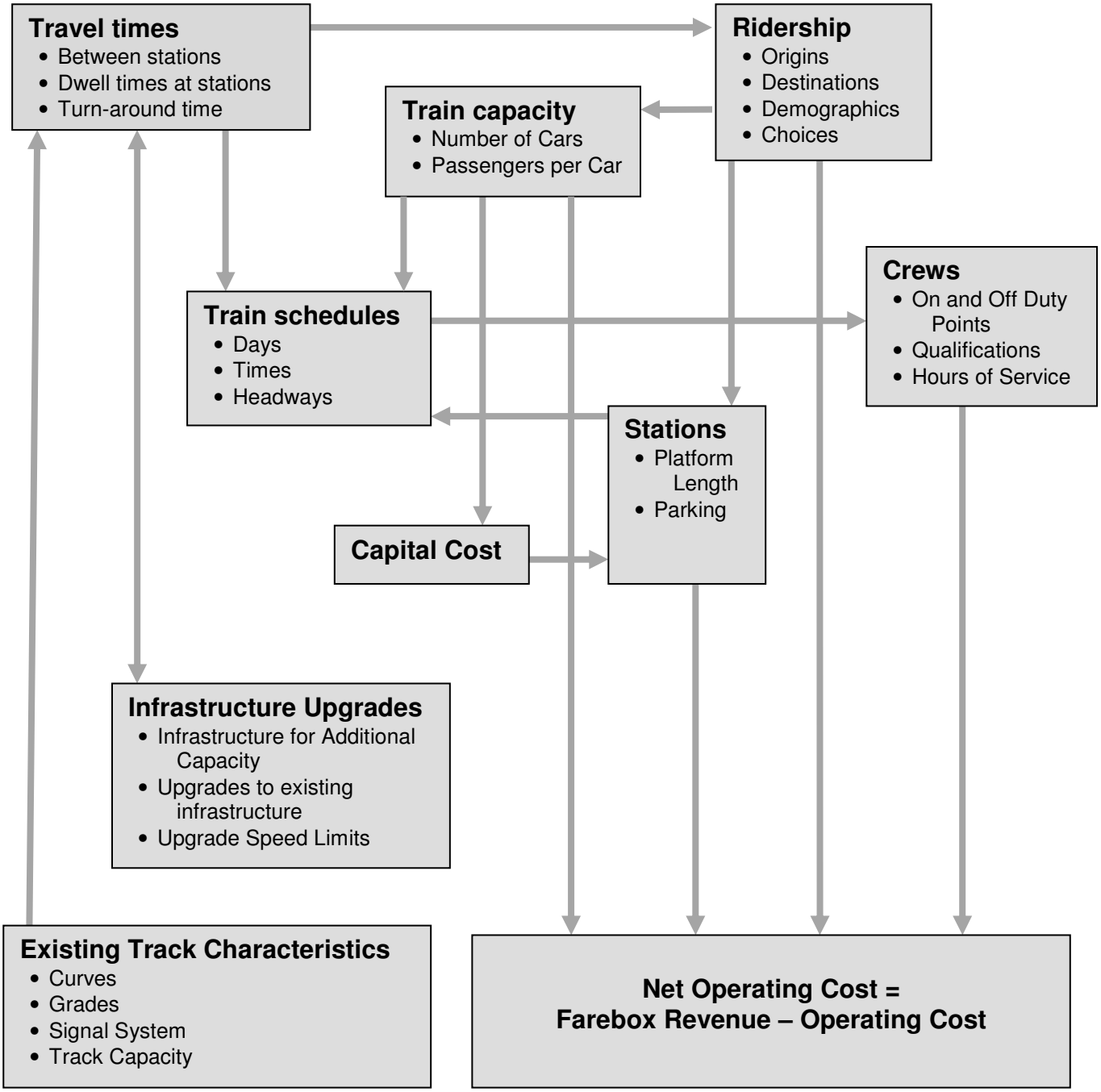


Exhibit 5-2
Driver and Driven of Operations Plan Development

Elements and Issues	Drives	Is Driven By
Ridership • Origins • Destinations • Demographics • Choices	Train Capacity Stations Costs (Farebox Revenue)	Travel Times Regional Growth
Travel Times • Between stations • Dwell times at stations • Turn-around time	Train schedules Track Upgrades	Existing Track Characteristics Track Upgrades
Train Capacity • Number of Cars • Passengers per Car	Train Schedules Costs Capital	Equipment Availability
Train Schedules • Days of Operation • Times of Operation • Headways	Track Upgrades Costs - Operating	Travel Times Train Capacity Stations Net Operating Cost
Crews • On and Off Duty Location • Qualifications • Hours of Service Rules	Costs	Train Schedules Labor Agreements Federal Regulations
Existing Track Characteristics • Curves and Grades • Signal System • Track Capacity	Travel Times	
Track Upgrades • Infrastructure for Additional Capacity • Infrastructure Upgrades • Speed Limits	Costs Capital	Train Schedules Travel Times
Stations • Platform Length • Parking	Costs Capital Train Schedules	Ridership
Costs • Capital • Operating Cost • Farebox Revenue • Net Operating Cost (Subsidy)	Project Feasibility Stations	Crews Train Capacity, Schedules Track Upgrades

5.2.2 Track Configuration

The development of realistic running times depends on accurate track configuration information and vehicle performance data. Track geometry and configuration, notably curvature, grades, turnouts, and station locations, affect train speed and therefore affect running time. For this study, track grade and curvature are assumed to be the current BNSF alignment. Aspects of the track configuration that were deemed available for improvement are super-elevation, siding construction or extension, and station location. Each of these aspects of the improvement was either largely or entirely accommodated within the existing BNSF right-of-way, or would require discrete and fungible land acquisitions (such as stations). In other words, reducing the sharpness of a curve requires acquisition of land to the inside of that curve regardless of existing land uses or environmental constraints, whereas location of a station can be selected to a significant degree to minimize land use conflicts or environmental constraints.

Super-elevation. Passenger train speed limits were calculated assuming 4-inch actual and 3-inch unbalanced super-elevation. Super-elevation is the raising of the outside rail of a curve to enable higher train speeds through the curve. Unbalance is a empirically-developed number added to the actual super-elevation to arrive at an "equivalent super-elevation." The maximum speed of the vehicle through a curve is set at the maximum allowable for a given combination of actual and unbalanced super-elevations. For example, on a curve with 3 inches of actual super-elevation, 3 inches of unbalanced super-elevation means that the vehicle can safely negotiate a curve that has been calculated for 6 inches of super-elevation: 3 inches actual and 3 inches unbalanced. Most railroads use 3 inches as their maximum unbalance, although 4 inches can be used with application to the FRA for an equipment-specific exemption. The FRA has a procedure for testing specific vehicles to allow 4 inches of unbalanced super-elevation. Increased actual or unbalanced super-elevation would require a significant amount of train dynamics testing and discussion with the host railroad, and is outside the scope of this feasibility study.

The amount of super-elevation affects the speed at which a train may negotiate a curve. Increasing actual or unbalanced super-elevation of a curve increases the speed at which trains are allowed to operate on the curve. Federal track safety standards (49 CFR 213) provide a formula for calculating maximum curve speed based on these two variables. The maximum actual super-elevation allowed by the federal regulation is 7 inches. BNSF standards limit super-elevation to 5 inches; however, BNSF generally prefers that super-elevation not exceed 2.75 inches. Care must be exercised in establishing the amount of super-elevation on curved track. Super-elevation is designed to be offset by centrifugal force at the maximum speed allowed. High super-elevation combined with heavy trains and tight curves may create "stringlining" issues for freight

trains, wherein the combination of drawbar forces, curvature, and super-elevation brings the center of gravity of a freight car across the inside rail of the curve, at which point the freight car overturns to the inside of the curve.

Station Location. Station location is an important component of running time calculation. For example, a station stop on track that has a 60-mph maximum authorized speed will have a much larger effect on train running time than a station stop on 30-mph track due to the longer acceleration time needed from 0 to 60 mph. A station stop that is located close to a speed restriction will also have a different effect than a station that is not.

This study assumes that all stations are located on a dedicated station track separate from the main track in order to avoid clearance conflicts between ADA-compliant, high-level platforms and freight trains. Freight trains include non-standard cars and equipment such as snowplows that exceed the width of passenger vehicles and do not clear the high platforms that are necessary for ADA compliance. (Low platforms, often used in joint freight-passenger corridors, are not carfloor height and thus not ADA compliant.) This is a result of recent federal regulatory interpretation that requires all stations to have carfloor-height boarding of all cars in a train rather than special ADA-compliant access for only one car of the train. Typical high-level platform height is 48 inches above the top of rail.

Running Times. Initial running times were calculated for the proposed super-elevation and alignment. For this calculation, track geometry and maintenance quality are proposed to be the highest that is commensurate with the existing curvature, enabling maximum speeds (on tangent track) of 80 mph (FRA Track Class 4). The running time calculation assumes that the Auburn station is immediately north of the 3rd Street SW bridge, with the speed limit for the turnout from the main track the same as the main track speed. The Covington station is assumed to be immediately east of Covington Way SE with a 35-mph speed limit on the turnouts from the main track. The Maple Valley station is assumed to be west of the Highway 169 bridge with a turnout speed of 50 mph.

Exhibit 5-3 shows the curve speed limits used as input data to the Train Performance Calculator (TPC). Currently, passenger trains must operate at the posted freight train speed. The new passenger train speed limit is the speed limit possible when increasing curve super-elevation to 4 inches and applying the calculation found in 49 CFR 213.239 [maximum speed = square root of ((super-elevation inches + 3) / (0.0007 x degree of curve))].

Exhibit 5-3
Curve Speed Limits used as Data in Train Performance Calculator (TPC)

Reference Location	Curve Number	Between MP	And MP	Curvature	Current Speed Limit	New Passenger Speed Limit
SE Ravensdale Way MP 88.3						
	89	89.2	89.7	2d21m	40	40
SR 169 MP 89.8						
	90	89.9	90.2	4d2m	40	50
	91	90.2	92.4	1d40m	40	78
216th Ave SE MP 91.5						
	92	92.4	92.7	2d1m	40	70
	93	92.7	93.1	2d30m	40	63
	93A	93.1	94.1	1d0m	40	79
	94	94.1	94.5	1d59m	40	71
Covington Way SE MP 94.7						
	Covington Station	94.5	94.8		40	35
	95	94.8	95.7	1d0m	40	79
	96	95.7	96.1	5d58m	35	41
	97	96.1	97.5	Max 3d16m	35	55
	97A	97	97.9	2d18m	35	66
	98	97.9	98.4	0d56m	35	66
	98A	98.4	98.6	8d0m	30	35
	98B	98.6	98.9	4d17m	30	43
	99	98.9	99.1	4d40m	30	43

Reference Location	Curve Number	Between MP	And MP	Curvature	Current Speed Limit	New Passenger Speed Limit
	99A	99.1	99.3	5d27m	30	43
		99.3	100.1		30	79
Green River MP 100.1						
	100	100.1	100.5	5d58m	30	41
	101	100.5	102.24	1d0m	25	79
Auburn-Black Diamond Rd MP 101.6						
		102.24	102.41		20	50
		102.41	102.46		20	35
		102.46	102.61		20	30
	102	102.6	102.7	2d30m	20	15
	102A	102.7	102.8	10d0m	20	15
	102B	102.8	102.97	10d15m	20	15
BNSF Seattle Subdivision MP 102.97						

5.2.3 Vehicle Characteristics

Two types of rail vehicles were used for the TPC calculations. The recently-manufactured DMU vehicles built for the Westside Commuter Express (WES) in Portland, Oregon, were considered a reasonable approximation of state-of-the-art, FRA-compliant technology. For comparative purposes, an analysis using conventional locomotive-hauled trains was also run, using trainsets (locomotives and coaches) currently in use by Sound Transit's Sounder service.

5.2.4 Running Times

Running times were calculated by TPC computer software. The TPC uses the track and vehicle information as the basis for calculation. All resistance forces (e.g., friction, gravity, and acceleration) and all propulsive forces (e.g., propulsion power, momentum, and gravity if applicable) are combined in a formula that is recalculated for 1-second intervals of the train's travel. At the end of each second's calculation, the resulting train position and speed are noted.

These are used as input for the next calculation and are also used as input in a separate integrated model of how the engineer would control the power and brakes. The TPC's output is a table of the train's location and speed for each second of the trip.

Exhibit 5-4
Schedule Running Time for a DMU Set

WEST		EAST
00:00	Maple Valley 13.16	00:20
00:04 00:05	Covington 8.42	00:12 00:11
00:20	Auburn 0.0	00:00

DMU Running Time

Exhibit 5-4 shows the schedule running time for a motor-trailer DMU set. The average speed is 39 mph. The "motor" is a DMU that is powered; the "trailer" is an identical car except not powered. Each car has a cab at one end, enabling the train to reverse direction without being turned to face in the opposite direction. A motor-trailer combination would typically have eight axles if composed of two coupled units (2 cars). Two motor cars and a trailer car are required to meet BNSF's 12-axle requirement for track shunting signal activation. The running time difference between the 2-car and the 3-car DMU configuration is not significant.

Locomotive and Commuter Coaches Running Time

The running time was estimated using the same track data and a commuter train consisting of an F59 locomotive and two Bombardier tri-level commuter coaches, the same equipment used by Sound Transit in Sounder commuter service. The scheduled running time was virtually identical in both directions for the DMU and a locomotive-hauled passenger train.

Recovery Time

Passenger train schedules have three components: raw running time, dwell time, and recovery time. Raw running time is the time actually needed to make the trip allowing for all predictable events that typically affect the running time. Dwell is the amount of time scheduled to be spent stopped at stations. Recovery time is an amount of time equal to about 8% of the total of raw running time and dwell time. This 8% factor is empirically derived from experience with similar commuter rail systems. Schedule running time is the total of raw running time, dwell, and recovery time. All schedules depicted in this study include 2 minutes of recovery time.

Schedule Tolerance

Schedule tolerance is an amount of time that a train can be late and still be considered on time. Schedule tolerance for commuter service is typically 5 minutes in most North American operations. However, operational planning must include the lateness allowed in the schedule tolerance so that delays do not propagate from one train to another, such as a train terminating at

one end of a corridor, changing direction, and emerging in the other direction as a new train. Because the distance and schedule running time are relatively small in this corridor, and economical use of equipment and infrastructure is dependent upon precision, schedule tolerance is assumed to be 2 minutes.

5.3 Train-Control Systems

Train-control systems are the systems by which trains are authorized for movement on controlled tracks, kept separate from each other to avoid collisions, and advised of track conditions ahead so that engineers can operate their trains appropriately. The purpose of a train-control system is to allocate space on the railroad for trains in a manner that derives utility, safety and efficiency from both the trains and the track. Train-control systems may use verbal, visual, or digital transmission of authority to the train crew. The most common verbal system in North America is Track Warrant Control (TWC), which consists of the dispatcher authorizing train movement within discrete limits and on a specified route, by radio communication. The TWC system is commonly used on low density lines and is currently in use on the BNSF Railway's Stampede Pass line including the segment from Auburn to Kanaskat. The most common visual system is wayside (or block) signaling, which consists of an automatic signal system that detects the presence of trains within blocks (discrete track segments) and sets signals at trackside to display lights whose color and condition (steady or flashing) conveys information to train crews observing the signals. Most block signal systems in the U.S. have a command-overlay called Centralized Traffic Control (CTC), which enables dispatchers to set priority of train movement, direction, and route within the automatic safety checks of the block signal system.

Neither TWC nor CTC enforce the adherence of trains to the instructions given verbally or visually. Train crews must adhere to the instructions to operate safety – the automatic features of a block signal system serve only to prevent the block signal system itself from delivering unsafe or conflicting instructions to trains, and do not prevent trains from failing to observe signals and act in accordance with their indications. In recognition of this lack of automatic safety enforcement of verbal and visual instructions, and in response to several recent multiple-fatality train accidents, the Rail Safety Act of 2008 was enacted, requiring installation by December 31, 2015, of a Positive Train Control (PTC) system on virtually all principal rail lines hosting intercity or commuter passenger trains, or freight trains carrying toxic inhalation gases. The BNSF Railway's Stampede Pass line will, by virtue of its annual gross freight train tonnage and its ownership by a Class 1 railway (BNSF), fall within the purview of the act. Therefore, a PTC system will almost certainly be required on the line by the end of 2015 for the commencement of passenger-train service.

BNSF's TWC system, as introduced above, uses a system of verbal authority transmitted by the train dispatcher to the train crews by radio. The crew must write the instructions onto a form and repeat them to the train dispatcher, who then must approve the repeated version before it is effective. This method is time consuming and only appropriate for low- to moderate-density traffic rail lines. TWC control is not effective for most commuter operations.

In contrast, CTC enables the dispatcher's instructions to trains to be transmitted at a faster rate, and generally incorporates power-operated turnouts between track, both of which serve to increase actual, realized train speeds and enable higher train densities. This feasibility study assumed that the portion of the Stampede Pass Line between Auburn and Kanaskat would have a CTC traffic control system with a PTC overlay. The CTC traffic control system would need to extend all the way out to Kanaskat in order to appropriately interface BNSF freight trains with DMU commuter trains. The BNSF is currently developing and testing technology for its version of PTC. The configuration, performance, and cost of the PTC system that BNSF will ultimately deploy is unknown at this time.

5.4 Track Infrastructure Development

Several iterative steps are typically followed to develop the track infrastructure needed to support a commuter train service on existing freight railroad lines. First, it is necessary to determine the infrastructure needed to support the commuter service in isolation from any freight trains. This infrastructure includes station tracks, storage tracks, and sidings necessary to operate the commuter service described by the associated service and operating plans. Second, additional infrastructure is added to maintain existing and anticipated future freight train capacity, flexibility, and reliability. It is sometimes necessary to determine if the current quality of operation is the level at which the freight railroad desires to be kept, or if infrastructure should first be planned to establish the desired level of service for freight before beginning the superimposition of the new or expanded passenger service on the line. The BNSF Stampede Pass Line has low capacity for railroad operations; however, the capacity limitation is not found within the DMU study area or related to local operation, so no preliminary improvements for quality of freight operation were considered in the study. The final stage is to superimpose the passenger train operation on the existing freight operation and determine the infrastructure needed to maintain both services simultaneously.

5.4.1 Commuter Service Alternatives

Headway. A constant headway (fixed interval) timetable minimizes infrastructure requirements. It also facilitates operational consistency for train crews and management because every trip is

similar. Constant headway can be any amount of time that is the same between all trains. For example, a train departing each endpoint every 25 minutes is a constant headway timetable. Clockface headway has the additional advantage of providing the same service at the same time of the hour, every hour. Clockface headway is the most convenient for passengers but also provides additional benefits to operation. Employees can be more familiar with the pattern without having to look up the nuances of every trip. For example, 25 minutes between trains is constant, but a pattern of trains at :00, :25, :50, :15, :40, :05, and so on is more difficult to memorize and repeat for both train-service employees and passengers.

Clockface headway has a cost disadvantage compared with other constant headway arrangements. Clockface headway requires specific infrastructure at specific locations regardless of cost or construction difficulty. A lower cost alternative involves developing a constant headway using only existing or easier to construct, lower cost infrastructure or to increase schedule running time to allow use of the lower cost infrastructure. The study examined headways of 15, 20, 23, 30, 33, and 60 minutes. The Startup Service plan 60-minute clockface headway presented no capital or operating cost that required an alternative headway. The Full Service Plan headway of 33 minutes was selected because of a significantly lower capital and operating cost than a 30-minute or shorter headway service.

5.4.2 Connection with Sounder Trains

Sounder trains do not operate on constant headways (see Exhibit 5-5). The current (2010) time intervals between morning trains are 41, 25, 25, 25, 29, and 40 minutes. The times between evening trains are 35, 30, 25, 27, 28, and 35 minutes. Examination of a service designed to connect directly with all current Sounder trains at Auburn demonstrated a substantially greater capital and operating cost requirement than for constant headway schedules. However, Sounder service is scheduled to a combination of Sounder commercial requirements and BNSF operational needs which both could be expected to change with the passage of time. To accommodate change and maintain connections with all Sounder trains, the capital cost would be substantially higher than the cost of meeting the existing schedules. Infrastructure for a service that could connect directly with current and future Sounder service would require double track for the DMU service for the entire distance between Maple Valley and Auburn as well as the additional infrastructure needed for freight operations.

Exhibit 5-5
Sounder Schedule

Sounder	Desired Connection	Startup 1 Trainset	Full Service 2 Trainsets
Northbound			
	(5 minutes)		
5:20 AM	5:15 AM	5:15 AM	5:15 AM
6:01 AM	5:56 AM		5:48 AM
6:26 AM	6:21 AM	6:15 AM	6:21 AM
6:51 AM	6:46 AM		
7:16 AM	7:11 AM		
7:45 AM	7:40 AM	7:15 AM	7:27 AM
8:25 AM	8:20 AM	8:15 AM	8:00 AM
4:50 PM	4:45 PM	4:46 PM	
5:25 PM	5:20 PM		5:24 PM
Southbound			
	(10 minutes)		
6:36 AM	6:46 AM		7:00 AM
7:16 AM	7:26 AM	7:25 AM	7:33 AM
3:41 PM	3:51 PM	3:56 PM	3:51 PM
4:16 PM	4:26 PM		4:24 PM
4:46 PM	4:56 PM	4:56 PM	4:57 PM
5:11 PM	5:21 PM		5:30 PM
5:38 PM	5:48 PM	5:56 PM	6:03 PM
6:06 PM	6:16 PM		6:36 PM
6:41 PM	6:51 PM	6:56 PM	7:09 PM

5.4.3 Other Auburn Connections

There are also bus connections at Auburn to SeaTac, Bellevue/Overlake, Burien, Federal Way, Enumclaw, Sumner, Puyallup, Algona / Pacific, and locally within the Auburn area (see Exhibit 5-6). Between 4:54 AM and 9:31 AM there are 78 connecting buses or trains. The maximum time between connections is 11 minutes. Although direct connections with all Sounder trains are not practical, the 60-minute and 33-minute services both provide many direct and close connections to bus and Sounder service at Auburn.

Exhibit 5-6
Auburn Transit Center: Morning Bus/DMU Commute Connections

Time	Connection	Time Between Connections	Time	Connection	Time Between Connections
4:52	Metro Burien		7:08	Metro Burien	0:00
5:01	ST Overlake	0:09	7:16	Sounder North	0:08
5:12	Metro DART Pacific	0:11	7:16	Sounder South	0:00
5:14	Metro Burien	0:02	7:17	Metro Seattle	0:01
5:15	Metro Seattle	0:01	7:20	Metro DART Pacific	0:03
5:16	ST Overlake	0:01	7:24	ST Overlake	0:04
5:20	Sounder North	0:04	7:30	Metro Federal Way	0:06
5:31	ST Overlake	0:11	7:31	Metro Auburn CC	0:01
5:32	Metro Seattle	0:01	7:33	ST Federal Way	0:02
5:34	Metro Enumclaw	0:02	7:38	ST Overlake	0:05
5:45	ST Overlake	0:11	7:38	Metro Burien	0:00
5:50	Metro Burien	0:05	7:45	Sounder North	0:07
5:52	Metro Seattle	0:02	7:46	Metro Enumclaw	0:01
5:55	Metro Federal Way	0:03	7:47	Metro Seattle	0:01
5:55	Metro Enumclaw	0:00	7:54	ST Overlake	0:07
5:58	ST Overlake	0:03	7:54	Metro Federal Way	0:00
6:01	Sounder North	0:03	8:01	Metro Auburn CC	0:07
6:01	Metro Auburn CC	0:00	8:01	Metro DART N Auburn	0:00
6:09	ST Overlake	0:08	8:03	ST Federal Way	0:02
6:12	Metro DART Pacific	0:03	8:14	Metro Burien	0:11
6:15	Metro Enumclaw	0:03	8:16	Metro DART Pacific	0:02
6:18	Metro Burien	0:03	8:20	Metro Federal Way	0:04
6:22	Metro Seattle	0:04	8:25	Sounder North	0:05
6:25	ST Overlake	0:03	8:28	ST Overlake	0:03
6:26	Sounder North	0:01	8:31	Metro Auburn CC	0:03
6:30	ST Federal Way	0:04	8:33	ST Federal Way	0:02
6:30	Metro Federal Way	0:00	8:35	Metro DART SE Auburn	0:02
6:31	Metro Auburn CC	0:01	8:44	Metro Burien	0:09
6:36	Sounder South	0:05	8:55	Metro Federal Way	0:11
6:39	ST Overlake	0:03	9:01	ST Overlake	0:06
6:42	Metro Burien	0:03	9:01	Metro Auburn CC	0:00
6:51	Sounder North	0:09	9:01	Metro DART N Auburn	0:00
6:52	Metro Seattle	0:01	9:03	ST Federal Way	0:02
6:54	ST Overlake	0:02	9:14	Metro Burien	0:11
7:00	ST Federal Way	0:06	9:16	Metro Enumclaw	0:02
7:00	Metro Federal Way	0:00	9:16	Metro DART Pacific	0:00
7:01	Metro Auburn CC	0:01	9:25	Metro Federal Way	0:09
7:08	ST Overlake	0:07	9:31	Metro Auburn CC	0:06

5.4.4 Running Time and Equipment Sets

Raw running time plus 1-minute dwell at Maple Valley and Covington is 18 minutes. Recovery time of 8% is 2 minutes rounded to the nearest minute. Schedule running time is 20 minutes. A round-trip must include time to de-activate the control cab at the end of the train that was in the lead upon arriving and time to activate the control cab at the opposite end of the train including testing the air brakes and initiation of the PTC system. During the change of directions procedure, the operator must walk the length of the train as well as lock the de-activated control cab and unlock the control cab for the return trip. A minimum of 5 minutes is assumed for the entire procedure, but initiation time for the PTC system may increase this time significantly depending on the configuration of the PTC technology ultimately deployed by the BNSF. There must be a second change of direction before a set of equipment can begin a second round-trip cycle. Therefore, the total headway between trips of the same equipment must be at least 50 minutes (20 minutes west, 5 minutes turnaround, 20 minutes east, 5 minute turnaround).

5.4.5 Auburn Station

The scenarios all assume that the Auburn DMU station is located immediately north of the 3rd Street NW bridge at the south end of the Sounder platform adjacent to the east BNSF main line track. This location is adjacent to Bus Bays 3 and 4 and is about 260 feet from Bus Bays 1 and 2 and the center of the Sounder boarding area. The rear of a southward Sounder train is about 890 feet from the DMU station and also involves use of stairs or elevator up to the overhead bridge and back down. A passenger arriving on the rear car of a southward Sounder train could easily require 7 minutes to reach a connecting DMU train. A passenger arriving on a northward DMU connecting to a northward Sounder train could require 2 minutes walking time. These times must be considered when developing direct connection schedules.

DMU service using the current main track station platform at Auburn was investigated and determined not to be practical. There is not enough existing main line capacity to accommodate the DMU 5-minute turnaround times. Each DMU train entering the BNSF's Seattle to Portland main line and stopping at the existing Auburn Platform would use the equivalent of two trains of capacity.

5.4.6 Type of Service and Length of the Service Day

There are two basic ways to provide rush hour commuter rail service. The simplest approach is to operate one or more trains in the normal commute direction in the morning, returning in the evening. The advantage to this approach is that the amount of main line infrastructure required to accommodate the service is minimized. Single direction service requires the smallest amount

of capacity that can be occupied by a commuter train service. The stations can be designed to accommodate only a single train.

On the other hand, there are potentially greater costs to operating a one-way rush hour commute service. The endpoint stations must be able to accommodate all the vehicles simultaneously. The number of vehicles required may be greater for a one-way service than for a continuous service. The difference may be substantial in equipment cost between operating one-way service and operating two-way service in which equipment returns from the primary destination to the primary origin. Although there may be only a limited ridership in the reverse direction, offering the return trip as a revenue train provides an opportunity for revenue (such as night workers returning home in the morning) on a train that must operate anyway.

There are two significant elements that must be considered in determining whether to provide off-peak service. First, there must be capacity available to operate the train. Capacity for off-peak trains is dependent upon the way in which infrastructure is designed for the peak period trains. If the railroad agrees to infrastructure that only supports the peak period trains but not normal freight operation, the railroad will expect to operate at will during the entire day outside of the peak period. If the new or expanded service allows the railroad to carry on normal operation during the peak period, it should be expected that capacity for the passenger service is available throughout the day.

The second element is cost. Train operation is a complicated trade that requires a substantial amount of training. Locomotive engineers must have a federal locomotive engineer license. Other railroad employees do not need a federal license but are required to pass biennial examination on a large body of rules and procedures. Railroad employees are subject to the federal hours-of-service law. This law not only limits the amount of time that a railroad worker may be engaged in operating trains, it also limits their activities outside the period of time in which they are operating trains. For that reason, most commuter train crew members are paid during their layover between morning and evening rush hour. The amount of the payment varies with individual situations; however, it is usually an hourly wage during the period of time between the morning and evening trips. It may be a wage at the full pay rate or a wage at a reduced payment, in some cases 50% of the normal hourly rate, or it may be a flat 2 days of payment for each day of work, one representing the morning and one the evening commute. This is reasonable for the employees because there is literally no other work activity that they may pursue during the time they are in legal rest between trips. Therefore, it may be cost-effective to continue service beyond the peak time.

5.4.7 Fleet Operation

Many commuter services use fleet operation in which several trains operate from a suburban terminal to a city terminal in the morning and return in the evening. It is possible to operate several trains with little or no new infrastructure needed to support the operation. One set of equipment is needed for each train to be operated and there must be sufficient storage track at both ends of the service to accommodate all the equipment. Generally, the length of the service area is such that there is little benefit found in returning equipment to the origin point to start an additional trip.

The Southeast King County service area is short, making fleet operation impractical. For example, hourly headway for 4 hours in the morning and evening requires four sets of equipment. By operating bi-directional service, the same service can be provided with one set of equipment. Further, fleet operation of 30-minute headways for the same 4-hour period requires eight equipment sets, whereas bi-directional operation requires two sets. Operating cost can also be substantially lower for bi-directional operation than for fleet operation. Each crew works one round-trip in fleet operation. The crew may work only 2 hours per day, depending upon the length of the service. Each crew of bi-directional operation works several trips up to a day's work consisting of 8 or more hours of actual train operation.

Fleet operation is not practical for the Southeast King County service and was not considered in this study.

5.4.8 Additional Trackage Requirements for DMU Service

For a scenario that involves more than one set of equipment, additional trackage is needed at places where two DMU trains are in the same place simultaneously – a "meet" event. The additional trackage always includes construction of the additional track necessary to accommodate the two DMU trains simultaneously. It may also involve construction of additional track to accommodate freight trains since the two DMU trains on two tracks would leave no ability to operate freight trains.

In order to meet the scheduled running time, each train that is in operation must be able to travel at its optimal normal speed. This normal speed is the speed developed to optimize and meet a defined schedule. The development of scheduling individual trains assumes that each DMU commuter train occupies a section of track for five minutes. The defined "schedule tolerance" is two minutes which means that a DMU train can be operating two minutes late and will still be considered to be operating "on-time." An individual train will need approximately three minutes of clearance time on the track ahead of it in order to avoid running into restrictive signaling that will require the train to slow down in order to prepare to stop short of an occupied track ahead of

it. The additional track and signal infrastructure required for simultaneous operation of more than one train must designed to allow for normal train operating speeds. The train schedules will have to be adjusted to accommodate the time consumed in meeting the opposing direction DMU passenger train movement, if this is not possible. This analysis process was used to define the preference of a 33 minute versus 30 minute headway in the Full Service Plan.

The operational scenarios are illustrated by stringline diagrams, a time/distance plot of train movement. The distance reads left to right and time reads from bottom to top. The stations are named along the bottom margin and time in hours is labeled along the left margin. It is possible to see where all trains are at a given time by looking horizontally along a line representing that time. It is possible to see when trains pass any location by looking vertically along the line representing that location. It is possible to see the relationship of trains to each other by looking for intersections in the line representing a train. If lines cross, two tracks are necessary at that location, one for each train. In the margin above the station names, the solid horizontal line represents the main track. The gray horizontal lines represent existing tracks that were formerly sidings used for train movement but are now only used for freight car storage. The line representing an eastbound train rises left to right. The line representing a westbound train rises right to left.

The stringlines represent each DMU train as a heavy green line for on-time operation, a light green line for 2 minutes late, and a light red line 3 minutes in front of the scheduled location. For each encounter between trains, a second track is required between the points at which the 2 minutes late line crosses the 3 minutes in advance line in order to maintain schedule. The same concept is used to demonstrate the movement opportunities available for freight trains; instead of schedule tolerance, the end of the time available for freight movement.

5.5 Freight Service Coordination and Capacity

The theoretical (calculated maximum) capacity of the BNSF Stampede Pass line is limited by the 2-hour travel time between the sidings at Lester and Easton which are east and outside of the project study area. Generally, the greatest capacity is achieved by operating trains in alternate directions over the limiting segment of the line. Therefore, the maximum theoretical capacity is 24 trains per day. However, it is not possible to operate trains at this rate continuously. For practical operating purposes, the capacity is generally considered to be about half the theoretical capacity, or 12 trains per day. Occasionally, it may be reasonable to operate two trains in the same direction one hour apart, but the traffic control method on the line renders sustained operation of freight trains in the same direction at one hour headway infeasible.

The Stampede Pass line has no automatic block signals except at the entrances to the segments of main track between the sidings that have been improved for current freight operation. Trains are given written instructions by radio and are generally given absolute authority to a segment of the line. That means the train owns the piece of railroad it is authorized to use. No other train may follow it or use the track in the opposite direction. If there is a second train in the same direction, it may not be authorized to follow (except at less than 20 mph) the preceding train until the preceding train has relinquished a segment of its authorized track that it has already vacated and the train dispatcher has issued authority to the following train. The entire process takes between 5 and 10 minutes for each iteration, and must be repeated each time that the following train approaches the end of the segment of line it is authorized to use. If the trains are one hour apart, the train dispatcher must dedicate 5 to 10 minutes of time to these trains once per hour. Considering the potential workload of the train dispatcher, occasional operation of trains one hour apart can be feasible. As the headway diminishes, the labor required intensifies. At 30 minutes apart, the dispatcher must dedicate 15 to 20 minutes per hour for the two trains. Such labor-intensive operation of two trains limits the ability to handle other traffic on the assigned territory, which is currently between Auburn and Ellensburg, between Everett and Blaine, and between Burlington and Sumas.

Therefore, it is reasonable to test commuter train scenarios for their effect on freight trains at these headways.

5.5.1 Existing BNSF Freight Service

The Stampede Pass line is currently lightly used by freight trains because of the general reduction in railroad traffic; however, the lifetime of rail infrastructure is quite long. Continued use for 100 years is common. Rail infrastructure planning must accommodate the future to the degree possible. The railroad companies typically look ahead 20 years or more into the future when planning infrastructure and require the same of public projects. The freight traffic used in the 2007 Washington State Transportation Commission study has been used in the examination of the effect of superimposing the commuter traffic scenarios on BNSF freight traffic. Although April 2009 is more accurate for today, the traffic of April 2007 is typical for normal traffic and is the level of traffic that BNSF would consider as the starting point in its planning process. The traffic was taken from a week of actual BNSF operation on the Stampede Pass Line. The month of April 2007 represents a period of moderate to heavy traffic on rail lines throughout Washington. The daily freight traffic is shown in Exhibit 5-7. Stringlines showing the details of the freight traffic for the 7-day sample are in Appendix C.

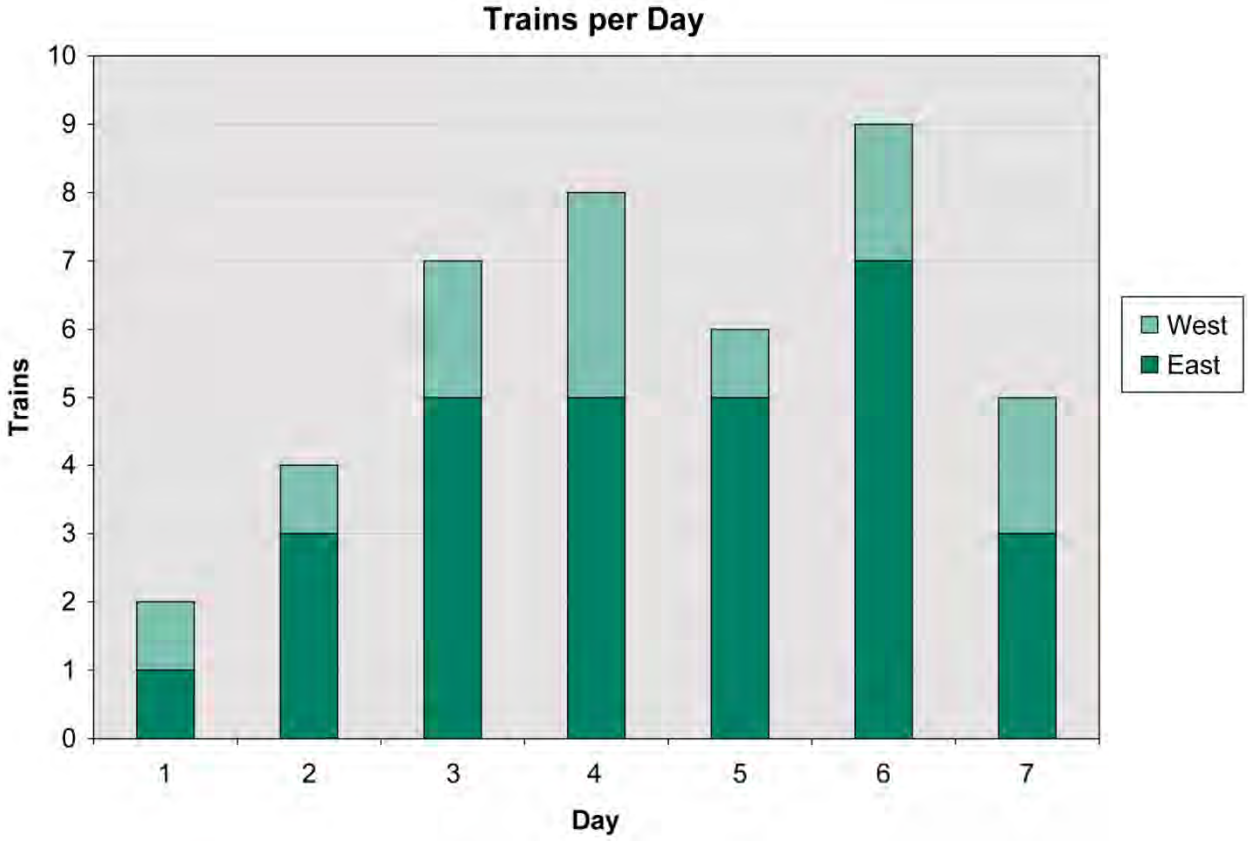


Exhibit 5-7
Daily Freight Traffic

5.5.2 Operation of Intermingled Commuter and Freight Service

Based on the representative week of freight traffic presented in the seven stringline diagrams (see Appendix C), there are several important elements to observe in the 7 days of BNSF traffic.

- Traffic is irregular. The traffic is different on each day. Only three trains operate regularly. One of them operated 6 of the 7 days at times varying by 16 hours. One operated all days at times varying by 21 hours. One operated 5 of the 7 days at times varying by 8 hours. Such unscheduled operation is standard practice for the U.S. railroad industry. As a matter of economy, railroads minimize the number of trains operated and operate them only when and as required by their internal logistics requirements. The railroad will not entertain a requirement to do otherwise. In some cases, railroads have agreed to a period of exclusion of their traffic, but it is generally obtained at great cost.

- Traffic is predominantly eastbound, part of an overall strategy for use of the capacity available on Stevens Pass and Stampede Pass and through the Columbia Gorge.
- Eastbound trains arriving at Auburn from the north have no place to wait clear of traffic at Auburn. Westbound trains may be delayed substantially at Kanaskat awaiting the arrival of an eastbound train.
- Many trains experience substantial delays that are not directly related to the movement of other trains.
- It is not possible to plan specific infrastructure to accommodate freight trains without delay as it is for the DMU service. The random distribution of freight train movement requires design of the most versatile and practical infrastructure to accommodate these random movements.

These operational characteristics are the basis for determining how freight traffic will be maintained while mixing in the commuter trains. To effectively mix both freight and commuter trains on this line, several capital improvement projects are required regardless of the final service plan ultimately adopted. These various potential service plans and related capital improvements are discussed in the following sections.

5.6 Summary of Service Plan Analysis

Of the potential service plans identified, three (60-minute, 33-minute, and 23-minute headways) were analyzed in detail for this feasibility study. The following stringline diagrams (Exhibits 5-8 through 5-14) (see also Appendix C for an explanation how stringline diagrams are used) represent seven scenarios involving the three service plans, as follows:

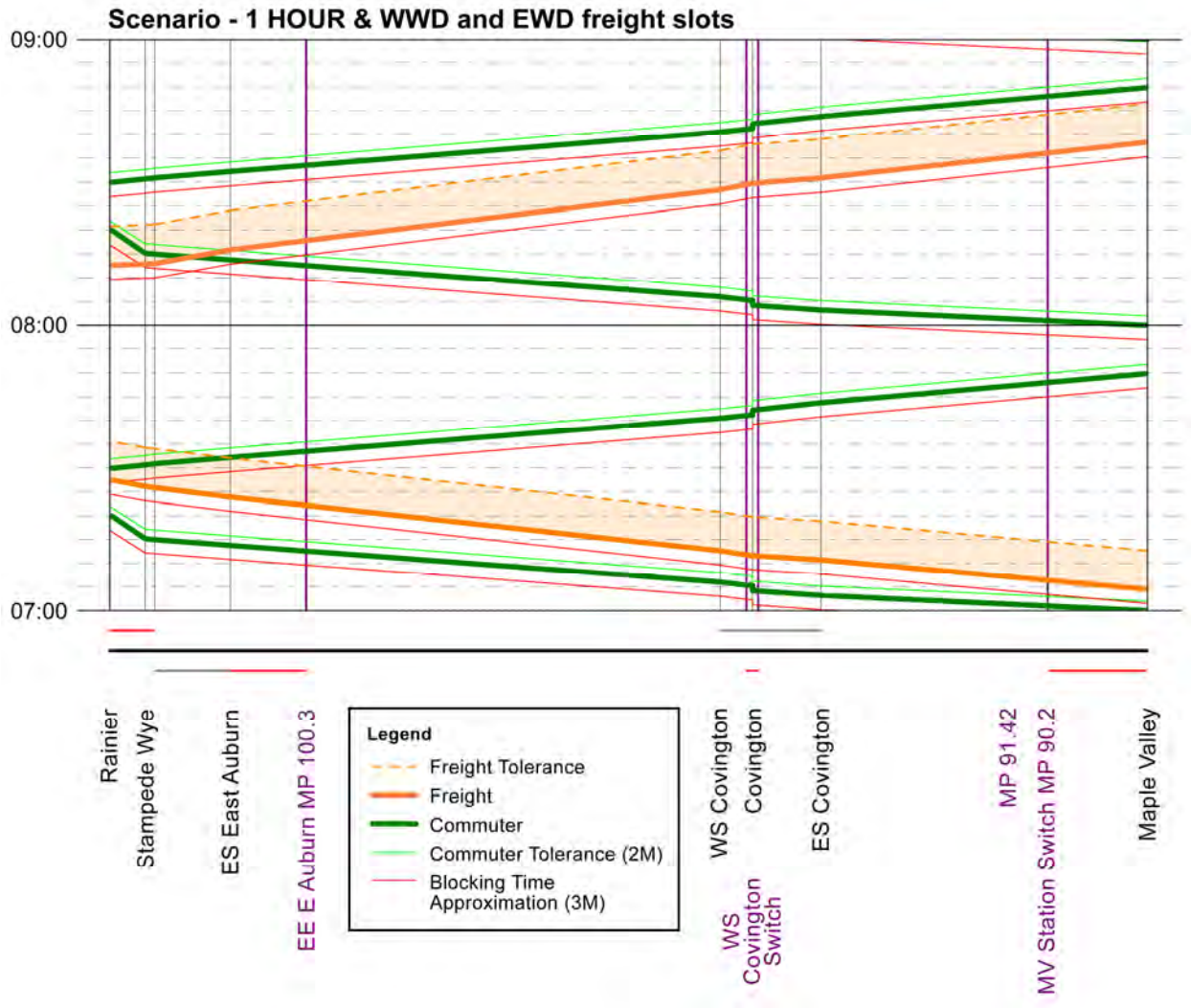


Exhibit 5-8
Scenario 1

Scenario 1: 60-minute headway, 20-minute running time, 1 DMU set, 1 freight movement opportunity per hour during the DMU service.

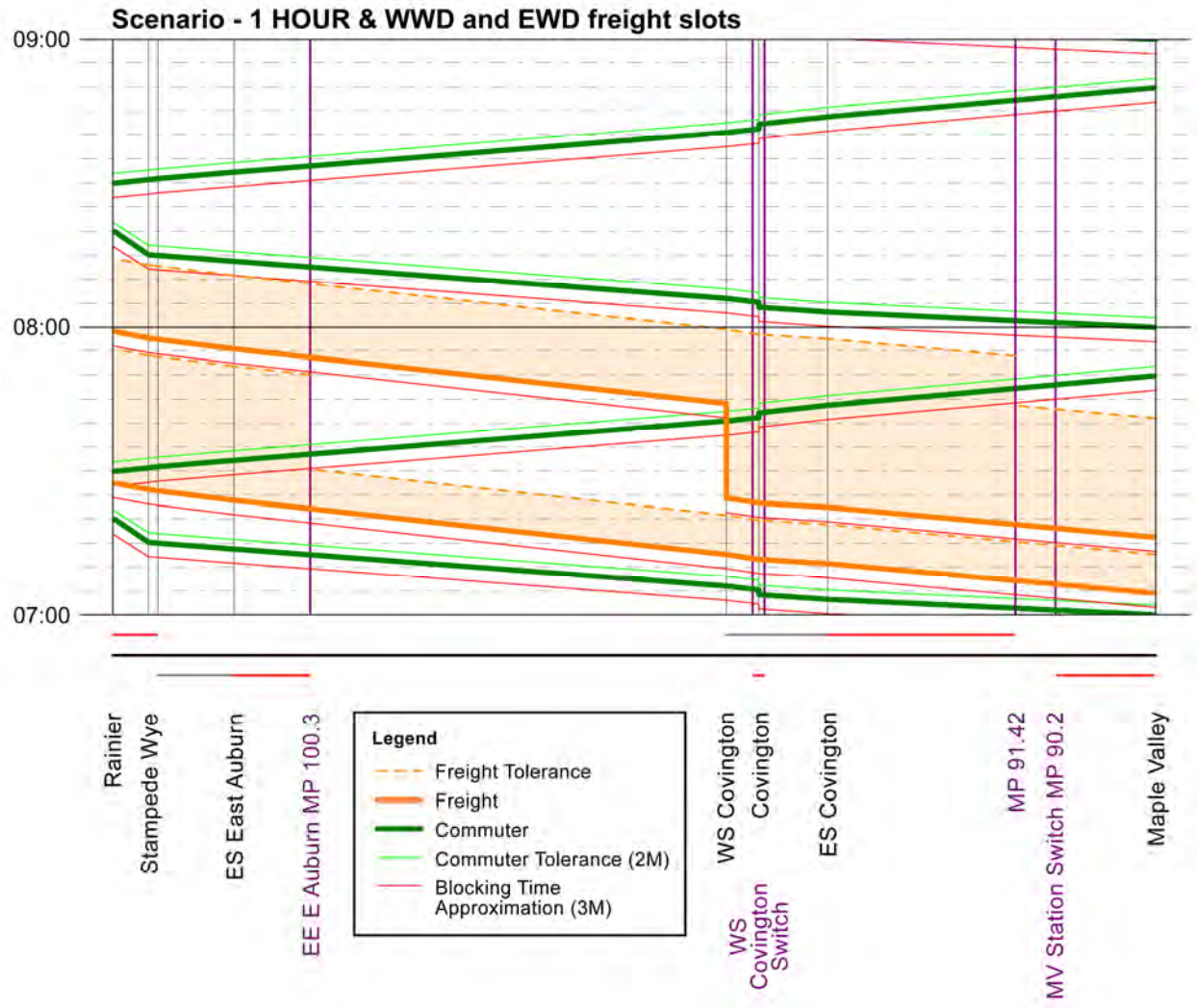


Exhibit 5-9
Scenario 2

Scenario 2: Identical to Scenario 1, but with the inclusion of an extension to the Covington siding, enabling freight-train meet-pass events at Covington, and enabling 2 westbound freight movement opportunities per hour during the DMU service.

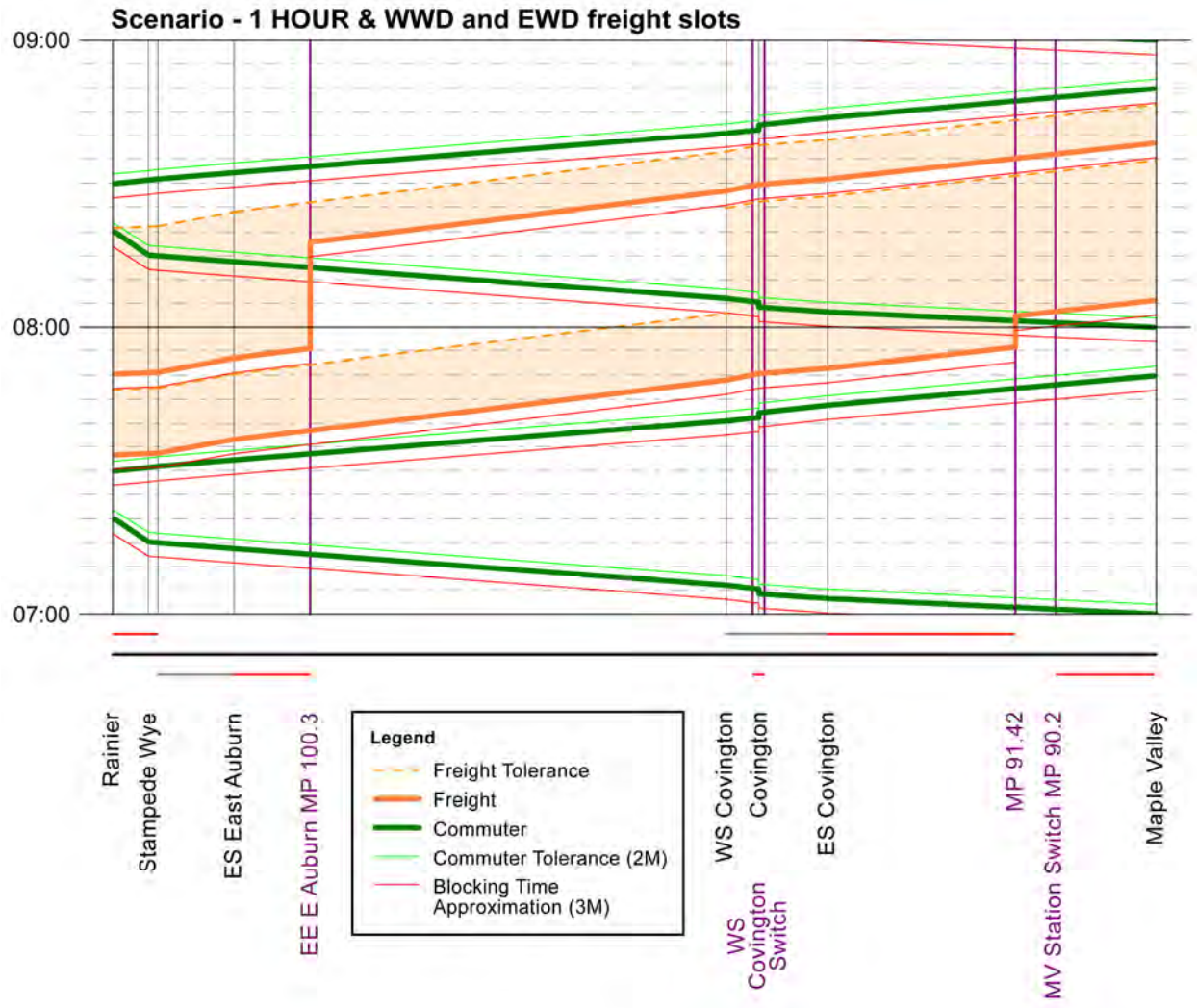


Exhibit 5-10
Scenario 3

Scenario 3: Identical to Scenario 2, but with 2 eastbound freight movement opportunities per hour during the DMU service.

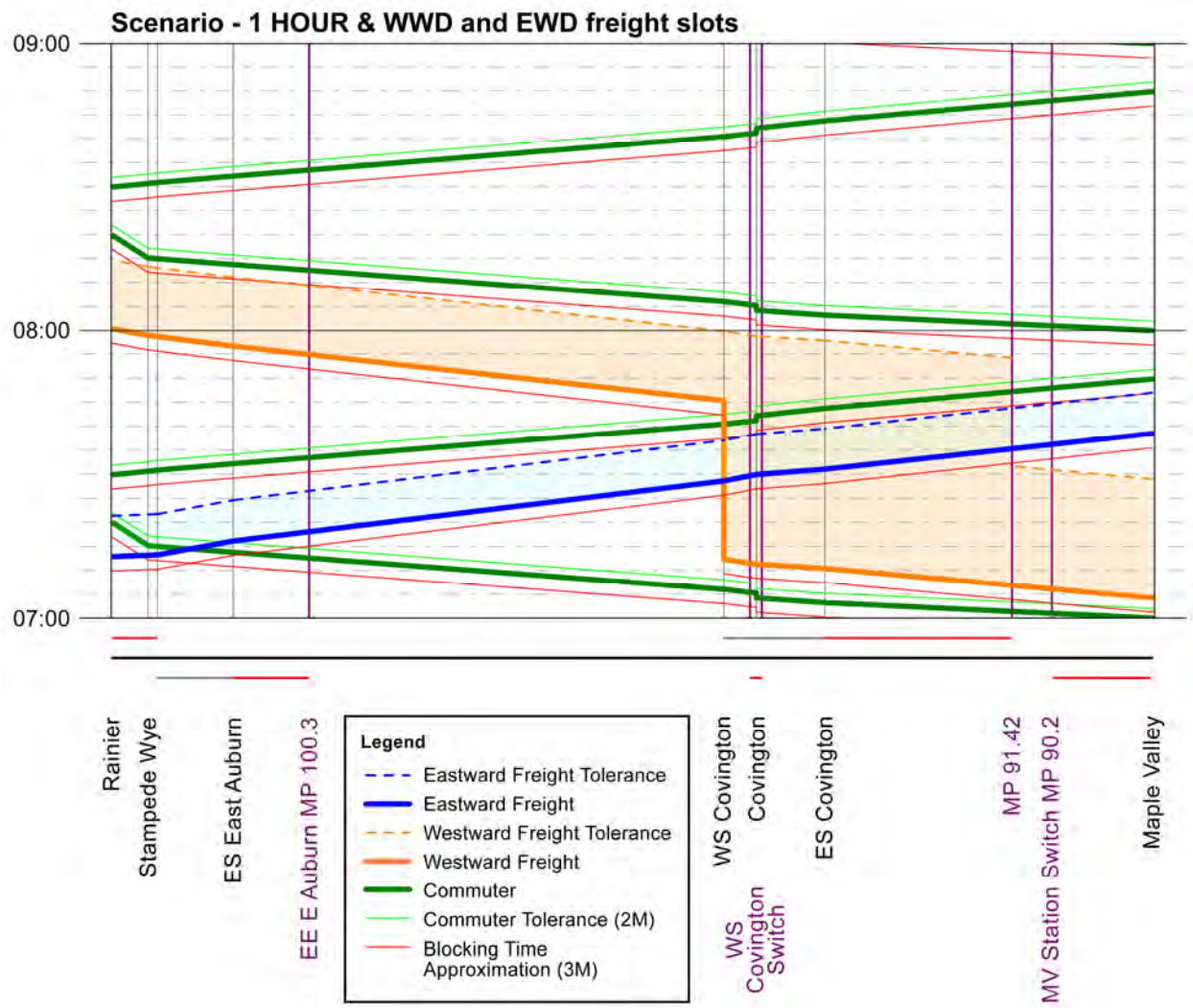


Exhibit 5-11
Scenario 4

Scenario 4: Identical to Scenario 3, but with one eastbound and one westbound freight movement opportunity per hour during the DMU service.

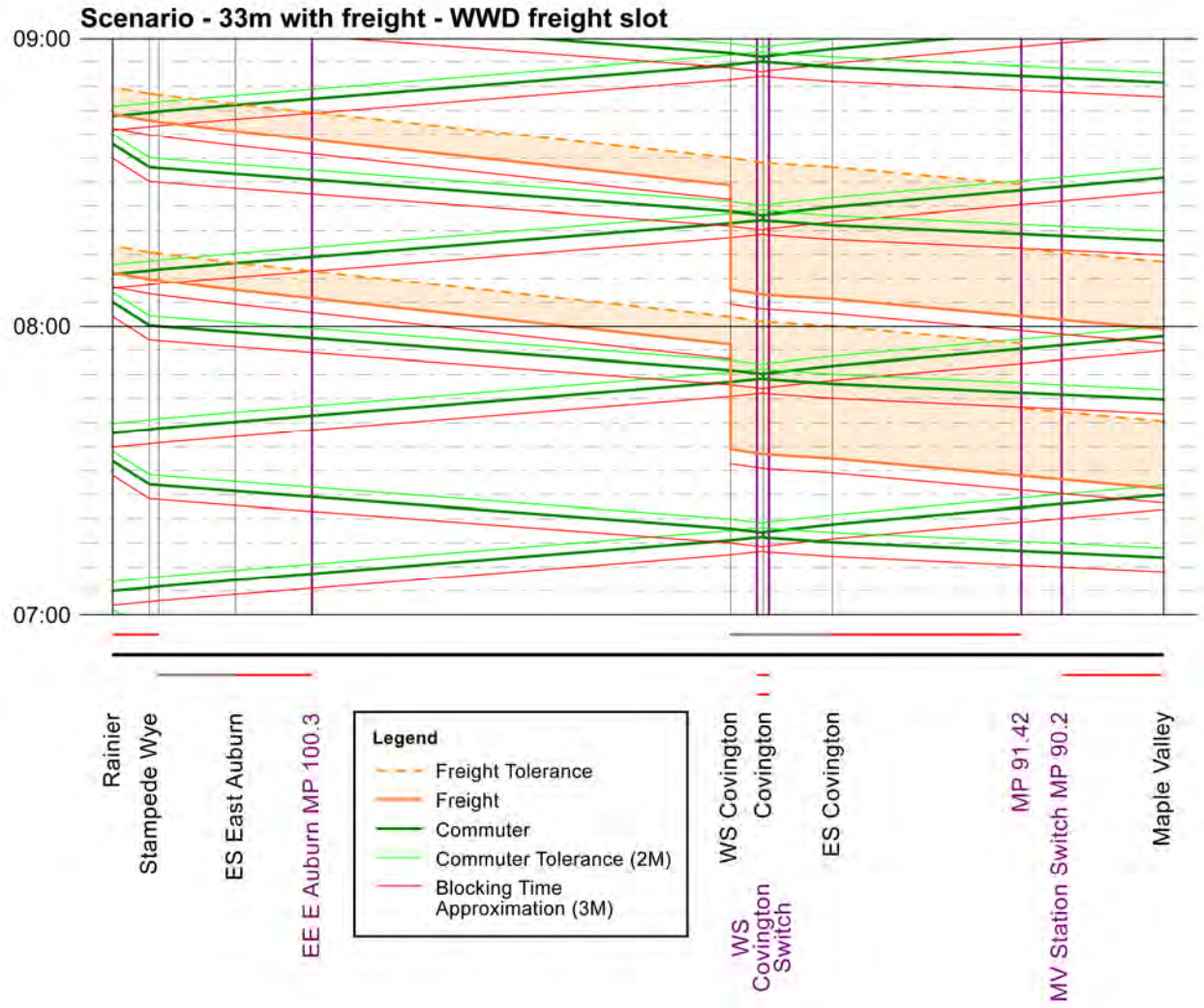


Exhibit 5-12
Scenario 5

Scenario 5: 33-minute headway, 20-minute running time, 2 DMU sets, 2 westbound freight movement opportunities per hour during the DMU service.

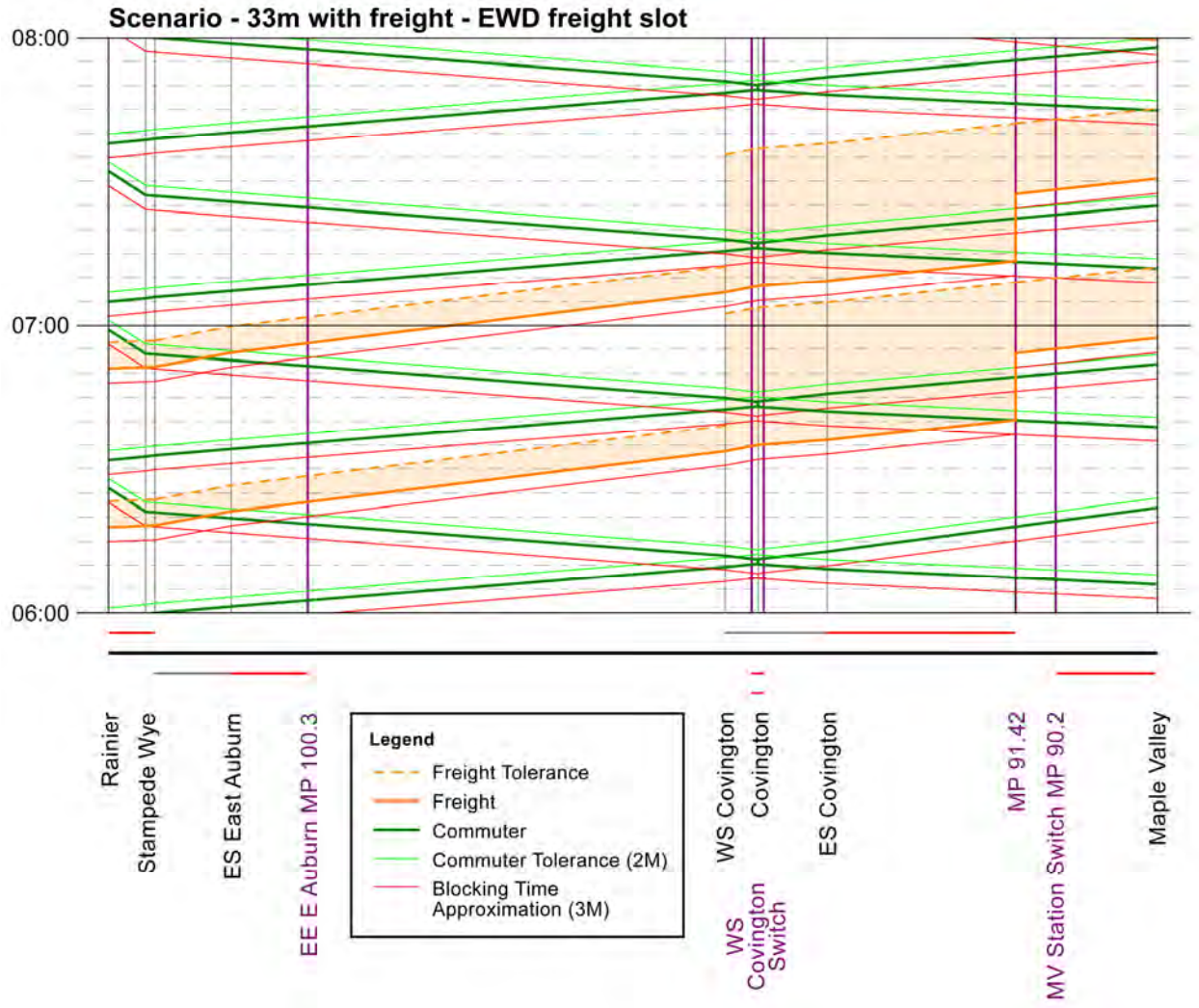


Exhibit 5-13
Scenario 6

Scenario 6: Identical to Scenario 5 but with 2 eastbound freight movement opportunities per hour during the DMU service.

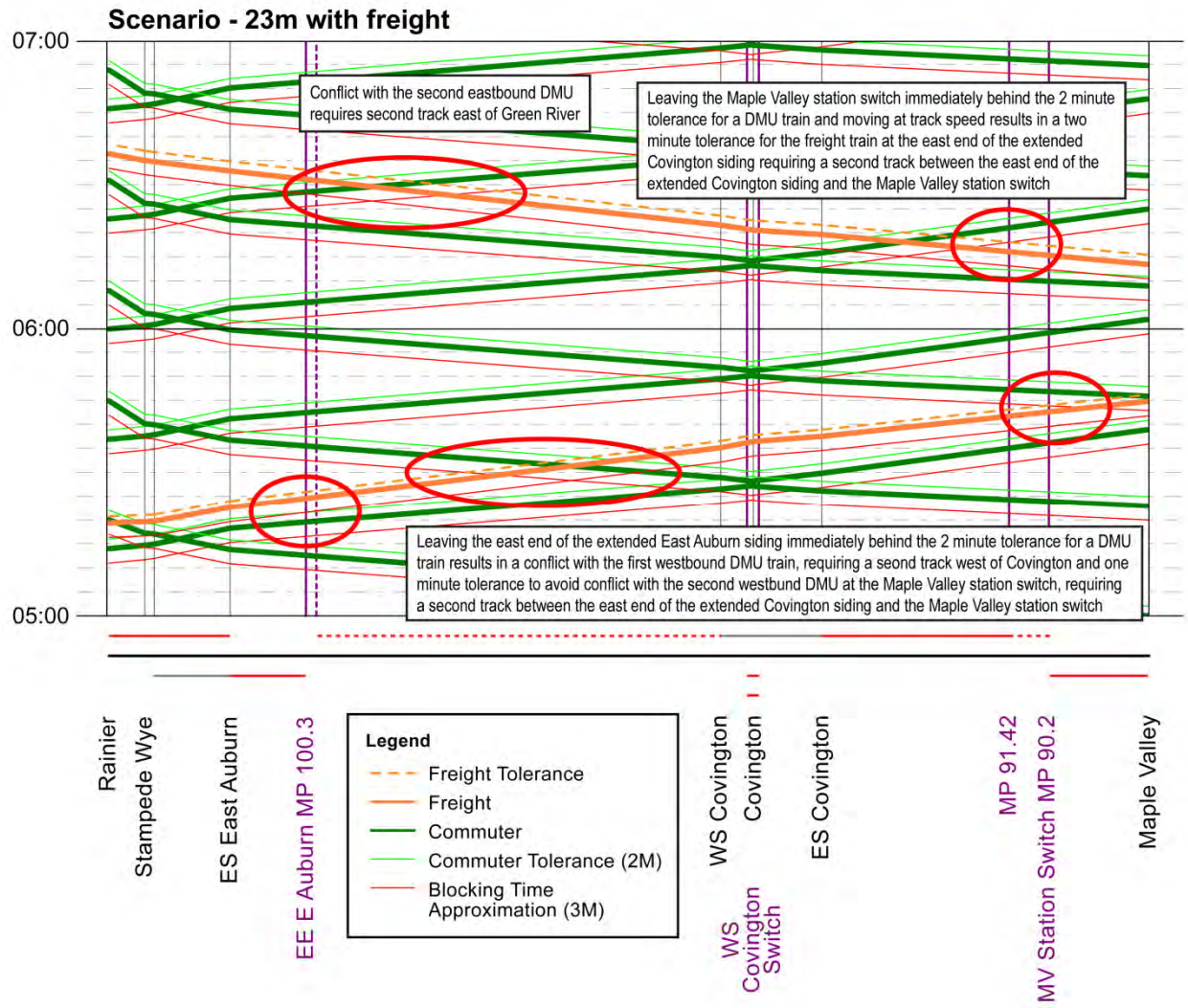


Exhibit 5-14
Scenario 7

Scenario 7: 23-minute headway, 20-minute running time, 3 DMU sets, no freight movement opportunities per hour during the DMU service. This stringline shows one eastbound and one westbound freight train with only 2 minutes of tolerance using the infrastructure for Scenario 6. It has an explanation of the conflict points and the additional infrastructure that would be needed to accommodate the service.

5.7 Potential Service Plans

Based on the service plan scenarios studied, two service options were considered feasible at this early stage of project development. These are described in the following subchapters. A third

potential service plan was not considered feasible at this time due to high capital costs and correspondingly low ridership levels.

5.7.1 Startup Service

Startup service envisions operating a single set of equipment on 60-minute headways with a 20-minute running time. This plan allows one freight movement opportunity per hour during commuter rush periods, two if the siding at Covington is extended to approximately 8,000 feet. For estimating purposes the siding was included in this plan.

Example of Connections at Auburn – Startup (1 trainset)

Connections at Auburn to Seattle, Tacoma, and Bellevue

Leave Maple Valley	Arrive Auburn	Leave Auburn	Arrive Seattle	Leave Auburn	Arrive Tacoma	Leave Auburn	Arrive Bellevue
4:46 AM	**5:06 AM**	5:20 AM	5:54 AM			*5:30 AM*	*6:22 AM*
5:46 AM	**6:06 AM**			6:36 AM	7:08 AM	*6:23 AM*	*7:22 AM*
6:46 AM	**7:06 AM**	7:16 AM	7:49 AM	7:16 AM	7:48 AM	*7:19 AM*	*8:22 AM*
7:46 AM	**8:06 AM**	8:25 AM	8:59 AM			*8:22 AM*	*9:22 AM*
3:06 PM	**3:26 PM**			3:41 PM	4:14 PM	*3:38 PM*	*4:33 PM*
4:06 PM	**4:26 PM**	4:50 PM	5:23 PM	4:46 PM	5:19 PM	*5:08 PM*	*6:03 PM*
5:06 PM	**5:26 PM**			5:38 PM	6:11 PM	*5:38 PM*	*6:33 PM*
6:06 PM	**6:26 PM**	5:25 PM	5:58 PM	6:41 PM	7:14 PM	*6:38 PM*	*7:31 PM*
7:06 PM	**7:26 PM**					*7:38 PM*	*8:29 PM*

Times in italics are Sound Transit Express Buses

Connections from Auburn to Seattle, Tacoma, and Bellevue

Leave Bellevue	Arrive Auburn	Leave Seattle	Arrive Auburn	Leave Tacoma	Arrive Auburn	Leave Auburn	Arrive Maple Valley
						5:16 AM	5:36 AM
		5:00 AM	*5:57 AM*	5:35 AM	6:01 AM	**6:16 AM**	6:36 AM
6:15 AM	*7:11 AM*	6:10 AM	6:36 AM	6:25 AM	6:51 AM	**7:16 AM**	7:36 AM
6:45 AM	*7:44 AM*	6:50 AM	7:16 AM	7:25 AM	7:45 AM	**8:16 AM**	8:36 AM
2:15 PM	*3:20 PM*	*2:23 PM*	*3:20 PM*			**3:36 PM**	3:56 PM
3:08 PM	*4:19 PM*	3:50 PM	4:16 PM			**4:36 PM**	4:56 PM
4:08 PM	*5:19 PM*	4:45 PM	5:11 PM	5:00 PM	5:25 PM	**5:36 PM**	5:56 PM
4:38 PM	*5:49 PM*	5:40 PM	6:06 PM	*5:17 PM*	*6:06 PM*	**6:36 PM**	6:56 PM
6:15 PM	*7:21 PM*	6:15 PM	6:41 PM	*6:19 PM*	*7:08 PM*	**7:36 PM**	7:56 PM

Times in italics are Sound Transit Express Buses

5.7.2 Full Service

The full service plan operates passenger service on 33-minute headways with a 20-minute running time using 2 sets of equipment. This service plan allows two freight movement

opportunities per hour during commuter rush periods and requires all the infrastructure improvements described previously.

Example of Connections at Auburn – Full Service (2 trainsets)

Connections at Auburn to Seattle, Tacoma, and Bellevue

Leave Maple Valley	Arrive Auburn	Leave Auburn	Arrive Seattle	Leave Auburn	Arrive Tacoma	Leave Auburn	Arrive Bellevue
4:34 AM	**4:54 AM**	5:20 AM	5:54 AM			*5:00 AM*	*5:52 AM*
5:07 AM	**5:27 AM**	6:01 AM	6:34 AM	*5:57 AM*	*6:38 AM*		
5:40 AM	**6:00 AM**	6:26 AM	6:59 AM			*6:23 AM*	*7:22 AM*
6:13 AM	**6:33 AM**	6:51 AM	7:24 AM	6:36 AM	7:08 AM	*6:50 AM*	*7:52 AM*
6:46 AM	**7:06 AM**	7:16 AM	7:49 AM	7:16 AM	7:48 AM	*7:19 AM*	*8:22 AM*
7:19 AM	**7:39 AM**	7:45 AM	8:19 AM	*7:57 AM*	*8:38 AM*	*7:49 AM*	*8:52 AM*
7:52 AM	**8:12 AM**	8:25 AM	8:59 AM			*8:22 AM*	*9:22 AM*
8:25 AM	**8:45 AM**					*9:08 AM*	*10:02 AM*
3:10 PM	**3:30 PM**			3:41 PM	4:14 PM	*3:38 PM*	*4:33 PM*
3:43 PM	**4:03 PM**	*4:11 PM*	*5:00 PM*	4:16 PM	4:49 PM	*4:08 PM*	*5:03 PM*
4:16 PM	**4:36 PM**	4:50 PM	5:23 PM	4:46 PM	5:19 PM	*5:08 PM*	*6:03 PM*
4:49 PM	**5:09 PM**	5:25 PM	5:58 PM			*5:38 PM*	*6:33 PM*
5:22 PM	**5:42 PM**	*6:06 PM*	*6:55 PM*	5:11 PM	5:44 PM	*6:08 PM*	*7:03 PM*
5:55 PM	**6:15 PM**	*6:33 PM*	*7:22 PM*	5:38 PM	6:11 PM	*6:38 PM*	*7:31 PM*
6:28 PM	**6:48 PM**	*7:08 PM*	*7:57 PM*	6:41 PM	7:14 PM	*7:08 PM*	*7:59 PM*
7:01 PM	**7:21 PM**	*7:33 PM*	*8:22 PM*			*7:38 PM*	*8:29 PM*
7:34 PM	**7:54 PM**	*8:03 PM*	*8:52 PM*			*8:38 PM*	*9:28 PM*

Times in italics are Sound Transit Express Buses

Connections from Auburn to Seattle, Tacoma, and Bellevue

Leave Bellevue	Arrive Auburn	Leave Seattle	Arrive Auburn	Leave Tacoma	Arrive Auburn	Leave Auburn	Arrive Maple Valley
						5:00 AM	5:20 AM
				4:55 AM	5:20 AM	**5:33 AM**	5:53 AM
		5:00 AM	*5:57 AM*			**6:06 AM**	6:26 AM
				6:00 AM	6:26 AM	**6:39 AM**	6:59 AM
5:45 AM	*6:41 AM*	6:10 AM	6:36 AM	6:25 AM	6:51 AM	**7:12 AM**	7:32 AM
6:15 AM	*7:11 AM*	6:50 AM	7:16 AM	6:50 AM	7:16 AM	**7:45 AM**	8:05 AM
6:45 AM	*7:44 AM*	*7:00 AM*	*7:57 AM*	7:20 AM	7:45 AM	**8:18 AM**	8:38 AM
7:15 AM	*8:14 AM*	*7:23 AM*	*8:20 AM*	8:00 AM	8:25 AM	**8:51 AM**	9:11 AM
2:15 PM	*3:20 PM*	*2:23 PM*	*3:20 PM*			**3:36 PM**	3:56 PM
2:45 PM	*3:55 PM*	3:15 PM	3:41 PM			**4:09 PM**	4:29 PM
3:08 PM	*4:19 PM*	3:50 PM	4:16 PM			**4:42 PM**	5:02 PM
3:38 PM	*4:48 PM*	4:20 PM	4:46 PM	4:25 PM	4:50 PM	**5:15 PM**	5:35 PM
4:08 PM	*5:19 PM*	5:12 PM	5:38 PM	5:00 PM	5:25 PM	**5:48 PM**	6:08 PM
4:38 PM	*5:49 PM*	5:40 PM	6:06 PM	*5:17 PM*	*6:06 PM*	**6:21 PM**	6:41 PM
5:38 PM	*6:45 PM*	6:15 PM	6:41 PM	*5:44 PM*	*6:33 PM*	**6:54 PM**	7:14 PM
6:15 PM	*7:21 PM*	*6:23 PM*	*7:20 PM*	*6:19 PM*	*7:08 PM*	**7:27 PM**	7:47 PM
6:45 PM	*7:50 PM*	*6:53 PM*	*7:50 PM*			**8:00 PM**	8:20 PM

Times in italics are Sound Transit Express Buses

5.7.3 BNSF Operational Impacts

The infrastructure improvements, as described in subchapter 5.8, allow BNSF to continue operating in the current manner, virtually unchanged, while the DMU service is operating. BNSF is kept whole as required. However, track and signal improvements can have an effect that is broader than the required amount of improvement. A new track or signal system cannot serve only a part of its function, serve its function for only select trains, or serve its function only during part of a day. BNSF also receives some additional utility from the new infrastructure, solving an existing operating problem and deriving some incidental improvement as well.

The lack of a place for a train from Seattle to await the arrival of a train from Ellensburg without affecting traffic on the north–south main line is a current problem for freight operations. A westbound train that cannot pass Auburn before the expected arrival of an eastbound train from Seattle must wait at Kanaskat for eastbound train to arrive. The delay can be substantial. During the hours outside of DMU service, the extended East Auburn siding eliminates the problem entirely, allowing an eastbound train to wait for the arrival of a westbound train without affecting north–south freight, Sounder, and Amtrak trains. During the hours of 60-minute headway DMU operation, the Covington siding may also be used for the purpose. The siding provides reliability for the DMU service during DMU operation, but it also allows a westbound freight train to wait at Covington instead of Kanaskat for an eastbound train if necessary. Outside the hours of DMU

operation, the East Auburn and Covington sidings provide alternatives that allow eastbound and westbound trains to meet with a minimum of delay.

The DMU infrastructure program also has secondary effects that benefit BNSF freight operation. CTC reduces train dispatchers' workloads and reduces associated delays. CTC increases operational safety, allows more flexible traffic management, and can also increase the productivity of maintenance-of-way forces.

It is possible to empirically demonstrate the fiscal benefit of the proposed capital projects to BNSF; however, it is not practical for an outside entity to estimate the fiscal benefit to BNSF. A railroad is a complicated logistical system. There is a rough figure for the value of a train by the hour (crew, fuel, depreciation, and so on), but cost-benefit analysis involves a substantially greater analysis. A capital project that removes a delay may result in better connections and greater equipment utilization at some distant location. There may be a saving in reduction of the idle time of the equipment at that location. However, if a train arrives substantially earlier than normal and it is a period of light traffic and activity, it may be necessary to increase the number of employees on a shift or let the train sit idle until its former arrival time. The reduction in delay may merely move the idle crew and equipment time from one location to another. A reduction in dispatcher workload may not translate to a significant fiscal advantage. It will likely not be sufficient to allow reduction of the number of employees. There may be an increase in reliability, but an exact value would be difficult to establish. Railroads employ complex and time-consuming analysis methods to establish the value of their potential capital improvements.

5.8 Infrastructure Requirement Summary

The proposed service design scenarios require six infrastructure improvement projects common to both the potential startup and full service plans. The full service plan would also require one additional infrastructure improvement. See Appendix E for schematic track diagrams illustrating these improvement projects. These projects are summarized below.

Improvement of Main Track Structure to FRA Class 4

Improvement of main track structure to FRA Class 4, enabling 79-mph maximum train speed for passenger trains.

Railway Signal Improvements, Auburn to Kanaskat

Installation of CTC with PTC overlay, Auburn-Kanaskat inclusive. The extension of CTC beyond the limits of passenger-train territory, as discussed above, enables rapid freight-train exit

from the passenger territory, and enforcement of authority and speed on westbound approaching freight trains.

Auburn Platform and Passing Track Improvements

Rehabilitation of the existing East Auburn siding, grade separation of the two public road crossings (M Street SE and R Street SE / SE Auburn-Black Diamond Rd), and extension to the east to a length of about 9,500 feet, enabling eastward freight trains to exit the Seattle-Portland main line and hold for a window through the Stampede Pass line commuter train territory. The siding minimizes the effect of the DMU service on Stampede Pass freight traffic and eliminates potential negative effects of the DMU service on Sounder, Amtrak, and freight trains on the Seattle-Portland main line. The west end of this siding is "lapped" with the track leading to the Auburn commuter platform, effectively reducing the extent of passenger-train territory on the Stampede Pass Line to the east switch Auburn to the west hold signal Maple Valley station, or 10.7 miles. The new Auburn platform is to be located just south of the existing Auburn platforms that presently serve the Sounder commuter trains.

Site Location of Auburn Station and New Siding

Covington Station Track and Platform

The 300-foot-long Covington platform is to be located on the south side of the Stampede Pass main line just east of the Covington-Sawyer Road crossing, which lies on property owned by the City. The capital work at this location consists of constructing an approximately 1,000-foot-long station track east of Covington-Sawyer Road including two No. 15 turnouts.

Maple Valley Station Track and Platform

The City of Maple Valley platform is 300 feet long and to be served by a stub-ended DMU only siding track planned to be 2,000 feet in length and to include a No. 20 turnout.

Ravensdale Operations and Maintenance Facility

A layover, storage, and light maintenance facility is planned at Ravensdale to be located off the Ravensdale siding. A small yard of two tracks, each track 600 feet in clear length, using two No. 11 turnouts is to be built for the layover and storage area.

Covington Passing Track Improvements

If only one BNSF freight train is allowed to operate in the corridor per hour, there is no need to meet or pass freight with the DMU hourly service, see Service Plan Scenario 1. However, often more that one freight train needs to operate per hour which requires the construction of a siding at Covington long enough to hold a freight train. Under Service Plan Scenarios 2 through 6, it is planned to install a controlled siding at Covington between MP 94.8 where a No. 20 turnout is to be installed and then extend the existing siding approximately 10,000 feet east to MP 93.0 installing a No. 20 turnout there. This provides over 8,000 feet of siding to mitigate DMU traffic effects on freight train capacity. This project also improves the overall schedule reliability of Scenario 1, but is not required.

5.9 Benefit-Cost Assessment

The principal variable between each scenario is the effect on freight train capacity; additional cost for DMU acquisition, operation, and maintenance in the 60-, 33- and 23-minute headway scenarios; and the addition of Covington siding. The 23-minute or less headway scenario creates significant net capacity loss for freight traffic for BNSF, and would require the addition of a new second main track between Auburn and Ravensdale to preserve freight capacity. This scenario was eliminated from final consideration because of the substantial additional cost and potentially significant adverse environmental impact. The increased value of the 33-minute scenario over the 60-minute scenario, thus, is largely the difference in ridership and revenue potential measured against the capital and operating and maintenance costs of additional DMUs, as well as a potential larger maintenance facility. These values are considered in separate sections. In sum, the physical characteristics of the corridor lend themselves to scenarios that are highly similar in terms of their demand for infrastructure, have highly similar reliability potential, and have highly similar operational constraints and considerations. The principal unknown factor is BNSF's long-term business plans for freight service on the Stampede Pass Line. A detailed benefit-cost analysis is outside of the scope of this study. Future phases of project development should include detailed benefit-cost analysis of potential service plans.

Washington State
Department of Transportation

Chapter 6: DMU Service Business and Financial Plan

This chapter addresses the contractual, financial, regulatory, and organizational issues in building, implementing, operating, and maintaining a commuter rail system in Southeast King County. The chapter starts with possible access options to the BNSF-owned corridor, identifies federal regulatory issues, outlines the typical contracting options available for new commuter rail systems, estimates the initial capital cost to implement the system as well as the ongoing operating and maintenance costs, summarizes funding concepts studied nationally and funding options possibly available in Washington, and summarizes governance structures found nationally and governance structures possibly available in Washington.

6.1 Railroad Access

Passenger Rail Authorities seeking to implement passenger rail service on existing railroad corridors must come to an agreement with the railroad that owns the rail corridor for access to or purchase of the corridor. Railroad access agreements between an Authority and a railroad fall into two broad categories: *sale agreements* and *capacity rights agreements*. Sale agreements involve outright sale of the corridor to the Authority. Capacity agreements involve sale by the railroad to the Authority of a right to run a specified number of passenger trains, or commit the railroad to providing a specific window for commuter rail service. This capacity right can be expressed as a real estate interest such as a lease or easement, or be expressed as a contractual, or license right. All railroad access agreements are lengthy documents covering hundreds of issues. Many provisions are similar to those found in any purchase agreement, e.g., deed form, title, closing conditions, etc. Issues especially noteworthy in railroad sale agreements and capacity rights agreements, together with a brief exploration of the provisions in these agreements, are outlined below.

6.1.1 Sale or Capacity Right?

The first step in negotiations with a railroad is to agree on what type of agreement is possible. An Authority and the railroad will enter into sale agreements only when the rail line involved is a light or moderate density (density refers to the number of trains operating on the corridor) branch line or a light density secondary main line that does not figure prominently in the railroad's current or future operations. A branch line is a line that "branches" off a main line and serves only local freight customers on the line. Branch lines typically have no major rail yards. No

through or overhead freight traffic moves on a branch line. Some branch lines have a very high level of traffic, based on the customers located on the line, or serve very important rail freight sites such as coal mines, coal-fired power utilities, automotive plants, quarries, etc. Many branch lines are leased to a railroad short line and the short line railroad handles the local distribution of rail freight to customers located on the branch line under a contract with the main line railroad. There are hundreds of short line railroads in the United States.

Main lines are the rail lines that handle a much greater volume of traffic, with both local freight service and overhead freight service utilizing the line. Major rail yards are located on main lines and main lines may be considered the interstate highways of a railroad's rail freight network. Where roughly parallel lines or routes are available (mostly through mergers or other consolidations), one route may be referred to as a secondary main line. Secondary main lines handle a reduced volume of traffic, may be maintained to a lower operational standard, and serve to provide alternative or relief routings to the nearby main line. Main lines are engineered and maintained to a higher standard than branch or secondary mains.

Because of the critical nature and strategic importance of main lines, railroads zealously protect the control and capacity utilization of these critical assets, and never sell the corridor to an Authority. Branch lines may be sold to an Authority, depending on the individual requirements and needs of the Authority and the railroad. A railroad will not likely sell a branch line if a major rail facility or customer (e.g., a coal mine) is located on the line. A secondary main line may also be sold, provided the line is not likely to increase dramatically in importance for the railroad in the future.

6.1.2 Sale Agreements

Compensation

The amount a corridor will sell for is a product of many factors, and is established by negotiation between the parties. FTA has acknowledged in the past that rail corridor value is often established by extended negotiation, and real estate appraisals based on land values are not the sole determinative of the corridor value. A rail corridor scheduled for abandonment with no apparent public use may sell for a few thousand dollars per mile, or remain vacant for years. A similar corridor identified as a future passenger rail line may sell for millions of dollars per mile. Part or all of the compensation agreed to by the parties is often the expense the railroad must incur to free-up the line for sale. This often includes new rail yard acquisition and construction, new or rebuild rail connections to other rail lines, or even new or rebuilt bypass routes. Compensation discussions are typically held in the strictest confidence by all parties.

Level of Service

The level of planned passenger rail service, i.e., the number of trains that may operate during a given period of time, is usually a critical factor in the decision to purchase a rail line, rather than receive the right to operate a specified number of trains. With the purchase of the line, an Authority usually receives much more latitude to schedule and operate as many trains as the rail infrastructure can handle. With a purchase, the Authority becomes the owner of the line and is therefore able to exercise much more control of the asset.

Rail Freight Rights

One aspect of ownership that normally does not transfer to the Authority is the rail freight rights. The railroad will normally retain the right and obligation to serve rail freight customers on the corridor. The right and obligation to provide freight service is regulated by the Surface Transportation Board (STB), formerly the Interstate Commerce Commission (ICC). This retained right is usually styled a "common carrier easement", and gives the railroad a real estate, contractual, and regulatory right and obligation to continue providing rail freight service. This common carrier obligation could transfer to the Authority, but few, if any, public entities want to be burdened with the obligations and regulatory entanglements of freight rail responsibilities. The common carrier responsibilities may, however, be transferred at closing or soon thereafter to a short line railroad.

Capacity Improvements

Unless no local customers are located on the rail line to be sold and no overhead rail traffic moves on the line, the railroad always has the continuing need to provide freight rail service. In these circumstances, before agreeing to the sale, the railroad will ensure, through the sale agreement, that the Authority is obligated to either design and construct specified track and signal improvements to increase capacity (such as double tracking or building additional passing sidings), or the Authority guarantees specified freight service standards (such as limited passenger windows). In rare instances when the level of freight service is minimal and is not projected to significantly increase, the railroad may agree to a specified nighttime freight window. The railroad and Authority can also agree to both specified improvements and freight service standards. The amount of capacity of improvements and standards depend on (1) the existing condition of the track and signal system; (2) the current and anticipated future level of freight service; and (3) the initial and future level of passenger service. In a sale agreement, however, the Authority does have more control over the capacity improvements that are necessary. The capacity improvements are also normally designed and built by the Authority. The Authority is expected to bear the full cost of all capacity improvements. It is important to

remember that sale agreements typically occur only when the level of freight service is low or minimal.

Indemnification and Insurance

The railroads insist that, as a result of the sale and initiation of rail service, no additional risk or liability exposure is assumed by the railroad, even if the railroad is the negligent party. The railroad position is that there was no liability exposure related to passenger rail before service started, and there should therefore be no exposure to the railroad in the future. In addition to strict liability provisions, multi-million dollar insurances coverages are required to be carried by the Authority, naming the railroad as an additional insured and covering the indemnity language in the agreement. Both major western carriers usually insist on at least a $200 million policy. These large insurance limits are required even in states with much lower governmental immunity and governmental liability cap provisions. In some recent access agreements (e.g., Minnesota, New Mexico, and Colorado), state law has had to be changed to allow these liability, indemnification, and insurance provisions to be enforceable. The indemnification and insurance issues have always been critical for the railroads, but in light of recent accidents and liability exposure, these issues are even more important. For a small commuter rail start-up operation, insurance costs can therefore be a sizable (over 25%) component of the cost of operations.

Maintenance and Dispatch

The sale agreement may provide that maintenance responsibility for the corridor also transfers to the Authority. If maintenance does transfer, standards or requirements are negotiated for track condition (including minimum FRA classification) that must be met by the Authority. Once passenger rail operations begin, the minimum track conditions for passenger service will normally be more than sufficient for freight operations, but service will not likely start immediately, and passenger service may not operate on the entire length of the rail corridor purchased. After passenger service is operating, the railroad's contribution for maintenance is usually a small percentage of the overall maintenance cost.

If maintenance remains with the railroad, then the standards the railroads must meet are included, along with the compensation the Authority must pay the railroad for the work done. Because maintenance standards are higher for passenger service, the Authority often bears a very high percentage of the maintenance cost.

Train dispatching of the line is often handled in agreements separately from maintenance. Most likely train dispatching will be performed by the railroad. In either case, dispatch protocol (what train has priority) is negotiated, as well as compensation for dispatch services.

Environmental Conditions

As with any transfer of property, the condition of the property and responsibility for environmental clean-up is a critical issue in the purchase of railroad property. Rail corridors and rail yards have typically been in heavy, Nineteenth Century industrial use for 100 years or longer. This rail use pre-dates most environmental monitoring and other current activities that mitigate impact to the environment. Just as in liability issues, railroads seek to avoid as much responsibility as possible for environment al clean-up after a sale to an Authority. As part of the sale agreement the railroads and Authority usually agree to a due diligence period prior to closing on a rail line sale, and the Authority may conduct Phase I and often Phase II environmental assessments. Because a rail corridor is long, narrow, and often difficult to gain easy access to, environmental assessments can be challenging. The sale agreement often allows the Authority to not consummate the transaction if severe environmental conditions are encountered. Rail yards, because of the intensity of industrial activity, may be an especially environmentally-sensitive area, and much attention is given these areas in the purchase of railroad property.

The Authority must obtain any environmental clearance necessary to construct and operate the passenger service. Noise and vibration issues are frequently raised, and with the recent FRA regulations on train whistles and quiet zones, implementation of quiet zones becomes the responsibility of the Authority.

Train Operation

In sale agreements, the selling railroad does not contract to operate the passenger trains. The Authority normally issues a Request for Proposals (RFP) for a third-party to operate and maintain the trains.

6.1.3 Capacity Rights Agreements

Compensation

Because the Authority is not acquiring the line, but rather is only acquiring the right to operate a specified number of trains, the compensation discussions with the railroad are actually much more complicated than in a sale agreement. Determining an appropriate “value” to assign to the right to operate the first, second, third, etc. round-trip passenger rail train is difficult at best. The reference here to the cost for the “right” to operate a train is separate from the actual operating cost (fuel, engineers, conductors, etc.) to run the train. An Authority usually asserts that much of the compensation that flows to the railroad is associated with the publicly-funded infrastructure improvements (track, signals, etc.) that are required to operate passenger rail service. These

infrastructure improvements are also utilized by the railroad in its operations. Although a significant part of the compensation to the railroad is the value of the track and signal improvements, railroads frequently contend, with justification, that the improvements, albeit useful, would not be necessary but for the introduction of passenger rail service.

Level of Passenger Service

The level of planned passenger rail service in a capacity rights agreement is scrutinized much more by the railroad than in a sale agreement. Recall that capacity rights agreements usually occur on rail lines that handle significant or important rail freight service. The number of trains operating and the time of days those trains operate is the determining factor in the track and signal improvements necessary to implement passenger service. Typically, the railroad is not content to surrender the corridor to exclusive passenger service during the entire peak rush hour period. The planned passenger schedule is combined with the existing level and timing of freight use to test the capacity of the existing infrastructure to handle all the trains, with the peak period obviously being the crucial period. To this initial service, reasonable expansion of both freight and passenger service is further added to determine what additional facilities will be necessary in the foreseeable future. It is this expanded service level and track capacity that railroads insist the Authority fund and build at the outset.

These factors compel all parties to devote much time, money, and resources into clearly identifying the level of anticipated passenger and freight service likely or possible on the corridor, and designing improvements to handle that level of service. Railroad capacity modeling is a technique frequently used by Authorities and the railroads to help determine the appropriate track and signal improvements. This issue, together with the capacity improvements necessary to support the service, is the battleground of most capacity right access negotiations.

Capacity Improvements

The issue of capacity improvements is closely linked to the level of passenger service issue. Based on the level of passenger and freight use, track, signal, and other improvements are negotiated and agreed upon. More so than in a sale agreement, the capacity improvements the railroad requires in a rights agreement are critical. This is because a sale only occurs when the freight use of the line is at a low level (either because the line is in a light or moderate density branch line or is a secondary main line) and is being utilized at much less than capacity. When the Authority is acquiring rights to operate a specified number of trains, the rail line has significant use already and the improvements necessary to operate the trains are therefore of utmost importance.

Railroads are extremely cautious about allowing passenger service to commence without all the facility improvements agreed to as necessary to handle increased passenger and freight volumes completed. Three factors lead the railroads to take this position:

- First, assuming the existing rail infrastructure could accommodate some initial level of freight and passenger service, if the railroad allows service to begin and freight needs increase, the railroad understandably does not want to be in the position of having to fund the cost of the additional capacity needed – capacity that was previously available, but was consumed by the introduction of passenger service.
- Second, if the existing infrastructure needs expansion and/or improvement prior to the start of passenger service, and those improvements are made, the least costly capacity improvements will naturally be constructed first. If freight needs subsequently increase, the railroad does not want to be in the position of building the more costly second round of capacity improvements at the railroad's expense.
- Third, railroads do not accept an Authority's agreement or pledge to fund future improvements if needed, or to limit its request for passenger service to only the initial service levels. Experience has shown that, once service is introduced and is successful, the public has an insatiable desire for more commuter rail service. Any Authority has a difficult task in absolutely committing future governing bodies to expend funds. After all, those funds may need voter approval (e.g., bonds, new taxes) or outside approval (e.g., Federal Transit Administration [FTA] funds). From the railroad perspective, all improvements for the foreseeable future, if not in place, must at least be funded and irrevocably committed to be built.

Because the railroad still owns the line, most capacity improvements will be designed and constructed by the railroad. In most instances, existing railroad labor agreements require that railroad employees actually construct the improvements involving the existing main lines. Normally, the agreement with the railroad contains cost estimates for all the capacity improvements, with the Authority responsible for any increases over the estimate.

Indemnification and Insurance

Regardless of the type of access agreement, railroads insist on the same provisions on insurance and indemnification.

Environmental Conditions

In capacity right agreements, the Authority does not take on all the risk of the environmental condition of the property. The railroad will insist, however, that any environmental clean-up

required as part of the construction of the capacity improvements be the financial responsibility of the Authority. Again, the railroad position is that "but for" the passenger project, the clean-up would not be undertaken.

The Authority must typically also obtain any environmental clearance for the capacity improvements necessary for the additional passenger service.

Maintenance and Dispatch

If the Authority purchases capacity rights, then the railroad will continue to maintain and dispatch the rail line. The standard of maintenance required for the speed and ride quality necessary for good passenger rail service is higher than that required for freight service. Accordingly, the agreement will detail the standard of maintenance required and set the cost paid for maintenance, or establish the method or formula for allocating ongoing maintenance costs. Because the railroad use of the rail line is still significant, these allocation formulas more evenly split maintenance costs than in sale agreements, where railroad use is less significant.

The agreement will also establish the process to be followed for identifying future capital projects. These future capital projects include capacity improvements requested by the railroad or the Authority, as well as capital maintenance projects such as major tie replacement and rail relay programs. The allocation formula or method of allocating these capital replacement costs is weighted to emphasize the more demanding operating requirements of passenger rail systems.

Dispatch of the line will remain with the railroad. Dispatch protocol (what train has priority) is negotiated, as well as compensation for dispatch services.

Train Operation

In sale agreements, the selling railroad does not contract to operate the passenger trains. In capacity rights agreements, the Authority may elect to contract with the owning railroad to provide train and engine crews for operation of the passenger rail service. Sometimes the owning railroad may insist that its crews operate any passenger trains that move on the railroad. If the railroad does provide crews, the agreement will detail the service needs of the passenger operations and establish the compensation for the Authority to pay the railroad for the train operations. Maintenance of the equipment is handled by a third-party contractor procured by the Authority.

6.1.4 Commuter Rail Proposals

The BNSF's standard response to inquiries about passenger rail service is that any proposal that satisfies the railroad's core business needs and improves the railroad will be considered

seriously. Those core business needs are defined as safety, protection of current freight rail customers, protection for through or overhead rail movements, protection against any and all increase in liability exposure, and guaranteed protection for capacity improvements for future freight rail business expansion.

As part of this study, several preliminary meetings were held with both local and BNSF headquarter (Fort Worth) representatives. While not committing to any specific level of service or necessary improvements, BNSF consistently restated these core business needs, stressing liability and insurance requirements. From the previous discussion of sale versus capacity rights, it is no surprise that BNSF does not consider this corridor available for sale. As a capacity rights transaction, BNSF, as owner of the corridor, would continue to maintain and dispatch the corridor as well as operate (crew) the trains.

6.2 Federal Regulatory Issues

Broadly speaking, federal jurisdiction of railroads is divided between STB and FRA. STB handles the economic regulation of railroads; FRA handles the safety aspect of railroads. STB economic regulation is mostly limited to freight service, and in only rare instances is passenger service implicated, and only as it affects freight service. FRA safety regulations extend to both freight and passenger service. In order for a rail carrier to provide freight service, it needs approval from the STB in the form of a Certificate of Public Convenience and Necessity (PC&N), or a modified PC&N. Similarly, in order for a rail carrier to discontinue freight service, or entirely abandon a freight line, it also requires approval from the STB. No STB authorization is necessary for the initiation of passenger rail service on this corridor.

FRA regulates just about all aspects of rail service, from minimum track, tie, and signal conditions to the hours of service railroad employees may work or be on duty. These extensive and comprehensive FRA rules and regulations on the safety aspects of passenger rail service would apply to this proposed service. All analysis on this Southeast King County Commuter Rail Study assumes full compliance with all FRA rules and regulations. FRA, however, does not formally “approve” the initiation of passenger rail service; no application is submitted to FRA for approval. FRA will carefully oversee implementation of the service, and will review and approve several component elements involved with implementation of service (e.g., the PTC Plan and the System Safety Plan).

FTA generally becomes involved with passenger rail service only when FTA funds are sought. If the decision is made to seek FTA funding, FTA will become heavily involved with the environmental documentation and environmental clearance of the project, as well through the

FTA "New Start" process, the method by which FTA reviews, evaluates, and possibly funds passenger rail projects.

6.3 Provision of Passenger Rail Service

Generally speaking, new Commuter Rail Authorities have four options for operating commuter rail services: (1) hire and train qualified personnel themselves, (2) issue an RFP and hire a third-party firm to operate some of all of the elements of the service, (3) contract with the host railroad to operate some or all of the service, or (4) contract with another governmental service provider to operate the service on behalf of the Authority.

Employee-Run System

Many of the old-line heritage commuter systems (systems that transitioned from private ownership to the public sector with no break in service, e.g., New York) are employee-operated systems. As described above, commuter rail systems are heavily regulated by FRA, with rules and regulations significantly different from the rest of the public transportation industry (bus, light rail, street cars, paratransit, etc.). This involves more extensive training and certification (e.g., locomotive engineers require FRA certification). Only one United States new commuter rail property (the Utah Transit Authority [UTA]) has opted to significantly utilize employees. UTA had an existing light rail system in operation and a much larger start-up commuter rail system, with a larger commuter rail system in the planning stages. An employee-staffed commuter system therefore, in UTS's view, made more economic sense for UTA.

Third-Party Contracting

An Authority can issue an RFP for some or all of the elements in operating a commuter system. The typical major contracted elements are operating (crewing) the trains; maintaining the equipment; maintaining the right-of-way (track, signals, structures, etc.); dispatching the system; maintaining the stations and fare vending equipment; and supervising the overall service. These RFPs are fairly commonplace in the industry now, and can readily be adapted for different operating environments. If the Authority is also responsible for building the capital improvements on the corridor, the operations and maintenance RFP can be combined with responsibility of construction, and even design of the improvements into more comprehensive design/build/operate/maintain RFP.

Host Railroad Service

Where the Authority does not own the railroad corridor, many systems are operated by the host, or owner, railroad, either because the host railroad requires that its employees staff the service, or

the Authority and host railroad agree to operate it with the railroad employees. Although the cost structure for the major railroads may be higher than the smaller third-party contractors, the host railroad has significant economies of scale in the elements of commuter rail services it provides: train crews and corridor maintenance and dispatch. As indicated above, for this service, BNSF will continue to maintain and dispatch the corridor and operate (crew) the trains.

Adding to Existing Commuter Service

Where another governmental entity already operates commuter service, a new Authority may contract with that other governmental authority to operate service, or jointly operate service. Existing systems already have committed considerable resources to implementing and operating commuter services, providing some opportunity to recognize economies of scale efficiencies for both the new and existing service. The Denton County Transportation Authority (DCTA, located just north of the Dallas Area Rapid Transit [DART] service area) is contemplating, at least initially, contracting with DART and its commuter service arm Trinity Railway Express (itself a joint service between DART and the Fort Worth Transportation Authority) for DCTA's commuter service to Denton, Texas.

Southeastern King County Commuter Service

As indicated above, BNSF has indicated that it will continue to own the corridor, and as owner will maintain the corridor, dispatch the corridor, and operate the equipment. BNSF does not maintain the equipment for other commuter systems, and has indicated it does not desire to maintain equipment for any system, including Southeast King County. If commuter service is implemented in Southeast King County, it is therefore assumed that BNSF will maintain and dispatch the corridor and supply crews for the trains. Southeast King County would need to either contract directly with BNSF, or with BNSF through another entity for these three elements. Southeast King County would need to arrange for equipment and station maintenance with a third-party contractor, again either directly by the RFP process or through another entity.

6.4 Capital Costs

Conceptual-level plans were developed for each of the infrastructure improvements identified as part of the operating plans as well as station facilities, rolling stock, and operating/maintenance facilities required to support the commuter passenger service.

6.4.1 Description of Projects

Improvement of Main Track Structure to FRA Class 4

The existing BNSF main line between Ravensdale and Auburn is FRA Class 3 Track operated by BNSF at a maximum freight speed of 40 mph under Track Warrant Control (TWC). The grade ascends from Auburn to Ravensdale at an approximate 1% grade throughout. There are 16 curves in this territory ranging from 1 degree to 8 degrees. The track structure is in good condition for a Class 3 freight track; the rail is a mixture of 115 lb. rail to 136 lb. rail, with the predominance of the rail being jointed 131 lb. rail. There are some very short locations of newer 136 lb. continuous welded-rail (CWR). The wood ties are in generally good condition with good line, surface, and cross level, or overall complying with FRA Class 3 track geometry standards. This information was derived from a brief site visit, review of a video of the corridor, and BNSF Track Charts, updated March 9, 2006. Based on this information, the following improvements were identified to upgrade the line to FRA Class 4 Track standards:

- Relay the existing jointed rail with new 142 lb. CWR to provide expected ride quality for the traveling public on the DMUs and reduce the maintenance cost of the territory with the elimination of the joints.
- Replace 30% of the existing ties that are defective.
- Distribute ballast, then surface and line the track to adjust spiral lengths and super-elevation of curves.

Railway Signal Improvements, Auburn to Kanaskat

For passenger trains to operate at speeds greater then 50 mph, the existing TWC train control needs to be upgraded to Centralized Traffic Control (CTC). New federal regulations also require the installation of Positive Train Control (PTC) in addition to CTC. Based on the potential service plans, federal regulatory requirements, and assumed station locations, the following signal improvements were identified:

- Installation of CTC from Control Point (CP) East Auburn to CP West Kanaskat including:

New Control Points at Mile Posts

- Relocate existing high/wide load detectors and AEI reader
- Relocate existing signal house at Auburn

Auburn Platform and Passing Track Improvements

To enable eastward freight trains to exit the Seattle–Portland main line and hold for a window through the Stampede Pass Line commuter train territory, the existing siding at East Auburn needs to be extended from its existing length of about 5,280 feet to a minimum length of 9,500 feet to enable the siding to hold a freight train. However, the existing siding is in poor condition with 90 lb. joint rail and poor ties. Therefore, it is planned to remove the existing siding, including the two turnouts to the main line located between Mile Post (MP) 101.29 and MP 102.29.

The new East Auburn siding limits planned from MP 100.35 to MP 102.41 will require the following:

- The widening of existing and/or construction of new grade separations, as follows:

  Construct a grade separation at Auburn-Black Diamond Road, MP 101.61, most likely an overpass.

  Construct a grade separation at M Street, MP 101.96. M Street is currently in the engineering and environmental permitting phase and is currently scheduled to be completed this year. This project, while currently not fully funded, is independent of this commuter project. This study assumed M Street grade separation will be constructed prior to the start of commuter service on this line.

  Construct a new railroad bridge next to the existing F Street SE railroad bridge.

  Construct a new railroad bridge next to the existing Auburn Way S railroad bridge.

  Construct a new railroad bridge next to the existing A Street SE railroad bridge.

- Construct a second bridge 150 feet long at MP 101.15 for the new siding track.
- Construct the new siding track from MP 100.35 to MP 102.41 including two No. 20 main line turnouts.

The new Auburn platform is to be located just south of the existing Auburn platforms, which presently serve the Sounder Commuter trains. The platform is planned to be 300 feet in length and make use of the existing parking available at the existing transit site, and minimal additional parking or paving is planned. The proposed platform track is planned to parallel the existing wye track and be approximately 1,400 feet in length and include a No. 20 main line turnout.

Covington Station Track and Platform

The 300-foot-long Covington platform is to be located on the south side of the Stampede Pass main line just east of the Covington-Sawyer Road crossing. The capital work at this location consists of constructing an approximately 1,000-foot-long station track east of Covington-Sawyer Road including two No. 15 turnouts. This siding is for DMU use only.

Work also includes widening Covington-Sawyer Road and improving the crossing signal warning system by adding flashing lights with gates and constant warning time prediction.

Covington Passing Track Improvements

To mitigate the interference of the DMU service on the freight operations, it is planned to construct a siding at Covington adequate to hold a freight train. The existing siding is not long enough to accommodate present-day freight trains and has the Covington-Sawyer road crossing almost in the middle of the existing siding. The new siding is planned to begin just west of the Covington-Sawyer road crossing, MP 94.8, where a No. 20 turnout is to be installed and then extend the existing siding approximately 1,000 feet east to MP 93.0 and install a No. 20 turnout there. This provides over 8,000 feet of siding capacity in the clear. The cost estimates and plans are predicated upon this plan. However, the siding in the future could be extended east of the existing 2-degree and 30-minute curve at MP 92.7 to provide an approximately 10,500-foot-long siding capacity. The west end of the existing siding is to remain for BNSF use as a stub-ended track for bad order set outs, maintenance-of-way use, or as a team track.

Maple Valley Station Track and Platform

The City of Maple Valley platform is 300 feet long and would be served by a stub-ended DMU only siding track planned to be 2,000 feet in length and including a No. 20 turnout. The platform and parking areas are on City-owned property. However, the City property is at a much higher elevation than the track at this location; therefore, unexpected costs for grading, retaining walls, stairs, and elevators may be necessary once designs are advanced further.

Ravensdale Operations and Maintenance Facility

A layover, storage, and light maintenance facility is planned at Ravensdale to be located off the Ravensdale siding. A small yard of two tracks, each track 600 feet in clear length, using two No. 11 turnouts is to be built for the layover and storage area. The layover facility includes the following:

- An approximate 65 x 275-foot open-sided steel frame repair shed.
- A 40 x 40-foot office and crew change building.

- Inspection pit, drip pans, and an oil/water separator.

6.4.2 Commuter Rail Station Descriptions

Commuter rail stations have been assumed at Auburn just south of the existing intermodal station; Covington just east of Covington Way; and Maple Valley just west of SR 169. The station facilities were assumed to include the following common elements:

- Level boarding platform approximately 300 feet long.
- Platforms that include canopies, ticket vending machines, closed-circuit television (CCTV), and information signing.
- At the Covington and Maple Valley station sites, 200 to 250 parking stalls, lighting, minor landscaping, and bus transfer parking.

No other station amenities such as staffed ticketing, station buildings, or public restrooms were assumed. Station costs were based on the recently-constructed Amtrak Stanwood station. The Maple Valley station includes substantial retaining wall construction to access the site.

All station platforms require separate station tracks to meet BNSF and Washington Utilities and Transportation Commission (WUTC) clearance requirements. The 300-foot minimum length of the platforms is predicated upon the use of 3-car DMUs with a combined length of 270 feet.

The Auburn platform will be attached or abut the existing Auburn platform track at the south end on the east side of the BNSF's Seattle Subdivision double main line. There is adequate room for the new station track to pass under SR 18; however, a BNSF signal house will require relocation where the platform is to be located.

The Covington platform is located on the southeast side off the BNSF Stampede Pass main line and off the proposed siding, which would be for use by the DMU service only. The Maple Valley-Black Diamond Road provides access to the platform.

The City of Maple Valley station is proposed in the southwest section of the SR 169 grade separation on existing property owned by the City of Maple Valley. However, this location is less than ideal because the access is through private residential developments and the track is approximately 20 feet below the existing areas where the parking and station are planned. Major grading and/or retaining walls with a new access road off SR 169 will be required. The parking lot will need to be terraced and ADA-compliant ramps provided to access the station platform.

6.4.3 Maintenance Facilities and Additional Infrastructure

This study assumes that all major maintenance would be contracted out to a third-party with an existing railcar maintenance facility in the region. This service could be done at one of Amtrak's heavy maintenance facilities in Seattle, Washington, or Oakland, California, or by a private third-party such as the Tri-City and Olympia Railroad's maintenance facility in Richland, Washington.

A small operations and maintenance facility would be required to perform mandated safety inspections and perform light maintenance activities such as changing oil and replacing break pads, air filters, and coolants. This building would consist of an open-sided steel frame capable of covering two tracks and capable of holding two sets of equipment under cover. One track would also have an inspection pit. Fueling would be performed by trucks on a regular schedule on a covered track equipped with drip pans and oil-water separator to prevent pollution.

The facility would also provide a small manufactured building to provide administrative office and crew change facilities including lunch room, lockers, and restrooms.

6.4.4 Rolling Stock

Currently, there are no FRA-compliant DMUs manufactured in the United States. However, the Sonoma Marin Area Rail Transit (SMART) is currently soliciting price proposals from manufacturers for 3-car trainsets similar to those described in this study. Proposals are to be submitted to SMART in late June 2010.

This study assumes that vehicles similar to SMART specifications will be available for purchase. It is anticipated that the cars – depending on the specific configuration of restrooms, wheelchair access, and bike racks – will seat between 225 and 250 passengers per 3-car trainset. The cars would have an overall length of 85 feet, carbody width of 10 feet 6 inches, and floor height above top of rail of 48 inches. The cars could be configured in either 2-car or 3-car trainsets and would have a top speed of 80 mph.

6.4.5 Summary of Capital Costs

Planning-level capital costs were developed for each of the identified capital projects. All costs, shown in Exhibit 6-1, are in 2010 dollars and include engineering, administration, construction management, and 30% contingencies. Costs have not been adjusted for inflation.

Unit costs were developed for the study based on recent construction projects similar in size and scope to this one, including WSDOT's Stanwood Station and Everett Delta Yard projects, and Sound Transit's Tacoma to Lakewood project.

These planning-level cost estimates are based on the limited information available at the time of this study and they are subject to change. See Appendix F for detailed cost estimates of the identified improvement projects.

Exhibit 6-1
SE King County Commuter Rail Capital Costs (in 2010 dollars))

Project	Service Plan		Cost Range ($Millions)	
	Startup	Full	Low	High
Rolling Stock – 2 Sets	√	√	$20.0	$24.0
Rolling Stock – 1 Additional Set		√	$10.0	$12.0
Main Track Rehabilitation	√	√	$22.1	$26.1
Railway Signal Improvements	√	√	$8.6	$11.1
Auburn Siding/Station Tracks	√	√	$74.7	$78.4
Covington Station Track	√	√	$9.1	$10.6
Covington Siding		√	$6.1	$7.1
Maple Valley Station Track	√	√	$11.4	$11.5
OMF Facility	√	√	$7.5	$9.6
Total			**$169.5**	**$190.4**

6.5 Operating Costs

Estimates of operating and maintenance costs early-on in projects studies are usually calculated based on a single operating metric, such as vehicles (car) miles or train operating hours using a flat per-mile or per-hour cost. On small systems this can be misleading, or at best is a poor planning toll. Recent averages are in the $15-$16 per revenue car mile range. These average car mile costs are all for larger systems, however, where the fixed costs are spread over many more car miles. On small systems, fixed costs are at least 50% of the total operations and maintenance costs for larger systems. Use of a single operating metric, such as vehicle miles, would therefore understate the likely actual costs. When calculating different service levels for planning purposes, use of a single metric would be inaccurate.

For new commuter systems that contract with either a third-party provider or the host railroad, fixed costs are typically as follows:

- **Agency Administrative Costs.** These costs are related to the basic oversight of the operation by the rail authority, including contract management, supervision, security, customer information, etc.).
- **Management Fee for the Contractor.** These costs relate to the costs incurred by the contractor regardless of the level of service offered. For example, the Authority will need to pay for the contractor's general manager, transportation supervisor, and chief mechanical officer whether the Authority operates 10 trains or 50 trains.
- **Station Maintenance.** This cost is more a function of the number of stations, rather than the amount of service. Station maintenance includes not only platform and parking lot cleaning and repair, but also fare vending equipment servicing and maintenance.
- **Insurance.** As discussed above, BNSF will require a $200 million insurance policy. The premium for this coverage will in all likelihood be a "minimum" premium, i.e., based on the level of insurance coverage, not dependent on level of service. As with other fixed costs, the premium will not vary significantly whether the Authority operates 10 or 50 trains a day.
- **Track Maintenance.** This is a fixed cost when the track is owned by the authority, but here it may not be, depending on the arrangement negotiated with BNSF.
- **Dispatching.** The corridor dispatch desk needs to be staffed 24/7.
- **Maintenance Facility Maintenance.** The Southeast King County service will require a separate facility, and that facility will need to be maintained.
- **Vehicle Maintenance Fixed Costs.** Much of the vehicle maintenance does not depend on the miles operated, but maintenance is required based on the calendar and the number of vehicles.
- **Annual Fund for Capital Replacement.** The fee negotiated with BNSF for access to the rail corridor will likely include a payment for capital replacement of the track and signal system. Therefore, the Capital Replacement Reserve is for stations, fare vending equipment, and most importantly, future vehicle refurbishment.

Some of the fixed costs identified above would be negotiated with BNSF, assuming BNSF maintains and dispatches the corridor and crews the trains, and may not be expressed as fixed costs for this service.

Data for costs associated with third-party-provided service are more readily available, and are a result of competitive solicitations. The cost estimates below are based on costs for a small

commuter rail start-up with a competitively solicited third-party contractor. The costs are expressed in 2010 dollars.

Estimated fixed costs for the Southeast King County commuter rail service are shown below.

Agency Administration	$500,000
Contractor Management Fee	$250,000
Station Maintenance	$100,000
Insurance ($10,000 per $1m)	$2,000,000
Track Maintenance (allocated @ $10,000/mile)	$150,000
Dispatching (estimate of allocated cost)	$75,000
Maintenance Facility Maintenance	$25,000
Vehicle Maintenance (1/2 of total vehicle maintenance)	$175,000
Capital Reserve	$100.000
Total Fixed Costs Estimate	**$3,375,000**

Variable cost elements associated with the service would be train operations (crew costs), fuel, and some vehicle maintenance. For the full service level, two train sets would be necessary, estimated to require four 2-person crews. The full service is estimated at 22 one-way weekday trips, with no mid-day or weekend service. For the starter service, one trainset is in service, making 14, one-way weekday trips, with no mid-day or weekend service, and for estimating purposes it is assumed it would require two 2-person crews. For the annual car miles and fuel consumption, it is assumed there would be approximately 255 weekday service days per year, as service would not be provided on major weekday holidays.

Estimated Variable Costs for the Full Service Southeast King County Commuter Rail Service

Train Operations (4, 2-person crews)	$800,000
Fuel ($4.00/gal, 0.5 miles per train mile)	$350,000
Vehicle Maintenance	$175,000
Total Variable Costs for Full Service	**$1,325,000**

Estimated Variable Costs for the Starter Service Southeast King County Commuter Rail Service

Train Operations (2, 2 person crews)	$400,000
Fuel ($4.00/gal, .5 miles per train mile)	$215,000
Vehicle Maintenance	$90,000
Total Variable Costs for Full Service	**$705,000**

Total Costs for Full and Starter Service

Service Level	Fixed Costs	Variable Costs	Total Costs
Full Service	$3,375,000	$1,325,000	$4,700,000
Starter Service	$3,375,000	$705,000	$4,080,000

There is no capital or operating cost estimates included here for any bus or other local circulation system connections at DMU commuter rail stations.

For farebox revenues, a $5.00 average round-trip fare was assumed for the ridership estimate. This is comparable with early 2010 existing base fares around the country (Sounder's one-way base fare is $2.55). With a full service plan ridership of 1,200 per weekday, and approximately 255 revenue weekdays per year (excluding weekday holidays), annual farebox revenue would be $765,000 (1,200 x $2.50 x 255) expressed in 2010 dollars. Of course, actual farebox recovery is subject to ridership, the established fare, and the discount fare available for monthly or weekly passes. For the full service level, an annual subsidy to cover the deficit in revenues of just under $4,000,000 ($3,935,000) would be necessary.

Two factors are clear from the information above. First, clearly the variable costs are a relatively small (a little more than 25% for the full service) of the overall costs. Second, there is not a large difference between the costs for the starter service and full service levels. Because the incremental operating and maintenance costs of adding service are low, increasing service levels (until additional capital infrastructure is necessary) may be the most cost-effective service to pursue.

These cost estimates could be reduced by a significant amount if the Southeast King County service could be contracted through the existing Sounder commuter rail service. If it is, many of the fixed costs could be spread across the larger Sounder system. For example, if this service is contracted through the existing Sounder service, the increase in the existing insurance premium for the $200 million policy will likely be minimal, and the allocation of the premium to this service will be only a fraction of a standalone policy premium.

The following chart demonstrates the effect a sharing of insurance ($2,000,000), agency administration ($500,000), and Contractor Management Fee ($250,000) costs. Assuming a 50% savings in these costs, there would be a net cost reduction of $1,375,000.

System	Total Costs	Revenue (Remains Constant)	Total Subsidy
Stand Alone System	$4,700,000	$765,000	$3,950,000
Shared System	$3,325,000	$765,000	$2,560,000

Similarly, an increase in farebox revenues would affect the necessary subsidy. Ridership is much more sensitive to the frequency of service than it is to marginal fare increases. Fares for commuter systems across the country, including the Sounder, are increasing. The information below demonstrates the effect that a $1 average round-trip fare increase, combined with cost sharing, would have on the necessary subsidy.

System	Base Average Fare	Total Costs	Revenue	Total Subsidy
Stand Alone System	$2.50	$4,700,000	$765,000	$3,950,000
Shared System	$3.00	$3,325,000	$918,000	$2,407,000

All the assumptions on shared service and costs with Sounder are obviously dependent on agreement and negotiations with Sounder. All fare decisions will ultimately be up to the policy board managing the service.

6.6 Funding Sources Studied Elsewhere

6.6.1 Funding Sources

There has been a wide assortment of funding sources that have been studied or suggested for transit projects in the United States over the past few years. Many of these sources never materialized, or have yet to be utilized, and may not be available under current Washington law. For the sake of completeness, below is the long list, in alphabetical order, of funding possibilities that have been identified by other entities.

Access Fees

A fee assessed on non-residential taxable property (perhaps on a per square foot basis) located near transit facilities. This fee is similar in concept to a Business Improvement District (BID) where a specified boundary is established near a station for assessment purposes.

Bond Anticipation Note

Bond anticipation notes are short-term bonds issued by governments and corporations anticipating the proceeds of a larger future bond. Issuing entities use the notes as short-term financing. Bonds of course need to be issued. This method would be for capital costs.

Capital Leasing

Transit agencies generally used capital leasing to help with purchasing transit vehicles. Rules on these arrangements have changed dramatically in the last 10-15 years and have limited their economic usefulness and advantage. In general, capital leasing is a lease that meets one or more of the following criteria:

- The lease term is greater than 75 percent of the property's estimated economic life.
- The lease contains an option to purchase the property for less than fair market value.
- Property ownership is transferred to the lessee at lease term expiration.
- The lease payments present value exceeds 90 percent fair market value.

Driver's License Fee Increase

A fee assessed to individuals for a driver's license renewal.

Emissions Fee

A surcharge applied to personal vehicles during annual inspection. All or a portion of the funds collected could be used to implement passenger rail service.

Farebox Revenue Bonds

The Transportation Equity Act for the 21st Century (TEA-21) authorized the use of farebox revenues and anticipated grant receipts as collateral for revenue bonds. Revenue bonds can only be backed by farebox revenues if the level of state and local funding committed to transit for the three years following the bond issue are higher than the funds that were committed in the three years prior to the bond issue. Agencies must identify another source of funds for operating expenses before issuing a revenue bond. The Metropolitan Atlanta Regional Transit Authority (MARTA, in Atlanta, GA) currently uses farebox revenue bonds.

Grant Anticipation Notes

Revenue bonds backed by anticipated grant receipts. Grant Anticipation Notes (GANs) were enabled by the establishment of program funding firewalls in TEA-21. Principal and interest on

GANs are eligible to be repaid with FTA capital funding. Proceeds raised by a GAN can be used for the local match for a FTA supported project.

Hotel Room Rental Tax

This tax is levied as a percent of the total rate on hotel room rentals. In some states a municipality or county may impose a local hotel room rental tax rate, in addition to the state tax, usually for the purpose of promoting tourism and/or the convention and hotel industry.

Local Option Motor-Fuel Sales Tax

This tax, levied on the quantity of motor fuel purchased within a specified local government jurisdiction, has been suggested elsewhere. The local option motor-fuel sales tax would allow local governments a choice to levy an additional motor-fuel tax.

Local Subsidy Option

Allows a municipality the option to raise revenue from designated sources. The local subsidy could be a surcharge to local services (e.g., trash collection, utilities). All or a portion of the funds could be used to implement rail passenger service in a municipality.

Mobility Improvement Fee

A proposed fee added to the annual vehicle registration fee.

Motor Vehicle Sales Tax

Levied on all retail motor vehicle sales. The tax could also be levied on motor vehicles purchased at retailers outside the state and used on Washington public highways by a Washington resident.

New Resident Impact Fee

Applied to new residents registering a vehicle in the State of Washington for the first time. Legislative action would be required to use these funds for passenger rail service.

Parking Fee

Allows municipalities who own and/or operate parking facilities to impose a surcharge by the space and by the hour at city-owned parking lots and garages. A similar fee could be levied as a percentage of total parking charges to parking operators in a municipality, regardless if the operator is publicly or privately owned. All or a portion of collected revenues could be used to provide a share of the cost needed to implement passenger rail service in a municipality. Not realistic for this service.

Payroll and Self Employment Tax

This option is currently used in the State of Oregon where a percentage of wages paid by an employer and/or the net earnings from self-employment are taxed with proceeds used for services within a transit service boundary. The rate increases annually by 1/100 of a percent for a 10-year period currently set to conclude in 2014

Property Tax

A local tax imposed on individual properties. Property tax is typically the largest single funding source for many community service providers (e.g., schools, police, fire, hospitals). Local action and approval would be required to allocate or increase funds for implementing passenger rail service in a municipality.

Public Improvement Districts

Public Improvement District (PID), or similarly titled districts allows cities to levy and collect special assessments on property within the city. Typically PIDs provide civil improvements to a specified area or development.

Public-Private Partnerships

A PPP is a contractual arrangement formed between public and private sector entities. Such an arrangement typically provides for extensive private sector participation in the design, construction, operation, maintenance, and/or financing of an infrastructure project. Under a PPP, public facility or system ownership is typically retained by the public entity. The private entity generally invests its own capital for design and development. A PPP, although a contractual arrangement, differs from a typical service contract in that the private entity makes a significant, at-risk, equity investment. In a PPP the public entity gains access to new revenue or service delivery capacity without providing up-front construction financing. As explained above, design and construction of most of the capital improvements will be done by BNSF, Vehicles and stations are the largest capital items that could be in a PPP.

Regional Toll Surcharge

An additional flat rate fee per trip on designated toll facilities. The surcharge could be pooled and used for implementing passenger rail services.

Rental Vehicle Tax

A tax imposed on the gross rental receipts from the temporary rental or lease of vehicles.

Sales Tax

Maybe the most common method of funding for newer transit districts across the country.

Special Purpose District

Special purpose districts (SPD) are taxing entities usually created to generate revenue for a specific reason such as crime control, libraries, or emergency services. Several transit agencies nationwide are considered a SPD. The Triangle Transit Authority in North Carolina is an example of a regional transit agency planning to provide passenger rail service across multiple municipalities within three Raleigh/Durham/Research Triangle Park region counties.

Tax Increment Financing District

A Tax Increment Financing (TIF) District is a tool local governments can employ to publicly finance needed infrastructure within a defined area. The cost of improvements to the area is repaid by the contribution of future tax revenues by each taxing unit levying taxes against the property. With transit projects, TIF funds are usually generated and used for rail stations and station areas.

Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA)

The Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA) established a federal credit program for eligible transportation projects of national or regional significance under which the United States Department of Transportation (USDOT) may provide three forms of credit assistance – secured (direct) loans, loan guarantees, and standby lines of credit. The program goal is to help attract new investment capital to transit projects incapable of generating sufficient revenues through user charges or dedicated funding sources. Eligible projects through this program must meet certain criteria. For example, a minimum project cost of $50 million and federal funding for the project cannot exceed 33 percent of the eligible cost.

Turnkey Service

Turnkey, in general is a product or service designed, supplied, built, or installed fully complete and ready to operate. Under this scenario, the transit agency would enter into an agreement with a private sector company to construct and build the transit facility. Upon completion, the agency will take charge of operating and maintaining the facility. This method may be used with a public/private partnership. Again, not all capital improvements on the BNSF corridor could be eligible

Vehicle Miles Traveled User Fee

A fee charged to vehicle owners based on miles driven rather than the traditional fuel consumption method. A vehicle miles traveled (VMT) user fee would require vehicles to install monitoring equipment to calculate the total number of miles traveled over a given period. The fee would be assessed to the registered vehicle owner with revenues used to implement passenger rail service. In many states, this fee is being proposed as an infrastructure funding mechanism to replace the motor fuel tax. Enabling legislation has not been enacted by any state or at the national level.

Vehicle Property Tax

A vehicle property (or ad valorem) tax is levied on the fair property value of a vehicle. This tax is assessed as a percentage of estimated worth and would be limited to personal passenger vehicles.

Vehicle Registration Fee

An annual assessment on vehicle ownership would be a standard, flat fee that would be applied and limited to personal passenger vehicles.

6.6.2 FTA Funding

There are many Federal Transit Administration (FTA) and Federal Railroad Administration (FRA) programs that can be used to fund a commuter rail system for both the operating and capital costs. A description of the major funding categories as they currently exist is included below.

New Starts

The discretionary Section 5309 New Starts program administered by the Federal Transit Administration (FTA) is the primary federal funding source for transit fixed guideway projects, including bus rapid transit and busways, light rail, heavy rail and commuter rail. New Starts projects are typically financed with about 50% Section 5309 discretionary New Starts funds. The remaining 50% comes from local sources. A feasible financial plan depends upon the identification of secure funding sources with sufficient revenue capacity to support the financing, operation, and implementation of any existing and proposed transit options. Local funds are necessary to provide the local match share of the federal capital grants and the operating and maintenance costs not covered by the passenger farebox revenue and federal or state assistance.

For a project to be considered for funding under the New Starts process, a detailed financial plan must be developed and is intended to provide documentation to the FTA regarding the system's

ability to financially carry out the proposed project. The financial plan includes a 20-year cash flow that documents the capital and operating costs of the system and the funding sources for those costs. The financial plan documents the financial history of the system, describes its current financial health, documents projected costs and revenues and demonstrates the reasonableness of key assumptions underlying these projections. A significant local commitment to the project is necessary to receive New Starts funding.

The local commitment needed varies as the federal process progresses. Early in the process, potential matching funds and the levels of funding available should be identified. As the process continues, a stronger commitment needs to be demonstrated. As an example, if the local match is to come from a sales tax that does not currently exist, then a successful referendum would need to take place. If state funds are to be used as match, a commitment from the state would need to be documented. If financing is included as a potential mechanism to provide local match, documentation regarding the ability to obtain financing would need to be presented as part of the financial plan.

Due to the limited funding available and the large number of requests for New Starts funding, all New Starts projects are required to go through a rigorous evaluation process. The FTA conducts the evaluation and then makes a recommendation regarding funding the project. Projects are evaluated using a number of criteria which include:

- Mobility improvements
- Environmental benefits
- Cost-effectiveness
- Operating efficiencies
- Transit supportive land use and future patterns
- Other optional factors

These projects are evaluated during the entire project development process. The FTA makes decisions about moving the projects through the phases of project development to a funding recommendation and finally to the execution of a full funding grant agreement (FFGA) based on these criteria.

Mobility improvements are measured by the travel time benefits per project passenger miles, low income households served and employment near stations. Environmental benefits are measured by the change in regional pollutant emissions, change in regional energy consumption and EPA

air quality designation. Cost effectiveness is measured as the cost per hour of travel time saved. Operating efficiencies are measured by system operating cost per passenger mile. Transit supportive land use and future patterns are measured by existing land use, transit supportive plans and policies and performance, and impacts of such policies. The other optional factors include the projected economic development impacts of the project.

In addition to the criteria noted above, the FTA will evaluate the local financial commitment of the project sponsor. The reliability of the proposed capital plan, the ability of the agency to fund operations and maintenance and the amount and availability of the local match are all evaluated as part of the local financial commitment.

Once each of these areas is evaluated, an overall project rating is assigned. The FTA considers the individual ratings and combines the ratings into an overall finance and project justification rating. The cost effectiveness and land use criteria both receive a 50 percent weight to establish a summary project justification rating. The mobility improvement rating is introduced as a tiebreaker if the two ratings fall equally between two ratings. The overall project justification rating and the overall finance rating are averaged into an overall project rating.

Small Starts

The Small Starts program, a component of the New Starts program, is intended to fund projects with a capital cost under $250 million and with a federal share of under $75 million in year of expenditure dollars and was introduced in 2005. The Small Starts program has a total of $200 million per year available for projects. The intent of the program is to provide a method of funding projects that has streamlined criteria and a streamlined approval process. However, experience has shown that the process is just as lengthy and complicated as the New Starts process.

In addition to the funding limits, a Small Starts project must 1) meet the definition of a fixed guideway for at least 50 percent of the project length in the peak period, 2) be a new fixed guideway project or 3) be a new corridor-based bus project with all of these minimum elements: substantial transit stations, traffic signal priority, low floor vehicles or level boarding, branding for the proposed service, and 10 minute peak/15 minute off peak headways or better while operating at least 14 hours per weekday.

For project justification, a Small Starts project is evaluated using the following criteria:

- Cost-effectiveness
- Transit-supportive land use policies

- Future patterns and other factors, including economic development

Local Financial Commitment is also evaluated to determine a finance rating for the project. If the project sponsor can demonstrate a reasonable plan to secure funding for the local share; the additional operating and maintenance cost to the agency is less than 5 percent of the overall operating budget; and the agency is in reasonably good financial condition they may qualify for a simplified financial evaluation. If a Small Starts project requests 50 percent or less in Small Starts funding, it will receive a High rating for local financial commitment.

The phases for a Small Starts project include Alternatives Analysis and Project Development. In the Small Starts program, preliminary engineering and final design are combined into the Project Development phase. Generally, Small Starts projects must demonstrate the completion of an alternatives analysis, selection of a Locally Preferred Alternative (LPA), adoption of the LPA into the region's constrained long range plan, development of a project management plan and preparation and submittal of the same information for evaluation and rating as New Starts projects entering preliminary engineering. There are, however, the following differences: the cost effectiveness rating will be calculated and reported using the opening year forecast; the land use information should be appropriate to the importance of land use to the project's success; the financial plan should cover the period up to and including the opening year; and mobility improvements information is not required.

With a federally funded project at any funding level, the federal government makes the decisions regarding the project. The federal process requirements are more stringent, add time to the project, and cause the overall cost of the project to be higher. A federally funded project could take from eight to ten years to be implemented. The benefit to using federal funds is that the requirement for local funds is lower. Going through the federal process, however, requires a significant level of local expense just to compete in the process and does not guarantee federal funding. Many projects are competing for the same dollars, and not all projects get funded at the necessary levels.

Changes to Federal Policy for New Starts and Small Starts

Changes are being made to improve the opportunities and equitable decision making for all New Starts and Small Starts projects in competition for federal funding. The Secretary's January 13, 2010, announcement rescinded the previous Administration's policy, as stated in a March/April 2005 Dear Colleague Letter from then FTA Administrator Jenna Dorn, that New Starts funding recommendations would be limited to projects that achieved at least a "medium" cost effectiveness measure based on the prescribed criteria. Transit industry concerns and issues with this policy have been well documented. With this policy shift, the Obama Administration will

apply the project evaluation framework as specified in SAFETEA-LU and will base funding recommendation decisions on projects achieving an overall rating of "medium" based on multiple measures. The Secretary and FTA Administrator also announced intention to change the "regulatory framework" to more fully and accurately reflect the wide range of transit benefits, including a revised cost effectiveness measure that will recognize these benefits. The announcement notes an upcoming rulemaking process to implement these changes, possibly in advance of the new Authorization bill.

As a result, New Starts and Small Starts rating and funding decisions will again be based on a multiple measure evaluation framework, as originally specified and practiced in FTA's Final Rule in December 2000, and as confirmed in both TEA-21 and SAFETEA-LU. In June 2009, FTA introduced this policy shift through new Policy Guidance directing that approximately equal weights would be applied to measures of cost effectiveness, transit supportive land use, and economic development in the evaluation and rating of New Starts and Small Starts ratings.

While the January 13th announcement has been truly significant and receiving much well deserved attention, it is helpful to see this as one step in a series of program reforms that USDOT and FTA are introducing. Observe the policy statements and new approaches introduced in ARRA and TIGER, the principles and new funding programs being introduced in the DOT-HUD-EPA Partnership for Sustainable Communities (including discretionary funding for Urban Circulators, and recent policy statements and guidance from FTA leadership. Many believe we are seeing signals of significant program improvements to come, possibly including some of the following changes:

- **New evaluation framework** discontinuing the long-standing "one size fits all" approach to project evaluation which applies identical criteria, measures and threshold rating values to all proposed projects, not accounting for differences in mode/technology, type of improvement/corridor, goals/objectives, etc. It is possible that a unique set of criteria, measures and weights could be applied to different categories of proposed projects. Note the recent introduction of the Urban Circulator Program, which applied Section 5309 New Starts funds under a completely unique set of evaluation criteria for urban circulators and streetcar projects.
- **Multiple measure evaluation based on livability and sustainability**. FTA has already begun applying its previous multiple measures and more equal weights in project rating, and has signaled that more significant changes are forthcoming through rulemaking. Perhaps a revised New Starts and Small Starts framework will apply the six livability principles that serve as the foundation for the DOT-HUD-EPA Partnership for Sustainable Communities:

1. Provide more transportation choices
2. Promote equitable affordable housing
3. Enhance economic competitiveness
4. Support existing communities
5. Coordinate policies and leverage investment
6. Value communities and neighborhoods

- **Refined definitions of rating criteria, measures and baseline alternative**, including significant change to the current cost effectiveness measure based on the transportation system users benefit (TSUB). FTA has struggled to date to identify an acceptable set of measures addressing criteria such as economic development, operating efficiencies and environmental benefits. Many see the current definition and level of effort applied to the baseline alternative as non-productive, particularly for Small Starts projects.
- **Attention to economic impact, return on investment and possibly benefit-cost analysis**. Such measures were applied by USDOT in the TIGER program applications, and could begin to surface in evaluation framework for New Starts or other surface transportation funding programs. It will be helpful to assess the decision-making value of these measures and lessons learned in the TIGER application process.
- **Implement a truly streamlined Small Starts program**. Many have complained that Small Starts projects are still taking a long time for development and FTA approvals. Perhaps the reforms noted above can lead to true streamlining commensurate with the level of federal investment.
- **Advancement of a "program of projects" rather than one corridor at a time**. Congress and FTA appear to be considering structural changes, potentially allowing non New Starts projects to serve as local funding match for a related New Starts project. The Community Streetcar Coalition, the New Starts Working Group and others have been seeking changes for some time now allowing project sponsors to leverage local and state funds invested in fixed guideway transit projects as match for a New Starts funded project and to credit project benefits from the initial phase when evaluating and rating the overall project.
- **Expedite planning and project delivery.** FTA may consider significant changes to the planning and project development process, including eliminating the Alternatives Analysis as a stand-alone New Starts requirement, instead applying the evaluation of alternatives already

completed in the NEPA process. FTA is already implementing procedural changes to NEPA documentation, recently imposing a page limit on NEPA documents in an effort to streamline the process and make documents more accessible to the public. FTA has already begun implementing changes to Letters of No Prejudice and Award Authority, in an effort to expedite project delivery. Additional improvements may be introduced as well.

- **State of Good Repair**. FTA and DOT have been emphasizing the requirement that agencies and projects plan for and finance ongoing maintenance and recapitalization needs. This was a primary criteria applied in the TIGER applications.

On June 3rd, the FTA issued an Advanced Notice of Proposed Rulemaking (ANPRM) to seek public comment on how to improve the calculation of "cost effectiveness" by the FTA. FTA is seeking comments on whether they should include other factors in the calculation of "cost effectiveness". The current approach is to use reduced travel time as the basis for this calculation.

The FTA is also seeking input on how to environmental and economic development benefits as part of the project. They will use the comments and input to amend the regulations that cover New Starts and Small Starts.

Alternatives Analysis

The Section 5339 Alternatives Analysis program funds the following:

- Complete Alternatives Analysis
- Specific technical tasks conducted as part of a proposed or on-going alternatives analysis
- Specific information developed for local decision-makers for the Secretary regarding potential New Starts and Small Starts projects

Priority is given to technical analyses that would advance major transit investments that foster the six livability principles that serve as the foundation for the DOT-HUD-EPA Partnership for Sustainable Communities:

- Provide more transportation choices
- Promote equitable, affordable housing
- Enhance economic competitiveness
- Support existing communities

- Coordinate policies and leverage investment
- Value communities and neighborhoods

Funding is available for up to 80% of the study cost and the award is available for three fiscal years.

Section 5307 Funding

The Federal Transit Administration (FTA) Section 5307 funds are funds received by a transit agency on an annual basis. The amount allocated is based on population, population density and service supplied in the area. This amount fluctuates from year to year but unless there is a significant change from the previous year, the amount is generally within the same range. Section 5307 funds are to be used on capital assets or programs. There is a requirement that a minimum of 1% of the annual apportionment be spent on transit enhancements and another 1% be spent on security related projects.

In addition, the FTA allows large urban transit agencies to spend a portion of the 5307 funding on programs, such as the capital cost of contracting, preventative maintenance and the capital cost of leasing. As funding for transit has become scarce, many of the transit systems are using this funding mechanism to assist in the operations of the agency.

Section 5309 Funding

FTA Section 5309 funds are discretionary funds received from the federal government for capital investment projects. Eligible capital projects under the Section 5309 Bus program include the purchasing of buses for fleet and service expansion, bus maintenance and administrative facilities, transfer facilities, bus malls, transportation centers, intermodal terminals, park-and-ride stations, bus rebuilds, bus preventative maintenance, passenger amenities such as passenger shelters and bus stop signs, accessory and miscellaneous equipment such as mobile radio units, supervisory vehicles, fareboxes, computers and shop and garage equipment. The Section 5309 New Starts (and Small Starts) program supports capital investments in transit fixed guideway systems or extensions of those systems.The Secretary of Transportation has the discretion to allocate funds for these programs, although Congress earmarks all available funding.

Job Access Reverse Commute (JARC) Funding

The goal of this program is to improve access to transportation services to employment and employment related activities for welfare recipients and eligible low-income individuals and to transport residents of urbanized areas and non-urbanized areas to suburban employment

opportunities. The program requires coordination of Federally-assisted programs and services in order to make the most efficient use of Federal resources.

6.6.3 FRA Funding

Railroad Safety Technology Program

The purpose of this program is to Facilitate the deployment of train control technologies, train control component technologies, processor-based technologies, electronically controlled pneumatic brakes, rail integrity inspection systems, rail integrity warning systems, switch position indicators and monitors, remote control power switch technologies, track integrity circuit technologies, and other new or novel railroad safety technology.

Projects that that make train control technologies interoperable between railroad systems, accelerate the deployment of train control technology on high risk corridors such as those that have high volumes of hazardous materials shipments or over which commuter or passenger trains operate or benefit both passenger and freight safety and efficiency are eligible for funding under this program. The proposed technologies must support the implementation of PTC by December 31, 2015. The maximum federal funding for a project is 80 percent.

High-Speed Intercity Passenger Rail (HSIPR) Program

The FRA launched the HSIPR program in June 2009 to support President Obama's and Secretary of Transportation LaHood's vision to transform America's transportation system through the creation of a national network of high-speed rail corridors. In the long-term, the HSIPR Program aims to build an efficient, high-speed passenger rail network connecting major population centers 100 to 600 miles apart. In the near-term, the program will aid in economic recovery efforts and lay the foundation for this high-speed passenger rail network through targeted investments in existing intercity passenger rail infrastructure, equipment and intermodal connections.

In 2009, $8 billion was made available for HSIPR programs as part of the Recovery Act signed by the President in February of that year. In addition to the $8 billion, approximately $92 million was available in remaining FY 2009 and 2008 funding under the previous State grant program.

Under this program, the FRA required pre-applications to gauge the interest in the program and an understanding of the types of projects requesting funding. Applications were then due in August for individual projects and planning studies and in October for the larger corridor development projects. Grant announcements were made in January 2010. A total of 79

applications were funded in 31 states. These initial strategic investments are focused on three key areas that will deliver transportation, economic recovery and other public benefits:

1. Building new high-speed rail corridors that will fundamentally expand and improve passenger transportation in the geographic regions they serve
2. Upgrading existing intercity passenger rail services
3. Laying the groundwork for future high-speed passenger rail services through smaller projects and planning efforts

Congress appropriated an additional $2.5 Billion in December 2009 for HSIPR projects and applications are currently being accepted for this funding.

Rail Line Relocation and Improvement Capital Grant Program

Under this program, a State (or political subdivision of a State, such as a city or county, or the District of Columbia) is eligible for a grant from FRA for any construction project that improves the route or structure of a rail line and 1) involves a lateral or vertical relocation of any portion of the rail line, or 2) is carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development.

For FY 2010, Congress appropriated $34,532,000 in Federal funds for the Rail Line Relocation and Improvement program, with $24,519,200 directed to 27 projects. The remaining $10,012,800 will be combined with the $589,700 remaining from the FY 2008 competition, $2,000,000 that was not awarded to one of the projects selected from the 2008 competition, and the $7,900,000 in FY 2009 discretionary funding. This $20,502,500 will be the subject of a competition that FRA expects will occur in summer 2010.

Disaster Assistance

A total of $20 million is available under this program to fund necessary repairs and improvements to Class II and III railroads for damage to railroad infrastructure caused by hurricanes, floods, and other natural disasters in areas for which the President declared a major disaster. This program will fund up to 80% of the cost of the project and the funds are available until expended. The funding will be made to the States on a competitive case-by-case basis.

Applications for this funding are not currently being accepted by were in accepted in 2008 and 2009.

Railroad Rehabilitation and Improvement Financing (RRIF) Program

This program provides direct federal loans and loan guarantees to finance development of railroad infrastructure. Under this program the FRA Administrator is authorized to provide direct loans and loan guarantees up to $35.0 billion. Up to $7.0 billion is reserved for projects benefiting freight railroads other than Class I carriers. Direct loans can finance up to 100% of the cost of the project and can be repaid over 35 years and interest rates at the cost of borrowing to the local agency.

Transportation Innovation and Finance (TIFIA)

This program makes three types of credit assistance available – direct loans, loan guarantees and standby lines of credit for surface transportation projects of national or regional significance. Some passenger rail projects may be eligible for TIFIA including intercity passenger rail facilities, passenger rail vehicles and components of magnetic levitation transportation systems.

Table of Options

Exhibit 6-2 includes federal and local funding and financing options for the capital and operating costs of the project. The table includes funding and financing mechanisms that have been implemented or are being considered for implementation to fund similar type projects across the United States. Some of the suggested financing and funding mechanisms could require changes to enabling legislation and significant public outreach and discussion.

Exhibit 6-2
Summary of Funding Options

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Development Impact Fees/Benefit Assessment Districts	• Fee collected on new development that occurs within project area • Fee assessment of existing property owners to pay for specific infrastructure that benefits area	• Primarily used on capital projects	• Those that directly benefit from project pay for a portion or all of the project	• If development fees are already being collected in area, could make total fees too high and development might not be feasible	• Can be set up in one time payments or annual assessments
Tax Increment Financing (TIFs)/TIRZs	• Using a portion of increased taxes from increased property values due to a specific transit/road project to pay for the project	• Primarily used on capital projects	• The project that causes the increase in the value receives the benefit of the increased value	• Typically cities and counties interpret this financing mechanism as though funding is being taken away from them	• Many requirements related to TIF/TIRZ financing

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Federal Discretionary Funds	• Federal Transit Administration funds that are earmarked by Congress	• Primarily used on capital projects	• Provides additional capital funding	• Competitive process • Requires strong local support and effective lobbying • Depending on type of funds could require additional work for application and could make process longer	
FTA New Starts Funding	• Federal Transit Administration funds earmarked by Congress for rail, BRT projects	• Primarily used on capital projects	• Potential new funding for project for up to 50% of the total project cost	• Competitive process • Increases timeline for project • Increases cost of project due to additional time needed to follow FTA guidelines	
Federal Railroad Administration Intercity Passenger Rail Investment Grants	• Grant program administered by the FRA to increase a state's role in intercity passenger rail development • $30,000,000 in federal dollars available	• Used on capital for intercity rail projects • Can be used on planning, rail car acquisition, improvements to tracks, interlockings, and/or signal systems	• Potential funding for an intercity passenger rail option	• 50% match required • Grants are for states so would require coordination with the state	• Applications will continue to be received until all funding is allocated or September 30, 2009, whichever is earlier • First round of funding applications due June 30, 2008

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Public Private Partnerships	• Comes in many forms including private funding of infrastructure based on benefits, Design Build Finance Operate Maintain (DBFOM) of infrastructure or any combination	• Primarily used on capital projects	• Additional funding source and potential financing mechanism that does not impact bonding capacity • Allows cost to be spread out over time • Potentially decreases cost of project due to inflation • Portion of risk assumed by private organization • Allows projects to be started and completed sooner	• Potentially higher costs due to financing by private entity • Potentially higher costs due to risk assumed by private entity • Need identified revenue source to repay investment	
Bonding	• Can include issuing bonds using fare revenues, sales tax revenues, grant revenues, toll revenues from the state or any other revenue source	• Used on capital projects	• Financing mechanism that can allow projects to happen sooner than with pay as you go • Potentially decrease cost of project due to inflation • Allows cost to be spread out over time	• Costs associated with issuance of bonds • Election required to issue bonds • Need identified revenue source to repay bonds	
Grant Anticipation Notes	• Notes payable issued to be paid from grant proceeds	• Used on capital projects	• Financing mechanism based on anticipated grants • Can be used to implement projects sooner	• Can only be issued to mature within three years of issuance • Need identified revenue source to repay notes	

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
TIFIA Loans	• Federal credit program for eligible transportation projects • Three types of credit assistance: secured (direct) loans, loan guarantees and standby lines of credit	• Used on capital projects	• Financing mechanism that allows projects to be completed sooner • Low interest loans • Easier than bonds to implement	• Need identified revenue source to repay loans	
State Infrastructure Banks (SIB)	• Allows certain states to use regular Federal-aid highway apportionments to capitalize state-administered revolving funds	• Used on capital projects	• Financing mechanism that allows projects to be completed sooner • Low interest loans • Easier than bonds to implement	• Need identified revenue source to repay loans	
Fares	• Cost to customer for use of transit system • Plan for regular increases in fares tied to Cost of Inflation	• Primarily used for operating	• Can plan for additional revenue • Allows customers to plan to pay a larger fare • Fare keeps up with inflation • Potential less ridership loss due to smaller increases	• Public hearings required to raise fares	• Important to communicate need for increases to customers

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Federal Funding for Operating	• Use of 5307, JARC, CMAQ on operating expenses	• Primarily used for operating	• Additional source of revenue for operating expenses	• 5307 shift of funds that could be used on capital for three specific programs: Capital Cost of Contracting, ADA services and Preventative Maintenance. • 5307 shift of funds reduces the amount of funding available for capital projects in the area • JARC/CMAQ funds are typically programmed for only a few years – would require additional source for continued funding	• Negotiations would have to take place with the transit systems that are currently using these funds for operating
Parking Revenues from City and Park and Ride Lots	• City to increase parking fees and give all or a portion of the fees to the selected project • Charge a parking fee at Park and Ride locations for either all parking or premium parking	• Primarily used for operating	• Additional source of funding • Increase in city parking fees could encourage increased use of transit	• Parking fees at Park and Ride locations could discourage transit use	• Politics of increasing city parking fees

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Fees on Tickets Sold at Entertainment Venues	• Charge a fee on tickets sold at entertainment venues to pay for transit services that serve the location	• Typically used for operating expenses	• Provides another source of revenue • Allows customers of venues to pay for transit services that serve the entertainment venues	• Ticket promoters or owners of the venues may not want to include fee because they might be concerned that people would not attend events because of fees	• Can be set up as a percentage or fixed fee on each ticket sold
Private Donations	• Donation from a private foundation • Can be trust fund or endowment	• Can be used for operating or capital	• Provides another source of revenue	• May include specific stipulations that don't fit the overall goal of project	
Leasing of ROW	• Lease Railroad ROW to utilities for cables and other utilities	• Can be used for operating or capital	• Additional source of revenue • Allows utilities to provide services where they are required • Allows use of cables or utilities by system	• Need to get utilities to agree to payment structure • Could be complicated structure	
Partnerships	• Develop additional partnerships where private companies pay for all or a portion of transit services or capital projects	• Can be used for operating or capital	• Facilitate the implementation of new services and capital programs sooner	• Need to get partners to understand the value of the partnership	

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Dedicated Sales Tax	• A percentage tax on all items sold in service area	• Can be used for operating or capital	• Additional dedicated source of funding	• Election may be required • Citizens would need to see the value in the project • Little control over amount received each year – dependent on economy	
Hotel/Motel Tax	• Percentage tax on hotel/motel fees	• Can be used for operating or capital	• Additional source of funding • Diversification of funding sources	• Tourism industry may believe that additional tax will cause certain groups not to plan a trip to the area • May be similar funding mechanism in place for other projects	
Car Rental Tax	• Percentage tax on car rentals	• Can be used for operating or capital	• Additional source of funding for commuter rail • Diversification of funding sources	• Car rental businesses may believe that the additional tax will cause a decrease in the car rental business	
Vehicle Registration Fee	• Increase the vehicle registration fee and allocate additional revenues to transportation	• Can be used for operating or capital	• Additional source of funding • Diversification of funding • Based on car ownership in area	• Difficulty in getting appropriate agency to agree to increasing fees	

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Property Tax for Transit	• Implement a property tax to pay for transit	• Can be used for operating or capital	• More reliable source of funding • Will typically increase year to year based on property values	• Property owners will not want to pay additional taxes • Requires legislative changes	
Advertising Revenue (buses, benches, shelters)/sponsorships	• Allow for advertising on buses, benches, shelters, and other amenities for a fee • Can be a long-term contract for advertising on a shelter or other amenity in exchange for the construction costs • Naming rights could be sold for park and ride facilities or other infrastructure	• Can be used for operating or capital	• Additional source of funding • Depending on contract structure, could be a fixed revenue source each year	• Administration costs for program can offset some of the additional revenue	• Program can be set up to have advertising company be responsible for maintenance of shelters or benches in exchange for advertising fees • Need strong marketing component

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Joint Development on Existing and Planned Facilities	• Private funds are used to develop property resulting in profit for the private developer and a developed asset	• Typically used for capital projects • Ongoing revenues could be used to offset operating expenses	• Increase revenue • Potential increase in ridership on transit • Enhances facilities • Sharing of risk on project	• Creation of joint development structure can be complicated • Ensuring fair distribution of revenues and risk can take time • Process to choose developer within required procurement guidelines can be a challenge • Potential that costs to implement are more than revenues from project	• Need for knowledgeable staff in evaluation of different proposals
Tolls	• Fees charged on highway system	• Could be used on operating or capital	• Additional revenue source	• Would required enabling legislation and possible partnership with State • Need for an understanding by the state on the benefits of sharing toll revenues for projects that are not road related	

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Congestion Pricing	• Work with state to implement congestion pricing on toll roads and allocate a portion of toll revenues to transit • Congestion pricing is pricing based on demand. When the demand is higher, the tolls are higher • Peak-period pricing on bus system • Peak-period parking fees by the county and allocate a portion of those fees to transit	• Could be used on operating or capital	• Additional revenue source	• Would require partnership with state and/or city for increasing tolls or parking revenues • Need for an understanding by state and city on the benefits of sharing toll and parking revenues on projects that are not road related • Peak-period pricing could be considered a fare increase • Would require commitment by transit operators to charge correct fare	
Safety Inspection Fee	• Charge a fee when cars are inspected	• Could be used on operating or capital	• Source of revenue with little fluctuation because it is based on number of vehicles	• Implementation of new fee could draw criticism • Need legislative support for implementation	
New Resident Impact Fee	• One time fee applied to vehicle registration for new residents	• Could be used on operating or capital	• Source of revenue that doesn't impact current citizens	• Could deter new residents from registering vehicles	

Funding/Financing Mechanism	Description	Used for Operating or Capital	Pros	Cons	Potential Issues/Comments
Distance-Based Road User Fee	• Fee charged to all that use roadways based on vehicle miles traveled (VMT) • A portion could be used to fund transit	• Could be used on operating or capital	• Source of revenue that is user based	• High start up costs for calculating VMT • Need for technology • Need for education	

6.6.4 Funding Sources of Similar Systems

Several transit agencies around the country were examined to gauge the methods actually employed to fund transit service. As expected, sales tax is the primary local funding source. The Texas transit authorities (Dallas, Fort Worth, Houston, Austin, and San Antonio) and the Denver region collect the sales tax at the municipal level while the Atlanta region and San Diego County collect the sales tax at the county level.

Exhibit 6-3 provides a list of transit systems surveyed and the local funding sources used by each. Four of the five of the transit systems surveyed use a percentage of local sales tax provide transit service. MARTA dedicates 50 percent of sales tax revenues for capital improvements and the remaining 50 percent to daily system operation. The percentage of local funding spent on capital and operating expenses varies by each transit provider.

Exhibit 6-3. Transit Systems Surveyed and Local Funding Sources

Agency	Region	Funding Sources	Funding Rate	Level of Funding Collection
MARTA	Atlanta	Sales Tax	0.5 cent	City of Atlanta, DeKalb and Fulton counties
RTD	Denver	Local sales tax	0.6 cent	Boulder, Broomfield, Denver, and Jefferson counties Portions of Adams, Arapahoe, Douglas and Weld counties
Sound Transit	Seattle	Motor vehicle/local sales tax	0.3 to 0.4 cent	Urban areas of King, Pierce, and Snohomish counties
NCTD – Coaster and Sprinter	San Diego	Local sales tax	0.75 cent	San Diego County
Tri-Met	Portland	Payroll and self-employment tax	0.6718 percent	Employers within Tri-Met District Boundary

6.7 Governance and Funding Examples

This section summarizes governance options found elsewhere in the country. Commuter rail systems inherently go farther and cut across more jurisdictional boundaries than most other types of transit service. This means that the commuter rail service area will cross through and expand

beyond the political boundaries of existing local transit service areas as well as beyond the boundary of the individual municipal entities in Southern King County. Implementation of a commuter rail system will likely require a change or addition to the region's current governance structure in order to reflect new financial, political, and representational patterns of the areas served by commuter rail.

Below are examples of governance models from other areas of the country in order to have an informed basis for discussion in exploring potential commuter rail governance strategies in the Southern King County.

Generally, the institutional arrangements throughout the country range from state-run regional rail operations to large single-purpose regional rail authorities that extend service into multiple political jurisdictions, to regional transit authorities that are responsible for multimodal services, to sub-regional agreements between cities to contribute to the management of a rail service in a common corridor.

There are several new commuter rail systems currently in operation or being considered across the country. From these networks there is a wealth of information and experience on which to draw for the analysis of possible governance structures.

The more mature, heritage, systems are significantly larger in size than the newer ones, primarily because they have built ridership as the region has grown around them. Each was a catalyst for development and growth, as ridership followed, growing steadily as the train became a preferred commuter option for new residents. The following sections describe an array of institutional arrangements that characterize typical commuter rail governance structures.

6.7.1 Regional Transit Authority/District (Multi-Modal)

Regional transit authorities or districts are characterized by appointed boards, representation closely aligned with area political subdivisions, and the Authority to impose voter-approved taxes to balance financial resources with service demands. In many of the mature transit systems throughout the country, a regional transit Authority will manage and operate several types of transit services, such as light rail, commuter rail, bus, streetcar, paratransit, and even HOV lanes.

The following is a brief description of the two largest regional transit authorities near Southeast King County: Sound Transit here in Washington and TriMet in the Portland area.

Sound Transit District

Commuter Rail Service Description: Sound Transit operates the Sounder commuter rail service between Seattle and Everett and Seattle and Tacoma, Washington, a distance of approximately 82-miles. Service to Tacoma was initiated in 2000 and service to Everett was initiated in 2003. The Sounder commuter system currently carries approximately 8,700 passengers per day.

Governance and Administration Structure: In 1993, the state Legislature passed enabling legislation for Snohomish, King, and Pierce Counties to create a single regional transit agency, the Central Puget Sound Regional Transit Authority, (of course more popularly known as Sound Transit). The state legislature charged the agency with planning, building and operating a high-capacity transit system. In 1996, voters approved a plan that provides the foundation of that system and includes regional express buses, commuter rail and light rail services. The Sound Transit District boundary generally follows the urban growth boundaries created by each county in accordance with the state Growth Management Act.

Sound Transit is governed by an 18-member Board of Directors; 17 members are local elected officials, and the 18th member is the state DOT Secretary. Local elected officials include mayors, city council members, county executives, and county council members from within the Sound Transit District. State law requires appointments by an elected city official representing the largest city in the participating county and proportional representation from other cities and unincorporated areas. To ensure coordination between local and regional transit plans, half of the appointments in each county must be elected officials who serve on the local transit agency governing Authority.

Sound Transit generally purchases buses and trains that are then operated and maintained by partner agencies, such as King County Metro, Pierce Transit, and Community Transit. The Sounder Commuter rail is operated on tracks owned, maintained and dispatched by the BNSF Railway, which also provides operating crews for the commuter rail service.

Funding Structure: Sound Transit imposes voter-approved taxes to plan, build, and operate the regional mass transit system. These taxes include a sales and use tax and a 0.3 percent motor vehicle excise tax (MVET) within the boundaries of the Sound Transit District. The Sound Transit plan for Subarea capital projects and transit services will be evaluated and adjusted annually as part of the Board's consideration and adoption of an annual budget to deliver fair share of investments to each of Sound Transit's five geographic areas, which include East King County, Snohomish County, South King County, North King County, and Pierce County.

According to Sound Transit, "the principle of subarea equity assures that Sound Transit taxes raised in each subarea are used for capital projects and operations that directly benefit that area." Each subarea has its own budget based on its projected share of local taxes, borrowed funds, federal grants, farebox revenues, etc. System-wide elements that improve mobility throughout the region are funded through a percent of local tax revenues contributed by each of the five subareas.

Tri-County Metropolitan District (TriMet)

Commuter Rail Service Description: TriMet operates the MAX and the Westside Express Service (WES). The WES commuter rail line connects Wilsonville, Tualatin, Tigard and Beaverton, Oregon, a distance of approximately 15-miles. Service was initiated in February 2009 and the system currently carries just under 1,200 passengers per day. The WES service connects to the MAX Light Rail service at Beaverton, and is therefore similar to the service being reviewed here in its route length and ridership.

Governance and Administration Structure: The TriMet District is a municipal corporation established by the state legislature in 1969 to take over local bus systems and provide regional transit service. Since that time, TriMet has managed and operated bus, light rail, streetcar, and most recently, the WES commuter rail service. TriMet is governed by a seven-member Board of Directors, appointed by the Governor of Oregon. Board members represent, and must live in, certain geographical districts.

The WES commuter rail line is managed and funded by TriMet, but the railcars are operated by the host railroad, Portland & Western Railroad staff. Metro is the metropolitan planning organization for the area, responsible for the planning of the region's transportation system, though TriMet operates most of the region's buses and the MAX Light Rail system.

Funding Structure: Capital costs for the WES commuter rail line came from federal and state sources. TriMet receives its operating revenue from payroll and self-employment taxes that are collected and administered by the state Department of Revenue. In 2003, the state Legislature provided TriMet with the Authority to increase the tax rate over ten years to help pay for new transit service throughout the region. The rate increases annually by 1/100 of a percent.

6.7.2 Regional Rail Authority/District (Single-Purpose)

A regional commuter authority or district would be a single provider of commuter rail service with its own board and planning, design, construction and operations functions. A new regional authority can usually be formed in one of two ways: (1) by a legislative statute at the state level

that defines and grants authority to a district; or (2) by a direct popular vote of the electorate in which voters opt-in to form a regional transit district. Like a regional transit authority responsible for multi-modal services, a single-purpose regional rail authority is also characterized by an appointed board, representation closely aligned with area political subdivisions, and the authority to impose voter-approved taxes to balance financial resources with service demands.

Only a handful of single-purpose regional rail authorities exist throughout the country, two of which are newly formed authorities – the Austin-San Antonio Intermunicipal Commuter Rail District (now titled the Lone Star Rail District) and the Sonoma-Marin Area Rail Transit District. Both districts are currently in the commuter rail planning stage. The Sonoma-Marin Area Rail Transit District is described below.

Sonoma-Marin Area Rail Transit (SMART)

Commuter Rail Service Description: The SMART Project is a passenger rail project located in San Francisco's North Bay between Cloverdale in Sonoma County and the San Francisco-bound ferry terminal in Larkspur, Marin County. The project will provide rail service along 70 miles of the Northwestern Pacific Railroad alignment. Environmental studies project that the system will carry 5,300 passengers per day. Service is scheduled to begin as early as in 2014.

Governance and Administration Structure: In 2003, the California state legislature established SMART as a new regional transportation district to oversee the development and implementation of passenger rail service in Sonoma and Marin Counties. Specifically, the SMART District is charged with planning, engineering, evaluating and implementing passenger train service and corridor maintenance from Cloverdale to a Ferry Terminal that connects to San Francisco.

The SMART District is governed by a 12-member board consisting of elected officials. Representatives include:

- Two County Supervisors each from Marin and Sonoma counties,
- Three appointed City Council members from each county, and
- Two representatives from the Golden Gate Bridge District.

SMART is currently working with local transit operators – including Golden Gate Transit, Marin County Transit, and Sonoma County Transit – to ensure that future commuter rail service will be seamlessly integrated into a complete multi-modal network.

Funding Structure: The SMART commuter rail project will cost an estimated $541 million (in current dollars) to build, including rail vehicles, stations, track upgrades, bridge reconstruction and other capital costs. Annual operating costs are projected to be approximately $19 million (current dollars). To date, SMART has obtained approximately $132 million from federal, state, regional and county sources. In 2008, Sonoma and Marin County voters approved a quarter-cent sales tax for the commuter rail project. Other potential sources of funding will include a retail sales tax in Marin and Sonoma Counties, passenger fares, property leasing and development, and freight user fees.

6.7.3 Joint Powers Authority

A Joint Powers Authority (JPA) is a common governance model for commuter rail transit operations. A JPA is an institution permitted under the laws of some states whereby two or more public authorities can operate collectively. A JPA is distinct from the member authorities and has separate operating boards of directors that can be given any of the powers inherent in all of the participating agencies. Unlike a new transit district, which would have its own source of funding as a taxing entity, a JPA relies on funding through its constituent members. A JPA can have legal standing at the state level or can be a partnership entered into between its constituent members via intergovernmental agreements at the local or regional level.

The rationale for forming JPAs to govern commuter rail systems varies. In some cases, a JPA is formed during the planning and design phases of commuter rail, while in other cases a JPA is formed to take over governance from another agency, such as a state DOT.

Examples of JPA's include California's Caltrain (Peninsula Corridor Joint Powers Board), the South Florida's Tri-Rail (South Florida Regional Transit Authority), and northern Virginia's Virginia Railway Express (VRE). A brief description of each is provided below. Trinity Railway Express (TRE), very similar to a JPA, is a joint service operated by DART and the Ft.Worth Transportation Authority, but does not have a separate Board.

Peninsula Corridor Joint Powers Board (PCJPB)

Commuter Rail Service Description: The PCJPB is the governing body for the Caltrain Peninsula commuter rail service between San Francisco, San Jose and Gilroy, a distance of approximately 77-miles. Service was initiated in 1987 and the system currently carries an average of 39,100 passengers per day.

Governance and Administration Structure: The PCJPB was formed in 1987 to oversee the Caltrain service, and in July 1992 assumed the total operating and funding responsibilities for

running Caltrain from the state DOT. The PCJPB consists of three member agencies from the three counties in which Caltrain line serves: the City and County of San Francisco, San Mateo County and Santa Clara County. Currently, the San Mateo County Transit District (SamTrans) is the managing agency for Caltrain, and performs capital planning, service planning, budgeting, marketing, and customer service functions, in addition to supervising train operation. The PCJPB contracts with Amtrak to operate the trains (conductors, locomotive engineers, and other operating personnel) and maintain the tracks and rolling stock.

The PCJPB consists of three representatives from each of the three counties served by Caltrain. Representatives include:

- San Francisco: 1 seat appointed by the Mayor, 1 seat appointed by the S.F. Public Transportation Commission (MUNI), 1 appointed by the County Board of Supervisors;
- San Mateo County: 1 seat appointed by the Cities Selection Committee, 1 seat appointed by the San Mateo County Transit District (SamTrans), 1 appointed by the County Board of Supervisors;
- Santa Clara County: 1 seat for the County Board of Supervisors representative on the MTC, 2 seats appointed by the Santa Clara Valley Transportation Authority (VTA)

Funding Structure: Through the PCJPB, Caltrain commuter rail service is jointly funded by the City and County of San Francisco, San Mateo County Transit District, and Santa Clara Valley Transportation Authority.

South Florida Regional Transportation Authority (SFRTA)

Commuter Rail Service Description: The SFRTA is the governing body for the Tri-Rail commuter rail service between Miami, Fort Lauderdale and West Palm Beach, Florida, a distance of approximately 71-miles. Service was initiated in 1987 and the system currently carries an average of 16,100 passengers per day. Tri-Rail also connects to the Metrorail heavy rail transit system in Miami.

Governance and Administration Structure: The SFRTA is a tri-county transit Authority created in 2003 by the state legislature to replace the Tri-County Commuter Rail Authority. The new umbrella Authority was charged with developing a regional multi-modal travel system by expanding cooperation between the Tri-Rail commuter rail operations and the three existing county public transport authorities of Broward County Transit, Miami-Dade Transit, and Palm Tran. The Tri-Rail commuter rail service is solely operated by SFRTA.

The SFRTA is a nine-member board, with equal representation from the three member counties, one state DOT representative, and two governor appointees. While the SFRTA currently serves Miami-Dade, Broward, and Palm Beach Counties, its service area can be expanded by mutual consent of the Authority and the board of county commissioners representing the proposed expansion area.

Tri-Rail shares its track with Amtrak's Silver Meteor and Silver Star and CSX's Miami Subdivision. The Florida Department of Transportation purchased the track from CSX in 1989.

Funding Structure: Each county served by the SFRTA is required to dedicate $2.67 million to the Authority annually. This funding may come from each county's share of the ninth-cent fuel tax, the local option fuel tax, or any other source of local gas taxes or other nonfederal funds available to the counties. In addition, the state Legislature has authorized the levy of an annual $2 vehicle registration or renewal tax for the counties served by the Authority. Each participating county is also required to contribute $1.565 million annually for the operations of the SFRTA.

Virginia Railway Express (VRE)

Commuter Rail Service Description: The VRE provides commuter rail service from the northern Virginia suburbs to Alexandria, Crystal City and downtown Washington, D.C., along the I-66 and I-95 corridors. Service was initiated in 1992 and the system currently carries an average of 16,000 passengers per day.

Governance and Administration Structure: The VRE is a joint project of two regional transportation districts: the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock Transportation Commission (PRTC). The NVTC initially took the lead in seeking to plan and implement commuter rail service in northern Virginia. During the commuter rail planning process, jurisdictions outside the NVTC district could not reach agreement on how to support commuter rail by joining NVTC. Therefore, those counties outside the NVTC formed a separate regional transportation district commission – the PRTC. Legislation established a two percent motor fuels tax within the PRTC to be used to support VRE expenses (as well as other transportation investments).

NVTC and PRTC board members, who are comprised primarily of local and state elected officials, approve VRE's policies, fares, budgets and major spending decisions. NVTC and PRTC also has an established VRE Operations Board, consisting of three voting members plus alternates from each of the two commissions, plus a voting representative of the Commonwealth of Virginia.

The two commissions co-own all VRE assets (rolling stock, stations in the District of Columbia, etc.) and lease access to track from CSXT and Norfolk Southern freight railroads. The VRE contracts with Amtrak to provide train crews and light maintenance.

Funding Structure: Through a Master Agreement executed by NVTC and PRTC, participating jurisdictions, (with the exception of a few), pay for VRE through a specific funding formula. The formula weights ridership by jurisdiction of residence with a factor of 90 percent and population with a factor of 10 percent.

6.7.4 Division of State DOT

The provision of regional transportation services by state agencies is more common in small states with one dominant metropolitan area. Both Boston, Massachusetts and Baltimore, Maryland are examples of commuter rail systems that are planned and operated by a state DOT. The latter is described below.

Maryland Transit Administration (MTA)

Commuter Rail Service Description: The Maryland Area Regional Commuter (MARC) train service is a commuter rail system that operates along three lines. The Penn Line operates between Baltimore's Penn Station and Union Station in Washington, D. C. and carries an average of 20,000 passengers per day. The Brunswick Line operates between Brunswick, Maryland and Washington Union Station and carries an average of 7,000 passengers per day. The Camden Line operates between downtown Baltimore and Union Station in Washington D.C. and carries an average of 4,500 passengers per day.

Governance and Administration Structure: The MTA is a division of the State's DOT and operates local and commuter bus, light rail, subway, and commuter rail service. This division also coordinates rail freight logistics throughout the state.

The MTA contracts with CSX and AMTRAK to provide MARC rail commuter service on the three lines.

Funding Structure: MARC train service is funded directly by the state of Maryland.

6.7.5 Division of Metropolitan Planning Organization

While Metropolitan Planning Organizations (MPOs) generally play a significant role in the planning for regional commuter rail service, they are usually not the entity responsible for the

governance and administration of commuter rail service. One exception to this is New Mexico's recently opened Railrunner Express, as described below.

New Mexico Mid-Region Council of Governments (MRCOG)

Commuter Rail Service Description: The New Mexico Rail Runner Express provides commuter rail service between Albuquerque, Santa Fe, and Belen, New Mexico, a distance of approximately 97 miles. The first phase of service, between Belen and Bernalillo, was initiated in 2006. The second phase, an extension of the line to Santa Fe, opened in December 2008.

Governance and Administration Structure: The MRCOG is a multi-county governmental agency responsible for identifying and initiating coordinated regional planning strategies in central New Mexico and has, until very recently, been the lead agency in the implementation of the Rail Runner Express. MRCOG and the New Mexico DOT began planning for the commuter rail service between Albuquerque and Santa Fe in 2005. In that same year, the State of New Mexico purchased the railroad corridor from the BNSF Railway to ensure the priority of commuter trains along the line. And, until July of this year, MRCOG had assumed the lead in the design, construction and operation of the commuter rail service.

In 2008, the Rio Metro Transit District was formed and included Sandoval, Bernalillo, and Valencia Counties. Rio Metro developed a plan and budget for an integrated, regional transit system. And in July 2009, Rio Metro became the agent for the New Mexico DOT to operate and manage the Rail Runner Express.

Funding Structure: State and local funds, including bond funds, covered the capital costs of the Rail Runner project. Funding for operations of the commuter rail service initially was covered by federal Congestion Management and Air Quality (CMAQ) funds, along with ticket revenues and some state and local funds. However, in November 2008, two separate gross receipts taxes for regional transit were approved by voters to fund the Rail Runner commuter rail service and new transit connections.

The Rio Metro Transit District has approved an intergovernmental agreement with the North Central Regional Transit District (NCRTD) whereby the NCRTD will help fund Rail Runner operations by providing one-half of the revenue generated in Santa Fe County from the recently approved 1/8 of one-percent regional transit gross receipts tax. Funding for the Rail Runner will also be provided by the New Mexico Department of Transportation.

6.8 Potential Governance Structures and Funding Options Available in the Southern King County Region

6.8.1 Provision of DMU Service by Existing Transportation Agencies

There are several agencies in King County that are enabled by the RCW to provide public transportation services. The practicality of these agencies to provide DMU service in the study corridor is as follows:

King County Metro – Metro Transit is a part of King County government. Metro provides fixed-route bus service, ridesharing services and dial-a-ride paratransit services throughout King County. Metro has the ability to provide passenger rail service, though the only rail services it operates are under contract to the City of Seattle and Sound Transit respectively. DMU service in SE King County is not a part of Metro's adopted plan or budget. The recent economic downturn has resulted in a significant budget shortfall which precludes Metro undertaking additional large capital projects at the present time.

Sound Transit – Sound Transit is a special purpose district created to provide high –capacity transit service within most of the urbanized parts of King, Pierce and Snohomish Counties. The City of Auburn is the only part of the study area that is within the Sound Transit taxing district (the cities of Covington, Maple Valley and Black Diamond were not a part of the Sound Transit district at the time of agency formation). The Sound Transit enabling legislation allows for annexation, however, that would require action by the Sound Transit board as well as a public vote within the areas proposed for annexation. Decisions about the appropriate service to be provided would then be in the hands of the Sound Transit board.

Amtrak – At one time Amtrak did operate an intercity train (the North Coast Hiawatha) in the corridor. The service was discontinued in 1979. Amtrak has recently studied the feasibility of restarting service between Seattle and Chicago using that corridor but that route is not included in Amtrak's current plans or budget. Amtrak does provide commuter rail service as a contractor to other agencies in a number of places, but Amtrak's charter from congress stipulates that its purpose is to provide inter-city rail service not commuter service within an urban area. It is highly unlikely BNSF would recognize Amtrak's operating authority for commuter DMU service in this corridor.

WSDOT – The Washington State Department of Transportation provides funding for the Amtrak Cascades service that operates between Portland, Seattle and Vancouver BC under the provisions of RCW 47.79. DMU commuter service that is intended to serve a local corridor is

outside the scope of WSDOT current plans and is not reflected in any of the State's adopted policy documents.

This review suggests that while DMU operation by existing agencies may be theoretically possible, there is little reason to expect those agencies to pursue the idea. It is also apparent that the governance structure of the existing agencies along with their funding limitations would not be a good fit for the circumstances in the corridor.

6.8.2 Other Governance Structures

The list of possible public entities is not limited to the four existing agencies discussed above. The RCW enables at least a dozen types of agencies to provide public transportation services. As a part of this study, the following governmental structures were reviewed:

- County Transit Authority (RCW Chapter 36.57.)
- County Transit Authority in unincorporated area (RCW 36.57.100)
- Public Transportation Benefit Area Authority (RCW 36.57A.)
- City Transportation Authority (Monorail) (RCW 35.95.)
- Metropolitan Municipal Corporation (RCW 35.58.)
- Regional Transportation Authority (RCW Chapter 81.112.)
- County Rail District (RCW Chapter 36.60.)
- Regional Transportation Investment District (RCW Chapter 36.120.)
- Transportation Benefit District (RCW Chapter 36.73.)
- High Capacity Transportation Corridor Area (RCW 81.104.200)
- Port District (RCW 53.08.290)
- Cities and County through the Inter-local Cooperation Act (RCW Chapter 39.34.)

Out of the aforementioned group, the following entities most probably could **not be created** to operate and maintain a passenger rail service of the type described in this study. The reasons are as follows:

- **County Transit Authority** (Cannot operate a public transportation system in a county in which a metropolitan municipal corporation is performing the function of public transportation on May 5, 1974. (RCW 36.57.020) Seattle Metro was performing a public transportation function on that date)
- **County Transit Authority** (Authorized to operate and maintain public transportation in unincorporated areas of the county. This would preclude any of the cities being involved.) (RCW 36.57.100)
- **City Transportation Authority** (This entity is authorized to operate only a monorail) (RCW Chapter 35.95A.)
- **Metropolitan Municipal Corporation** (King County has assumed all of the rights and powers of Seattle Metro (RCW Chapter 36.56.) and Seattle Metro was a countywide metropolitan municipal corporation pursuant to RCW 35.58.040)
- **Regional Transportation Authority** (Involves boundaries in two counties (RCW 81.112.030))
- **Regional Transportation Investment District** (Transportation Projects do not include rail projects (RCW 36.120.020(8))
- **High Capacity Transportation Corridor Area** (RCW 81.104.200) This area is established in a county with more a population of more than 400,000 and adjoins a state boundary. King County does not adjoin a state boundary.
- **Port District** (The Port of Seattle, which is countywide, already exists in this area. Another less than county-wide port may not be created in the county. (RCW 53.04.023))

If the entities above are eliminated from consideration, it leaves four plausible types of public entities that could manage the operation of DMU commuter rail service in SE King County under current Law. These entities and their relevant characteristics are as follows:

Public Transportation Benefit Area Authority (RCW 36.57A). The PTBA is the most commonly used type of governance structure for public transportation in Washington State. Examples include Pierce Transit, Kitsap Transit and Community Transit. PTBA's have considerable flexibility in setting boundaries, fares, service policies, etc.

1. Created by a transportation improvement conference (RCW 36.57A.020.

2. Governing Board-9 voting member Board, who are elected officials from the cities and counties with the boundaries of the Area Authority, and one non-voting member selected from the labor organization(s).

3. Taxing Possibilities and Limitations:

    a. B&O and Household Tax (35.95.040)

    b. Cannot levy sales and use tax in this instance per RCW 82.14.045

    c. No authority to levy property tax

    d. No authority to levy motor vehicle tax

Cities and Towns though an agreement under the Interlocal Cooperation Act (RCW 39.34). A number of cities including Everett, Yakima and Pullman operate public transportation services. The Interlocal Cooperation Act gives cities the ability to contract with one another or other agencies for public transportation services including those that cross jurisdictional boundaries.

1. Created by an agreement between the cities and possibly King County

2. Governing Board – Determined by the agreement between the parties to the Interlocal Agreement

3. Taxing Possibilities and Limitations:

    a. May be able to levy a B&O and household tax per RCW 35.95.040

    b. Property tax within the cities current authority

    c. No sales and use tax within King County pursuant to RCW 82.14.045

    d. No authority for a motor vehicle excise tax

County Rail District (RCW Chapter 36.60). It is not entirely clear whether this statute would allow for passenger rail service. RCW 36.60.010 specifies that the boundaries are drawn to include property from which agricultural and other products are shipped. However, in RCW 36.60.010 also refers to the funding of passenger service. This statute may need to be amended to clarify that passenger rail service may be allowed.

1. Created by the county council (RCW 36.60.010)

2. Governing Board – The county council (RCW 36.60.010)

3. Taxing Possibilities and Limitations:
    a. Can levy for one year excess property tax in excess of the limitation of 1% (RCW 36.60.040)
    b. Levy property tax in excess of the l% limitation to retire bonds (RCW 36.60.040)
    c. B&O and household tax probably possible.
    d. Not authorized to levy retail sales and use tax.
    e. Not authorized to levy a motor vehicle excise tax

Transportation Benefit District (RCW Chapter 36.73 provides for the creation of a transportation benefit district for the operation of public transit. TBD's were originally enabled to facilitate a cooperative approach to funding transportation capital projects by local jurisdictions.

1. Created agreement through the Interlocal Cooperation Act (RCW 36.73.020 (2).
2. Governing Board – Determined by the agreement between the parties to the Interlocal Agreement.
3. Taxing Possibilities and Limitation:
    a. Levy property tax in excess of the l% limitation for a one year period (RCW 36.73.060)
    b. Levy property tax in excess of the 1% limitation to retire bonds (RCW 36.73.060)
    c. Sales and use tax per RCW 36.73.040(3)(a)
    d. Motor Vehicle Tax per RCW 36.63.040(3)(b)
    e. B&O and household tax per RCW 35.95.040

Authority for each of these entities was written into the RCW to address specific transportation needs or problems, but none of them were put in place to address the particular conditions found in SE King County. Therefore it should come as no surprise that even though it appears feasible to implement and operate DMU commuter rail service under any of these statutes none of them are a perfect fit for the circumstances in the corridor.

The biggest challenge a new entity must overcome is generation of adequate tax revenue to fund the service. It should be noted that of the four plausible types of entity identified, the first three

have very limited taxing ability and may have difficulty raising sufficient revenue from the allowed sources. In contrast, Transportation Benefit Districts are much more generously endowed with taxing authority (but are somewhat less well suited to providing ongoing governance for transit operations). Amendments to the RCW that allow greater flexibility in levying sales and use tax, property tax, or MVET would facilitate development of a commuter rail business plan that is a better for SE King County.

6.8.3 Funding Options Currently Available

The RCW provides the following taxes for public transportation service:

Retail Sales and Use Tax - Statutory Authority: RCW 82.14.045

Authorization: Authorize the imposition of a sale and use tax up to 9/10th of one percent of the sales price for public transportation (RCW 82.14.045(1).

Limitation: In the event a metropolitan municipal corporation imposes a sales and use tax, no city, county which has created an unincorporated transportation benefit area, public transportation benefit area authority, or county transportation authority wholly within such metropolitan municipal corporation shall be empowered to impose and/or collect such taxes (RCW 82.14.045(2).

However, if a Transportation Benefit District is created pursuant to RCW Chapter 36.73., separate sales and use tax could be levied pursuant to RCW 36.73.040.

B & O Tax - Statutory Authorization: RCW 35.95.

Authorization: Business & Occupation Tax

The corporate authorities of a municipality are authorized to adopt ordinances for the levy and collection of excise taxes and/or for the imposition of an additional tax for the act or privilege of engaging in business activities. Such business and occupation tax shall be imposed in such amounts as fixed and determined by the corporate authorities of the municipality and shall be measured by the application of rates against value of products, gross proceeds of sales, or gross income of the business, as the case may be (RCW 35.95.040).

Authorization: Household Tax

The excise taxes other than the business and occupation tax above provided for shall be levied and collected from all persons within the municipality in such amounts as shall be fixed and

determined by the corporate authorities of the municipality: PROVIDED, that such excise tax shall not exceed one dollar per month for each housing unit (RCW 35.95.040).

Limitations: For County Transportation Authorities and Public Transportation Benefit Areas, a vote of the people is needed before the tax may be imposed.

Property Tax:

Authorization: County Rail District can levy a property tax (RCW 36.60.040)

Transportation Benefit Districts (RCW 36.73.060)

Motor Vehicle Excise Tax:

Authorization: Can be levied by Sound Transit and also authorized for Transportation Benefit Districts (RCW 36.73.040(3)(b), but not authorized for other transit agencies.

It should be assumed that before any of the taxes are levied for this project, the voters in the area would need to vote to authorize the levying of such tax.

6.8.4 Local Tax revenue Summary for Southeast King County

Exhibit 6.4 shows local sales tax and property tax revenue collected in Auburn, Black Diamond, Covington and Maple Valley in 2009. The data reveals considerable disparity in tax rates and revenue collected. The totals shown reflect only the local share of sales and property taxes. A .9% sales tax for public transportation is levied by King County Metro across the entire county. Sound Transit also collects sales tax at the .9% rate but Auburn is the only city in the study area within Sound Transit's taxing district.

From the data in this table it is possible to roughly estimate tax rates that would generate sufficient revenue to cover annual operating expenses for the commuter rail service described elsewhere in this study. For example, a .1% sales tax would be expected to generate approximately $16,000,000 per year (mostly from retails sales in the City of Auburn). That would yield an amount well in excess of the annual operating costs for commuter rail service. In comparison, a property tax increase of $.25 per thousand dollars of assessed value would be expected to generate annual revenue of approximately $4,000,000 per year.

It should be emphasized these estimates are based on 2009 data and they assume no change in retail sales or property values as a result of the commuter rail project, nor any reduction in economic activity resulting from higher tax rates. The data used is only from the four cities in the study area and does not include the parts of unincorporated King County in the area. There is

very little retail activity in the unincorporated area but there is a considerable quantity of real property.

The estimates provided above are for illustrative purposes only. No assessment of the political feasibility of these taxes has been made.

Exhibit 6-4
Local Jurisdiction Tax Revenue Summary

JURISDICTION	Year	Retail Sales Tax Revenue	Rate	Property Tax	Rate
Auburn	(2009)	$11,909,179	0.84	$12,801,791	1.41
Black Diamond	(2009)	$249,526	2.10	$978,629	1.79
Covington	(2009)	$2,002,376	2.10	$2,072,652	1.163
Maple Valley	(2009)	$1,446,497	0.84	$2,971,124	1.25
TOTALS:		**$15,607,578**		**$18,824,196**	

6.8.5 Agreement and Consent Requirements:

Before any entity operates passenger rail service within either King County or within the boundaries of Sound Transit, that entity would need to have an agreement with either or both King County (RCW 35.58.250) and Sound Transit (RCW 81.112.090). Also, either or both King County (RCW 35.58.260) and Sound Transit (RCW 81.112.100) would need to consent to such rail operations.

Pursuant to RCW Chapter 36.56., King County has assumed all the powers of Seattle Metro which was formed under RCW Chapter 35.58. And, RCW 35.58.250 states, in part, the following in this regards:

> *Except in accordance with an agreement made as provided herein, upon the effective date on which the metropolitan municipal corporation commences to perform the metropolitan transportation function, no person or private corporation shall operate a local public passenger transportation service within the metropolitan area with the exception of taxis, buses owned or operated by a school district or private school, and buses owned or operated by any corporation or organization solely for the purposes of the corporation or organization and for the use of which no fee or fare is charged.*

Also, RCW 35.58.260 specifies that the city or cities would need consent of King County to operate the passenger rail service.

RCW 81.112.090 (relating to Sound Transit) has the following similar language:

> *Except in accordance with an agreement made as provided in this section, upon the date an authority begins high capacity transportation service, no person or private corporation may operate a high capacity transportation service within the authority boundary with the exception of services owned or operated by any corporation or organization solely for the purposes of the corporation or organization and for the use of which no fee or fare is charged.*

Also, RCW 81.112.100 specifies any city, county, county transportation authority, metropolitan municipal corporation, or public transportation benefit area within the authority boundary shall not operate high capacity transportation service without the consent of the authority (i.e. Sound Transit). However, this statute states further that nothing in this chapter shall restrict development, construction, or operation of a personal rapid transit system by a city or county.

Chapter 7: Initial Environmental Screening

The purpose of this chapter is to provide an initial overview of environmental constraints associated with the potential development of the Southeast King County Commuter Rail Project. This information is intended to help in taking further steps in project development and guide future decision making as the project concept and design progresses.

This environmental overview includes discussion of the following resources: sensitive areas, parks and historic sites, and land use. This chapter summarizes potential environmental issues that should be considered if the Southeast King County Commuter Rail Project moves forward into project development in the future. There will be a need for extensive, additional analysis of environmental constraints if the project moves forward.

7.1 Methodology

This overview provides a summary description of the existing conditions in the vicinity of the project. This summary is based on information and data presented in the attached series of maps that were developed by WSDOT (see Appendix D). Field investigations were not part of the scope of work for this study. The Appendix D exhibits present data pertaining to the following topics:

- Air Quality
- Seismic hazards, landslide hazards, and erosion hazards
- Hydrology, hazardous materials sites (water quality), and floodplains
- Land use and zoning
- Parks and historic sites
- Urban Growth Areas
- Wetlands and threatened and endangered species
- Zoning

Other potential environmental constraints that will need to be considered in future analyses include but are not limited to the following:

- Transportation
- Cultural resources
- Noise and vibration
- Energy and climate change
- Socioeconomics
- Environmental justice
- Visual quality

7.2 Existing Conditions

The following overview of existing conditions is based on review of the Appendix D exhibits that were prepared by WSDOT. The text below describes the existing conditions in the general vicinity of the existing rail corridor, and highlights the potential environmental constraints that may occur, based on available information, in the immediate vicinity of the proposed improvements.

7.2.1 Sensitive Areas

County and city governments identify and map environmentally sensitive areas within their jurisdictions. Environmentally sensitive areas generally include streams, aquifer recharge areas, floodplains, wetlands, locations of threatened and endangered species, and areas subject to erosion, landslide, or seismic activity.

Hydrology, Water Quality, and Floodplains

The project is located in the Green/Duwamish Watershed Water Resource Inventory Area (WRIA) 9 (see Appendix D). Numerous streams and water bodies exist in the vicinity of the existing rail corridor. Most notably, the existing track crosses and/or parallels the following surface waters: Ravensdale Creek, Jenkins Creek, Big Soos Creek, Covington Creek, Soosette Creek, and the Green River. Several of these water bodies are listed as impaired in the Washington State Department of Ecology's 2008 Water Quality Assessment. Many of these waterways provide habitat for fish, both anadromous and resident. The existing rail corridor also crosses several aquifer recharge areas, and crosses the 100-year floodplain in the vicinity of Jenkins Creek and the Green River. Several hazardous materials sites such as leaking underground storage tanks were identified in the general vicinity; none of these are immediately adjacent to the existing rail corridor.

The proposed City of Maple Valley Station site at MP 89.9 is located near Ravensdale Creek and a critical aquifer recharge area. Several public drinking water supply wells are also located near the proposed improvements. The proposed City of Covington Station site at MP 94.5 is located on the south side of the existing track, within a critical aquifer recharge area. Jenkins Creek parallels this part of the track on the north side, and the area north of the existing track falls within the 100-year floodplain. The proposed Auburn passing track improvements between MP 100.35 and 102.29 pass near the Green River and cross a critical aquifer recharge area and the 100-year floodplain at milepost 101.

Wetlands

The National Wetlands Inventory and King County's Sensitive Areas Ordinance (Appendix "F") were used to identify wetlands in the existing rail corridor, most of which are concentrated near waterways. In particular, wetlands associated with Jenkins Creek and the Green River are shown to occur near the existing rail corridor.

No wetlands are shown to occur in the immediate vicinity of the improvements proposed at milepost 89. Wetlands are shown to occur on either side of the track near the Covington Station and passing track at MP 94.5 and at MP 101 near the east end of the Auburn passing track. These areas are also designated as wetlands by the King County Sensitive Areas Ordinance.

Threatened and Endangered Species

A variety of sensitive, threatened and endangered species, or habitat identified as suitable for these species, occur in the vicinity of the existing rail corridor (see Appendix D). These species include bald eagle, spotted owl, marbled murrelet, and a variety of fish species including Chinook salmon and bull trout. Covington Creek, Jenkins Creek, Big Soos Creek and the Green River are designated critical habitat for Chinook salmon.

The proposed improvements at Maple Valley Station (MP 89.9) and Covington Station (MP 94.5) include areas designated as highly or moderately suitable habitat for marbled murrelet, and suitable habitat for spotted owl. The proposed Auburn passing track improvements between MP 100 and 101 include areas designated as priority habitat and species (PHS) zones, including areas of riparian habitat, swamp/marsh/bog, and urban natural open space.

Erosion, Landslide, and Seismic Hazards

Areas of erosion, landslide, and seismic hazards are common in the vicinity of the rail corridor (see Appendix D). Erosion and landslide areas generally occur near the major waterways in the vicinity of the existing rail corridor. There are areas of seismic hazard along Big Soos Creek and

Covington Creek, and the Green River valley. The western portion of the existing rail corridor is located within an area identified as a lahar zone. A lahar is a debris flow resulting from a volcanic eruption; in this case, an eruption of Mount Rainier could result in a lahar that could travel as far as 100 kilometers from the volcano.

The proposed Maple Valley Station at MP 89.9 includes an area designated as a severe erosion hazard. No erosion, landslide, or seismic hazards were shown to occur within the proposed Covington Station and passing track near milepost 94.5. The proposed Auburn passing track, between mileposts 100.35 and 102.29, falls within hazard zones for significant seismic hazard, moderate to high liquefaction potential, and the lahar zone.

7.2.2 Parks and Historic Sites

The data provided by WSDOT describes known historic sites, as defined by the Washington State Department of Archaeology and Historic Preservation (DAHP) or listed in the National Register of Historic Places (NRHP) (see Appendix D). The rail corridor crosses park land in two places near Jenkins Creek, and passes another park on Covington Creek. In Auburn, the rail corridor passes between a park on the Green River and an area of Tribal land. Three historic sites were identified adjacent to the rail corridor. One of these, the Neely Aaron Mansion, is listed on the National Register of Historic Places.

The assumed Maple Valley and Covington Station sites occur on publicly owned parcels. No historic sites were shown to occur near the assumed station sites. The proposed Auburn passing track improvements, between mileposts 100.35 and 102.29, pass through a park. One historic site was shown to occur adjacent to the proposed Auburn passing track at MP 101.

7.2.3 Land Use and Zoning

Designated land uses and zoning in the vicinity of the existing rail corridor are predominantly residential, with a mix of rural and urban densities proposed in the comprehensive plans for the area (see Appendix D). The existing rail corridor passes near one area zoned for industrial use located near Soosette Creek. Where the existing rail corridor crosses the Green River, an area is zoned for community business. Areas where the rail corridor is located within 200 feet of waterways are subject to King County's Shoreline Management Master Program. The existing rail corridor crosses shorelines designed for Rural and Conservancy uses. Additional restrictions may apply with regard to shorelines under local jurisdiction in Covington and Auburn.

The Maple Valley Station site is located in an area designated for urban residential use; the parcel is publicly owned and zoned for public use. The Covington Station is located in an area

zoned for rural residential use; the parcel is publicly owned and zoned for rural residential use. The proposed Auburn passing track between mileposts 100.35 and 102.29 pass through areas zoned for designated for rural and urban residential uses; the portion of the track between mileposts 100 and 101 passes through park lands and an area zoned for community business use. These improvements will be constructed within existing BNSF right-of-way.

7.2.4 Other Environmental Considerations

The following is a brief discussion of other potentially critical environmental constraints that will need future analyses.

- *Air quality* – any new DMU equipment will need to meet the new Tier 4 emissions requirement. It is anticipated that equipment that meets this requirement will be available at the start of operations.
- *Cultural resources* – the area has been inhabited by Native Americans and it is possible that cultural resources may occur in the vicinity of any of the potential improvements.
- *Noise and vibration* – it will be necessary to conduct a noise and vibrations study at each of the at-grade crossings and any yet to be identified sensitive noise receptors along the rail corridor. The FRA-mandated requirement that all trains sound their horns prior to approaching the crossing is the main noise generator. Potential mitigation would be to implement a quiet zone at the critical crossings.
- *Energy and climate change* – potential changes in energy use and greenhouse gas emissions associated with the project will need to be analyzed.
- *Socioeconomics* – potential socioeconomic effects of the project will need to be considered, at both a local and regional scale.
- *Environmental justice* – potential effects on low-income or minority populations will need to be analyzed to identify any disproportionate effects.
- *Visual quality* – effects on visual quality in the vicinity of the project will need to be evaluated.
- *Transportation* – this project needs to be included in the regional transportation plan, Puget Sound Regional Council's (PSRC's) *Transportation 2040* update, and other transit proposals in the area including enhanced bus service.

7.3 Summary of Initial Findings

Exhibit 10-1 provides a summary of the potential environmental constraints that were identified in the immediate vicinity of the proposed improvements associated with the project (see Appendix D). It is important to note that additional investigation and analysis will be required to confirm the presence and extent of these constraints and any potential impacts that would be associated with the project.

Additional analyses will be necessary to identify the extent of potential impact to sensitive areas. In particular, analysis will be needed to determine the extent of potential impacts to streams, wetlands, threatened and endangered species, and compliance with local comprehensive plans, shoreline and critical areas ordinances and other local, state and federal regulations.

Exhibit 7-1
Summary of Potential Environmental Constraints

Proposed Improvements	Potential Environmental Constraints					
	Hydrology, Hazardous Materials, Floodplains	Wetlands	Threatened / Endangered Species	Erosion, Landslide, Seismic Hazards	Parks / Historic Sites	Land Use / Zoning
Ravensdale Operations and Maintenance Facility, including small railroad yard						
Maple Valley Station Site: Pedestrian loading platform and parking facility at milepost 89	✓		✓	✓		✓
Covington Station Site: Pedestrian loading platform, parking facility, and walkway at milepost 94.8	✓	✓	✓	✓		✓
Covington Passing Track extension milepost 93.0 to milepost 94.8	✓	✓	✓	✓		✓
Auburn 2nd Main and Station Platform: New and rehabilitated track, grade separations and passenger loading facility between mileposts 100.35 and 102.41	✓	✓	✓	✓	✓	✓

Washington State
Department of Transportation

Chapter 8: Study Findings

8.1 Summary of Findings

8.1.1 Existing Conditions

The project study area was defined as the BNSF Railway Company's Stampede Pass railroad corridor located in Southeast King County. This corridor runs between Auburn and Ravensdale through Covington and Maple Valley.

A key issue for this study is the significant population growth in the communities of Covington, Maple Valley and Black Diamond and the need to improve transportation to and from these communities. There is a very limited network of highways and major arterials serving these areas and this network is now nearly at capacity and is projected to be over capacity by 2030. There is some bus service provided to these areas but increased service will place an even larger burden on the highway network.

8.1.2 Scenario Definitions

Three scenarios were evaluated in this study: the Baseline, Commuter Rail (DMU) and an Enhanced Bus scenario.

The Baseline scenario studied the existing conditions with considerations of known projects presently underway or in the planning stage. In this baseline scenario the Auburn Sounder Station is the primary hub for the existing regional transit services. The Sounder Commuter Rail service along with Pierce and Metro Transit buses serve the region to and from the Auburn Sounder Station.

The Commuter Rail or DMU scenario assumes operating a new rail service between Auburn and Maple Valley with an intermediate station at Covington and a small maintenance and layover facility at Ravensdale. This DMU service plans to operate over the existing BNSF freight line. Platforms are to be located at the south end of the existing Auburn Sounder Transit station, Covington and Maple Valley.

The Enhanced Bus scenario increased service on two existing routes, 149 and 168 and one new peak period only express service between the Maple Valley Park-and-Ride and the Auburn Sounder station via Covington on SR 18.

8.1.3 Ridership

The Puget Sound Regional Council (PSRC) Travel Demand Model was modified, and used to project ridership demand. The model was validated by a comparison of existing bus ridership compared with the model output. A base year of 2006 was selected with a forecast ridership of 2030 in order to evaluate the three scenarios.

The assumptions for the DMU ridership forecast included: That each of the three stations had park-and-ride capacity for up to 1500 vehicles, an operating speed of 40 miles per hour, one minute dwell times at the platforms and a frequency of service on either 15 minute or 30 minute headways. The frequency of service was the most important driver of ridership in the forecasting model. The model results for the DMU service at 15 minute headway showed forecast ridership of 2,190 daily, however, only 1,140 daily riders were forecast with 30 minute headways.

The model showed similar ridership results in the Enhanced Bus scenario.

8.1.4 Rail Operations Analysis

The rail operations service plan was based upon projected freight traffic on the BNSF corridor with DMU service options of 60-minute, 33-minute and 23-minute headways. Based upon projected ridership levels each DMU train set will consist of three cars, two powered and one non-powered. A start up service incorporated one DMU set at 60-minute headways with a 20-minute run time. The full service plan operates two sets of DMU equipment on 33-minute headways with 20-minute running time. At service levels of less than 33-minute headways, the planned infrastructure improvements will need to be upgraded once again, which would most likely include double tracking the entire rail corridor from Auburn to Maple Valley. No service plan less than 33-minute headways was considered due to the disruption of BNSF freight service or needed infrastructure improvements required to mitigate that disruption.

The track alignments are to be configured to accommodate 70 mile per hour operations of the DMU, providing 20 minute run times between the out reaching stations of Auburn and the City of Maple Valley with a stop at Covington.

Station platforms are to be at level boarding to comply with FRA ADA requirements and 300 feet in length to accommodate the DMU train lengths.

8.1.5 Capital Costs

The capital improvements identified were based upon the ridership forecast needs and the operating plan. Those capital items were identified as acquisition of rolling stock (DMU units) upgrades to the existing BNSF track on the study corridor, siding construction for freight operations, DMU only sidings, station platforms and related parking and access facilities and a maintenance and layover facility for the DMU vehicles and crews.

Two detailed cost estimates were completed, one considering the work to be performed by the BNSF on their right of way and the other estimate based upon contractor performed work only.

The low capital cost estimate range for the startup service is $169.5 million and the high capital cost estimate range for the full service plan using BNSF forces is $190.4 million.

8.1.6 Operating and Maintenance Costs

The operating fixed costs were based on costs for a small commuter rail start up with a competitively solicited third party contractor expressed in 2010 dollars. The operating fixed costs were estimate to be $3.4 million. The variable costs considered the start up level of service and a full level of service. Start up variable costs are estimated at $.7 million and full level of service costs $1.3 million. Total start up cost is estimated at $4.08 million and full service total cost at $4.7 million.

8.1.7 Funding Sources and Financial Plan

There are numerous potential funding sources available. However, it is anticipated that the most likely potential funding sources would be either sales tax (state or local) or a motor/vehicle sales tax to fund a potential DMU service. Washington State statutory authority will likely need revision in order to implement a future potential DMU service in SE King County.

8.1.8 Operating Entities

One of the existing operating entities could be assigned the governance of the DMU service, for example Amtrak, WSDOT, Sound Transit, or King County Metro, however, there is little reason to expect these agencies would be interested or willing to oversee this service. A new governing entity could also be established under existing Washington State law.

There are four possible public entities available under existing law:
Public Transportation Benefit Area Authority
Cities and Towns use of the Interlocal Cooperation Act
County Rail District

Transportation Benefit District

However, none of these statutes appear to be a good fit for a SE King County DMU service. Amendments to the RCW could be necessary in order to allow greater flexibility in levying sales and use tax, property tax or MVET to facilitate development of the SE King County DMU service.

8.1.9 Initial Environmental Screening

No field investigations were made during this study. WSDOT GIS exhibit maps were used to assess the environmental constraints that may be imposed on this proposed DMU Study. Detailed future environmental analysis will need to be conducted if this project moves forward.

8.2 Next Steps

The next steps to follow completion of this preliminary feasibility study will be determined by the communities in Southeast King County: Auburn, Black Diamond, Covington and Maple Valley. To that end, a Phase II project implementation effort has been identified by the communities and a federal Housing and Urban Development (HUD) grant of $360,000 has been secured through Congressman Dave Reichert's office in the Washington State Eighth Congressional District. The scoping effort for the Phase II implementation will commence in mid-summer 2010

END OF REPORT