Draft Report

Sublimity Interchange Area Management Plan

Prepared for

Oregon Department of Transportation

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Prepared by

CH2MHILL

Exhibit "B"

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Abbreviations and Acronyms

ADT	average daily traffic
ATR	automatic traffic recorder
CLOMR	Certified Letter of Map Revision (FEMA)
DEQ	Department of Environmental Quality
DLCD	Department of Land Conservation and Development
EA	Environmental Assessment
EFU	Exclusive Farm Use
ECSI	Environmental Cleanup Site Information (DEQ database)
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
HDM	Highway Design Manual
IAMP	Interchange Area Management Plan
LOS	level of service
LWI	Local Wetlands Inventory
MCBFHA	Mill Creek Basin Flood Hazard Area
MOU	Memorandum of Understanding
NHS	National Highway System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OHP	*Oregon Highway Plan*
OSHPO	Oregon State Historic Preservation Office
OTC	Oregon Transportation Commission
OTIA	Oregon Transportation Investment Act
OTP	*Oregon Transportation Plan*
OWRD	Oregon Water Resources Department
PMT	Project Management Team
REA	Revised Environmental Assessment

SPIS	Safety Priority Index System
STIP	State Transportation Improvement Program
TDM	transportation demand management
TMC	turning movement count
TPR	Transportation Planning Rule
TSP	Transportation System Plan
UGB	urban growth boundary
V/C	volume-to-capacity ratios
VMT	vehicle miles traveled

Executive Summary

The Sublimity Interchange, located at the junction of Oregon 22 and Cascade Highway in Marion County, Oregon, will be undergoing modifications and improvements. This Interchange Area Management Plan (IAMP) documents the land use and transportation strategies developed to protect the function of the Sublimity Interchange over the long-term (20-plus years) in light of these planned improvements, as directed by Oregon Administrative Rule (OAR) 734-051-0155(6).

Evaluation of interchange ramp and bridge alternatives occurred as a result of earlier planning and design efforts; the interchange ramp and bridge design was approved through an Environmental Assessment (EA) by the Federal Highway Administration (FHWA) in 1995. However, this study did evaluate the operational functioning of the ramp terminals, as proposed.

Operations analyses performed indicate that both interchange ramp terminals will require signalization by the year 2025. A signal was assumed at Whitney Drive in 2006, and the realignment of Golf Lane with Whitney Drive is assumed to take place within the 20-year timeframe of this project. Analysis indicates that some adjustments to the signalization at Cascade Highway and Shaff Road would be required in the future to synchronize signal operations along Cascade Highway.

Land use analysis conducted as part of the IAMP indicates the proposed facility would be adequate to handle proposed land uses as well as potential land uses that could arise from the conversion of land zoned for farm use subject to Measure 37. Future development of industrial and commercial properties would likely lead to the signalization of the new access for the backage road during the 20-year timeframe.

Alternatives analyzed for this IAMP were access-related in nature, and the preferred alternative package contains access management recommendations for Cascade Highway both north and south of the interchange within the 1,320-foot Interchange Area Management Area limits.

An effective access management strategy will help ensure compatibility between future transportation and land use needs (both local and regional) while optimizing mobility and safety conditions at the interchange and on Cascade Highway. This IAMP presents the following access management recommendations:

- A backage access road should be built behind the properties located northeast of the interchange, extending from Cascade Highway (at a point approximately 1,580 feet north of the interchange ramp terminus) to Sublimity Boulevard (at a point approximately 470 feet west of the Sublimity Boulevard/Cascade Highway intersection). Upon redevelopment, the properties located in this section would need to access the backage road instead of Cascade Highway. All private approaches to Cascade Highway in the Interchange Access Management Area Limit would be closed and access relocated to the backage road. These access recommendations are illustrated on Figure 4-9 of this document.

- The City of Sublimity should amend its Development Code to create an "Interchange Overlay Zone" that will prohibit future development on properties along Cascade Highway (northeast of the interchange) without the presence of an alternate access road.
- Access control should be purchased along the roadway property frontage of Tax Lot# 091W03A00100.The existing access serving this lot and Tax Lot# 091W03A0200 will be allowed to retain access to Cascade Highway.
- The existing approach serving Tax Lot# 091W03A00300 will be consolidated with the approach serving Tax Lots# 091W03A00200 and 091W03A00100.
- A frontage access road should be built from a point on Cascade Highway directly across from the proposed backage road (approximately 1,580 feet north of the interchange ramp terminus), to tie in with the existing driveway serving Tax Lots# 091W03A00300, 091W03A00200, and 091W03A00100. The existing access currently serving Tax Lots# 091W03A0200 and 091W03A00100 would be closed and access relocated to the frontage road.
- The Oregon Department of Transportation (ODOT) should grant deviations for several accesses south of the interchange, including Whitney Drive, Golf Lane (with proviso that it be realigned, as agreed, with Whitney Drive as warranted in the future), and access to the ODOT Park-and-Ride lot.
- ODOT should grant deviations for Sublimity Boulevard and several private driveway accesses north of the interchange, based on the City of Sublimity Development Code changes noted earlier.
- ODOT should grant a deviation for the intersection of Sublimity Boulevard and the westbound interchange ramp terminals, as the future project is designed.

  The Fern Ridge Road and Santiam Street at-grade intersections should be modified or eliminated to improve access management and safety conditions along Oregon 22.

In addition to access management recommendations, this IAMP also includes the following physical improvement and traffic management recommendations:

- Reconstruct the Oregon 22 entrance ramps to provide standard merge operations onto Oregon 22.
- Widen Cascade Highway from and including Sublimity Boulevard through the Shaff Road/Fern Ridge Road intersection.
- Realign Golf Lane across from Whitney Street.
- Signalize the Oregon 22 ramp termini - Sublimity Boulevard/Cascade Highway intersection (north of interchange).
- Signalize the Oregon 22 ramp termini/Cascade Highway intersection (south of intersection).
- Signalize the Whitney Street - Golf Lane/Cascade Highway intersection.

- Coordinate traffic signal operations along Cascade Highway due to the close spacing of signalized intersections.
- When traffic demand requires, install a right-turn pocket on the eastbound Oregon 22 exit ramp approach to Cascade Highway.
- When traffic demand requires, install right-turn pockets on the Shaff Road/Fern Ridge Road approaches to Cascade Highway.
- Provide bus and carpool service to the existing park-and-ride facility. This facility is not currently served by bus routes or formal carpool programs. Expansion of service to this facility would aide in managing traffic demand through the IAMP area. — CORRECT

  The Fern Ridge Road and Santiam Street at-grade intersections should be modified or eliminated to both for access management and safety along Oregon 22.

This document includes a complete description of the IAMP development process, land use assumptions, existing conditions analysis, access-related alternative evaluation, and traffic operations analysis. Short-term, medium-term, and long-term transportation strategies for the Sublimity Interchange Area are provided.

This IAMP was prepared in collaboration with ODOT, Marion County, the City of Stayton, and the City of Sublimity.

SECTION 1

Background

Purpose and Intent

Oregon Administrative Rule (OAR) 734-051-0155(6) states: "Interchange Area Management Plans are required for new interchanges and should be developed for significant modifications to existing interchanges..." This is a "project-based" IAMP, and is being prepared in accordance with the recommendation in the above OAR because of planned modifications and reconstruction of the Sublimity Interchange, located at the junction of Oregon 22 (North Santiam Highway) and Cascade Highway in Marion County, Oregon. The intent of the IAMP is to provide a consensus framework plan among all affected public jurisdictions and agencies to protect the state's investment in the Sublimity Interchange facility. Preparation of this document was conducted in accordance with state IAMP guidelines.[1]

This IAMP evaluates the transportation effects of the proposed interchange improvements and land use plans within the study area. Future commercial, industrial, and residential developments are expected to occur within the influence area of the interchange. The IAMP will recommend operational and physical improvements and access management techniques to maximize the operation of the interchange to accommodate future growth.

The purpose of this IAMP is to develop a strategy for the Sublimity Interchange that will protect the function of the interchange for at least 20 years. The Sublimity Interchange was proposed for modification and reconfiguration in the *Joseph Street Environmental Assessment.*[2] The original design was subsequently revised and there is currently an interchange design scheduled for construction in 2008-2009 that includes improvements to the entrance ramps, but not the exit ramps.

Problem Context

The current Sublimity Interchange poses safety and operational issues in that both the east and westbound entrance ramps to Oregon 22 terminate in stop signs. As a result, motorists are forced to quickly accelerate to highway speed from a complete stop. Westbound travelers must enter Oregon 22 traffic from a stop and accelerate up-hill, as the interchange is located at the top of a knoll. Traffic on Oregon 22 is traveling at 55 miles per hour or more, and during peak periods offers few breaks. Eastbound traffic enters on the top of a knoll, but with limited sight distance. Significant numbers of Stayton and Sublimity area residents traveling to jobs in the Salem area use the Sublimity Interchange.

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[1] *Interchange Area Management Plan Guidelines (Final Draft)* Prepared by: David Evans and Associates, Inc. with Angelo Eaton & Associates. October. 2005.

[2] *Joseph Street-Stayton North City Limits Environmental Assessment* (prepared by ODOT, March, 1995); *Joseph Street-Stayton North City Limits Revised Environmental Assessment* (prepared by ODOT , May, 1995)

The primary traffic issue within the interchange influence area is the location and function of access points to Cascade Highway. The Golf Lane access is very near the south side interchange ramp terminus. Currently, Golf Lane serves only a few houses. However, existing zoning would allow for more residential development, creating a potential operational conflict. Sublimity Boulevard, which provides access to the business cluster in the northwest quadrant of the interchange, is slightly off-set from the existing interchange ramp terminals on the north side of the interchange. In the south-east quadrant, recent efforts have been made to improve traffic operations and control the access to Cascade Highway by prohibiting left turns to Martin Street. There is a traffic signal at the intersection of Fern Ridge Road-Shaff Road and Cascade Highway. On the north side of the interchange, the roadway is a two lane road, with a paved shoulder on the west side. Bicycle lanes are provided from Division Street through Sublimity.

Project History and Phasing

The planned modification and reconstruction of the Sublimity Interchange is part of a much larger ODOT undertaking, the Joseph Street-North Stayton City Limits project (henceforth referred to as the "Joseph Street project"). The Joseph Street project was conceived in the late 1980s and the Environmental Analysis for the project was approved by the Federal Highway Administration in 1995.

The selected alternative of the Joseph Street project entailed the following transportation improvements:

- Conversion of approximately 8.5 miles of two-lane Oregon 22 to a four-lane divided highway. Includes a 100-foot separation between the centerline of the westbound and the centerline of the eastbound travel lanes (to permit future expansion to a six-lane roadway within the right-of-way required for this project.
- Construction of new interchanges at Aumsville-Shaw Highway and Golf Club Road;
- Reconstruction/modification of existing interchanges at Silver Creek Falls and Cascade Highways (Sublimity Interchange).
- Implementation of full access control.
- Construction of new frontage roads.

Joseph Street project improvements were designed to be constructed in two major phases.

- Phase 1, which has already been completed, included the widening of Oregon 22 to four lanes between Joseph Street to MP 12, the construction of new interchanges at Aumsville-Shaw Highway and Golf Club Road, and the construction of Golf Lane (to provide access for properties whose approaches to Oregon 22 were removed).
- Phase 2, yet to be completed, will occur in two stages: Stage 1 entails the reconstruction/modification of the Sublimity Interchange; Stage 2 entails the widening of Oregon 22 from two to four lanes from MP 12 to MP 14.1.

- Stage 1 is currently underway, with physical improvements to the Sublimity Interchange programmed to begin in 2008. The proposed improvements will provide for standard merge entrance ramp operations. This IAMP is being prepared as part of Stage 1. Stage 1 improvements are shown on Figure 1-1.
- Stage 2 will be completed when necessary funding is available. Stage 2 improvements are shown on Figure 1-2.

The project area was identified as Oregon 22 between milepoint (MP) 5.16 and MP 14.1. The Joseph Street project entailed the following proposed improvements: widening Oregon 22 to four lanes in the project area; installing complete access control; and "Phase 1", already completed, entailed the segment of Oregon 22 from Joseph Street (MP 5.44) eastward to the MP 12.

Interchange Function

Oregon 22 is an Oregon Transportation Commission (OTC) designated expressway, and is classified by the Oregon Highway Plan as a highway of statewide significance and a Statewide Freight Route. Oregon 22 is also part of the National Highway System (NHS). Oregon 22 serves as a major connector between the Mid-Willamette Valley and Central Oregon.

Functional classifications of roadways in the vicinity of the Sublimity Interchange are summarized in Table 1-1.

TABLE 1-1
Roadway Functional Classifications

Roadway	Functional Classification
Oregon 22 (North Santiam Highway)	Rural Principal Arterial – Other*
Cascade Highway (outside city limits)	Arterial**
1st Street (Cascade Highway south of Oregon 22)	Principal Arterial***
Center Street (Cascade Highway north of Oregon 22)	Arterial****
Fern Ridge Road	Major Collector***
Shaff Road	Minor Arterial***
Martin Drive	Local***
Whitney Street	Local***
Golf Lane	Local***
Sublimity Boulevard	Local****
9th Street	Local****

TABLE 1-1
Roadway Functional Classifications

Roadway	Functional Classification

Sources:

* *Oregon Highway Design Manual* (2003)

** *Marion County Rural Transportation System Plan* (1998)

*** *Stayton Transportation System Plan Final Draft* (2004)

**** *Sublimity Transportation System Plan* (1998)

The Sublimity Interchange is an important facility for the communities of Stayton and Sublimity, and serves the following functions:

- Commercial/Industrial: The interchange directly serves the downtowns of each community, and the businesses therein. As the commercial and industrial-zoned areas of these communities continue to develop, the Sublimity Interchange will increasingly function as an integral economic development asset.
- Residential Commuting: A significant number of Stayton and Sublimity residents utilize the interchange to access Oregon 22 for their daily commutes into the Salem-Keizer area.
- Agricultural: The interchange serves a farm-to-market function for the numerous agricultural operations in the area.

Sublimity Interchange modifications and associated local improvements must be planned and implemented to accommodate the multi-functional nature of the interchange.

Goals and Objectives

It is the goal of this IAMP to propose access management, construction and land use measures to interactively augment the effectiveness of the interchange modification design. This report documents the results of the project planning process used to achieve this stated goal for the Sublimity Interchange.

As stated in Policy 3C of the 1999 Oregon Highway Plan, *"it is the policy of the State of Oregon to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways"*. From this definition and a consideration of project-specific local transportation issues, the generalized objectives of the Sublimity IAMP are to:

- Prolong the useful life of the state's investment in the Sublimity Interchange
- Control or decrease, through access management measures, the number of conflict points on Cascade Highway in the vicinity of the Sublimity Interchange
- Provide feasible and equitable driveway relocation alternatives for property owners with current direct access to Cascade Highway
- Balance the need for the interchange to support community development interests with the need for safe and efficient operation within the interchange area

Establish agreements with local governments on how to effectively manage the long-term function of the interchange

- Monitor how the interchange capacity is managed through cooperation with local governments
- Provide certainty for property and business owners and local governments

IAMP Study Area

The Sublimity IAMP project study area is comprised of Oregon 22 between the Golf Club Road Interchange and the Mill Creek Bridge on Oregon 22, and Cascade Highway between SW 9th Street in Sublimity and Fern Ridge Road SE-Shaff Road in Stayton. The study area is shown on Figure 1-3.

Cascade Highway is alternatively called, respectively, Center Street inside Sublimity city limits and North 1st Avenue inside Stayton city limits. The study area encompasses the southern portion of the City of Sublimity, the northeastern portion of the City of Stayton, and portions of unincorporated Marion County.

The boundaries of the IAMP study area were developed based on a review of the surrounding roadway network and land use patterns as well as existing and future travel patterns. The parameters of the study area take into account:

- Required state IAMP regulations
- Required state access management regulations: the IAMP study area includes all land uses and roadways located within 1,320 feet of the existing Sublimity Interchange. This distance corresponds to the spacing standard outlined in the OAR 734-051 Division 51 rules for interchange ramps.
- Transportation facilities and traffic operations
- The mutual impact of existing natural and cultural resources

  The mutual impact of existing and planned land uses

Related Work Products

- The Oregon 22 Sublimity Interchange modernization project is an approved project in the 2006-2009 Draft STIP. The project is described in the STIP as a "Partial Interchange Reconstruction". This IAMP is part of the final planning for this project.
- Integral to the preparation of this IAMP is the *Joseph Street - North Stayton City Limits Environmental Assessment*[3]. This EA and subsequent REA, which were approved by the Federal Highway Administration (FHWA), provide the rationale for Sublimity

[3] Both the *Joseph Street – Stayton North City Limits Environmental Assessment* and *Revised Assessment* were consulted in this IAMP planning process. Source information: *Joseph Street – North Stayton City Limits Environmental Assessment* (ODOT and FHWA) March, 1995; *Joseph Street – North Stayton City Limits Revised Environmental Assessment* (ODOT and FHWA) May, 1995.

Interchange area improvements and serves to document the determination that project actions will not have a significant impact on the human environment.

- The City of Stayton Transportation System Plan (TSP) lists two Capital Improvement Projects (aside from the Sublimity Interchange project) that are located in the Sublimity Interchange influence area. These are excerpted below:
  - *Cascade Highway/1st Avenue Widening from Highway 22 to Regis Street – widen to 5 lanes with sidewalks.*
  - *Cascade Highway/Whitney Street signalization with EB and WB Left Turn Lanes and Realign Golf Lane.*[4]

    Both of the above projects were factored into the operational analysis and alternatives decision-making process for this IAMP.
- The City of Sublimity Transportation System Plan lists the City's objectives for street network circulation and access management in the immediate vicinity north of the Sublimity Interchange.

Public Involvement

The purpose of the public involvement program is to build a planning process that (1) balances the needs and issues of residences and businesses in the Sublimity Interchange area, including those who depend on the highway, and (2) has the informed support and acceptance of these communities and interests. One key goal of the program is to elicit public discussion of the issues affecting the selection of access relocation alternatives to ensure future safe and efficient conditions in the vicinity of the Sublimity Interchange along Cascade Highway.

Detailed discussion and results of the public involvement process for the Sublimity IAMP project is given in Appendix A of this document.

[4] Source: *City of Stayton Transportation System Plan* (Final Draft 2004); Table 8-1 Capital Improvement Cost – Street Improvements; p. 8-1

Insert Figures 1-1 through 1-3 (11 x 17)

SECTION 2

Existing Conditions Inventory and Data Analysis

Regulatory Framework

The Sublimity IAMP study area contains land from three jurisdictions: Marion County, the City of Sublimity, and the City of Stayton. IAMP improvements are therefore subject to applicable land use regulations for each jurisdiction, as well as state and federal regulations.

State, county, and local regulations pertaining to IAMP actions are addressed in the Plan and Policy Review, located in Appendix B.

Existing Land Use

The Sublimity IAMP study area contains a mixture of urban and agricultural land uses. The Sublimity Interchange lies between the communities of Stayton (population 7,360) and Sublimity (population 2,160)[5]. In the immediate vicinity the land is used primarily for agricultural purposes. A general description of land uses in the study area is as follows:

- **NW Quadrant:** commercial and light industrial uses along Sublimity Boulevard; low-density single-family residences along Cascade Highway.

  NE Quadrant: farm use.

- **SW Quadrant:** farm use; a few single-family residences.

- **SW Quadrant:** state-owned park-and-ride lot; medium-density single and multi-family residences; commercial establishments; elder-care residential facility.

Comprehensive Plan Designations

Comprehensive Plan land use designations in Marion County, the City of Stayton, and the City of Sublimity are coincident with the zoning designations for these respective public agencies. Relevant zoning district designations are addressed below.

Zoning Designations

Planned interchange improvements will take place solely within unincorporated Marion County, and will therefore only be subject to applicable Marion County zoning code regulations. However, longer-term IAMP recommendations will involve utilizing land inside Sublimity and/or Stayton jurisdictional limits. Additionally, the potential for

[5] Source: *2004 Oregon Population Report.* Portland State University Population Research Center. Population numbers given are year 2004 estimates.

increased traffic in the interchange is tied to the type and intensity of development allowed in each of the zoning districts in the IAMP study area. For this reason, IAMP study area zoning regulations for Sublimity and Stayton are addressed here in addition to Marion County.

Zoning designations in the Sublimity IAMP study area are shown in Figure 2-1.

Marion County Zoning

Existing Marion County zoning districts in the study area are as follows:

- Exclusive Farm Use (EFU)
- Urban Transitional Farm (UTF)

Project Relevant Issues

- Public road improvements are permitted outright in all Marion County zones providing that such improvements are in conformance with the *"applicable comprehensive plan and the standards of the Department of Public Works"* [per Marion County Zoning Ordinance 25.10(b)]. The Marion County Comprehensive Plan does not contain any language constraining transportation improvements in an EFU zone. Therefore, Marion County zoning regulations do not constrain planned Sublimity Interchange improvements.

City of Stayton Zoning

Existing City of Stayton zoning districts in the Sublimity IAMP study area are as follows:

- Commercial-Retail (CR)
- Interchange Development (ID)
- High-Density Residential (HD)
- Multiple-Family Residential (MD)
- Single-Family Residential (LD)

Project Relevant Issues

- Public road improvements are permitted outright in the CR and ID zones [per Stayton Development Code 17.16.690.2(j) and 17.16.710.2(i), respectively].

- Public road improvements are conditionally permitted in the HD, MD, and LD zones [per Stayton Development Code 17.16.680.3(f), 17.16.670.3(b), and 17.16.660.3(b), respectively]. Although no IAMP improvements are planned to occur in any of these three zones, any change which results in transportation-related public improvements in these zones would be subject to site review by the City of Stayton.

City of Sublimity Zoning

Existing City of Sublimity zoning districts in the Sublimity IAMP study area are as follows:

- Commercial (COM)
- Industrial (IND)
- Future Industrial
- Low-Density Residential (R-1)
- Medium-Density Residential (R-2)

Project Relevant Issues

- Public road improvements are permitted outright in all City of Sublimity zones [per Sublimity Development Code 2.403.01.D] provided that *"the right of way is not expanded to more width than prescribed for the street in the Public Facilities segment of the Comprehensive Plan."*

Transportation Facilities and Traffic Operations

This section summarizes the existing transportation conditions within the study area, provides assumptions and methodologies to be used in the traffic operational analyses, and catalogues existing transportation system facilities and services. To the extent possible, physical as well as operational characteristics of the roadways, intersections and transportation services are described.

Existing Transportation Facilities

Vehicular Facilities

The following section describes the existing physical characteristics of the study area roadways and the study intersections. Figure 2-2 shows traffic control and channelization in the study intersection.

- **Oregon 22** is the major east-west highway in Marion County. It is located between the cities of Stayton and Sublimity, and is connected to both cities via an interchange at Cascade Highway. In addition to the Cascade Highway interchange, two other interchange locations, Golf Club Road and Fern Ridge Road, provide access to and from Stayton and Sublimity. Santiam Street provides a fourth connection between Oregon 22 and the City of Stayton. Golf Club Road and Cascade Highway are full interchanges, while Fern Ridge Road and Santiam Street are stop controlled at-grade intersections located east of the study interchange.

  Both the east- and westbound Oregon 22 entrance ramps terminate in stop signs. Drivers enter Oregon 22 traffic from a full stop (right-turn only), and are required to accelerate up-hill due to the topography of the highway. In the vicinity of the Sublimity Interchange, Oregon 22 is a two-lane undivided, access controlled highway. The posted speed limit is 55 mph.

  The Oregon 22 eastbound exit ramp terminates in a shared left and right turn lane that is stop controlled at Cascade Highway. At this intersection, Cascade Highway has one

through travel lane in each direction, with a shared through and right-turn lane for southbound travel and a shared through and left-turn lane for northbound travel.

The Oregon 22 westbound exit ramp forms the east leg of the Cascade Highway/Sublimity Boulevard intersection. It consists of a single lane with shared left, through and right-turn movements. The ramp is stop controlled at its approach to Cascade Highway. At this intersection, Cascade Highway has one travel lane in each direction, with a shared through and left-lane for northbound travel and a shared left, through and right-turn lane for southbound travel.

- **Cascade Highway** is a major north-south arterial that provides the primary access to the cities of Sublimity and Stayton from Oregon 22.

  North of Oregon 22, Cascade Highway is a two lane roadway with paved asphalt shoulders on its west side. The posted speed limit on the minor arterial is 45 mph.

  South of Oregon 22, Cascade Highway is generally a two lane roadway with paved asphalt shoulders. Left turn pockets are provided at the Whitney Street and Shaff Road-Fern Ridge Road intersections. As described in the Pedestrian Facilities section, a portion of Cascade Highway, from Whitney Street to the south, is served by a sidewalk. The posted speed limit on Cascade Highway is 45 mph.

  Between the Oregon 22 eastbound ramps and Whitney Street, the width of Cascade Highway is less than the City of Stayton's standard street width of 40 feet for principal arterials. Two bridges are located on Cascade Highway within the City of Stayton project limits. Mill Creek Crossing occurs south of Golf Lane and Lucas Ditch crossing occurs south of Martin Drive.

- **9th Street** forms a T-intersection with Cascade Highway in the southern portion of Sublimity and provides access to a residential area. All approaches to the intersection are single lanes, with no dedicated turn pockets. The west approach to the intersection is stop controlled.

- **Sublimity Boulevard** is located just north of Oregon 22, and aligns with the interchange's westbound ramps. All approaches to the intersection are single lanes, with no dedicated turn pockets. The east leg is comprised of the Oregon 22 westbound ramps. The west leg is a two lane roadway providing access to the business cluster in the northwest quadrant of the interchange including an insurance agency, motorcycle/car dealerships, a tire shop, and a hotel. The east and west approaches to the intersection are stop controlled.

- **Golf Lane**, located just south of Oregon 22, is a two lane local roadway. At Cascade Highway, a shared right-left turn lane is stop controlled. Cascade Highway has a shared through-right lane for southbound travel and a shared through-left lane for northbound travel. Currently this road serves a small number of residences; however, the adjacent undeveloped parcels are zoned for additional housing development. Across Cascade Highway from this intersection is the access to an ODOT park-and-ride lot.

- **Whitney Street** consists of one travel lane in each direction. At Cascade Highway, a shared right-left turn lane is stop controlled. Cascade Highway has a shared through-

right lane for northbound travel and a through lane with a left-turn pocket for southbound travel. Further to the east of Martin Drive, Whitney Street connects to a single family residential area. Adjacent to Cascade Highway, Whitney Street services commercial and retail properties. The Whitney Street intersection with Cascade Highway is scheduled to be signalized in 2006.

- **Martin Drive** is a right turn in, right turn out only connection to Cascade Highway with access to Whitney Street. The area served by Martin Drive and Whitney Street is primarily a small commercial/retail base area that includes a gas station with a mini-mart, fast-food restaurant, liquor store, and pharmacy.
- **Shaff Road-Fern Ridge Road** provides a key east-west route in northern Stayton and helps relieve traffic congestion through the City. It is a two lane roadway with left-turn pockets at the signalized intersection with Cascade Highway.

Truck Routes

Through the project area, Oregon 22 and Cascade Highway are designated as truck routes. Oregon 22 is also designated as a Freight Route in the 1999 Oregon Highway Plan. Truck routes designated by the City of Stayton serve the following areas: the industrial area on the west side of the city, NORPAC in central Stayton, and Morse Brothers south of Stayton. Shaff Road-Fern Ridge Road is a designated City of Stayton truck route.

Bicycle Facilities

Dedicated bicycle lanes are provided on Cascade Highway from the northern portion of the study area (vicinity of Division Street) through the City of Sublimity. Through the remainder of the IAMP study area, bicyclists must utilize the available roadway shoulders or share the vehicle travel lanes.

Bicycle lanes are also provided on a segment of Fern Ridge Road, east of Cascade Highway to Wildflower Drive.

Pedestrian Facilities

A sidewalk is provided on the east side of Cascade Highway from just north of Whitney Street continuing south through the City of Stayton. Throughout the remainder of the study area, pedestrians on Cascade Highway must utilize the available roadway shoulders.

Shaff Road-Fern Ridge Road and Whitney Street also have a sidewalk on the south side of the roadway, while Martin Drive has a sidewalk on the north side.

Public Transportation & Other Alternative Modes

Transit service in the Stayton/Sublimity area is provided by the Chemketa Area Regional Transit Service (CARTS) and the Wheels of Joy dial-a-ride system for disabled persons. Based on current and future ridership projections, neither would have a significant effect on area traffic patterns.

Laidlaw Transit provides bus service for the North Santiam School District. Within the study area, Cascade Highway and Shaff Road-Fern Ridge Road are designated as school bus routes.

A Park-and-Ride facility with 94 stalls and semi-covered bicycle racks is located in the southeast quadrant of the Oregon 22/Cascade Highway interchange.

Rail/Pipelines/Others

Willamette Valley Railroad services the City of Stayton on a spur line originating in Woodburn. Two to three trips per week currently service the area. Two at-grade crossings, Washington Street at NORPAC and Locust Street/Wilco Road), are located south and west of the IAMP study area, respectively.

The City of Sublimity has no railroad service.

There are no airports in the direct vicinity of the study area. A full service commercial airport is located in Salem, approximately 15 miles to the east. Several small private airstrips and a heliport at the Santiam Hospital are within a 20 mile radius.

Existing Facilities Deficiencies

Deficiencies in the existing transportation network are outlined in the Marion County and City of Stayton **Draft Transportation System Plans. These deficiencies are noted below:**

Missing sidewalk links within the study area include:

- Shaff Road – north side from Stayton Middle School to Cascade Highway
- Fern Ridge Road – north side Cascade Highway to west of Summerview Way
- Cascade Highway – west side from Oregon 22 to Shaff Road
- Cascade Highway – east side from north of Whitney to Oregon 22

Arterials and Collectors with deficient pavement widths include:

- Shaff Road from western UGB to west of Cascade Highway
- Cascade Highway south of Oregon 22 Eastbound Ramps to Whitney Street

Existing Traffic Conditions

Traffic Operations Performance Measures

Operational performance measures are outlined below for the three jurisdictions within the study area: ODOT, City of Stayton and City of Sublimity.

ODOT

The intersections and approaches adjacent to the Oregon 22 interchange are under ODOT jurisdiction.

The Oregon Highway Plan outlines specific performance measures to be maintained along ODOT facilities as part of their Mobility Standards. These standards are intended to maintain mobility along important roadway sections and vary according to functional classification, location, and role within the National Highway System. Table 2-1 summarizes the mobility standards set by the Oregon Highway Plan.

TABLE 2-1
Maximum Volume to Capacity Ratios for Peak Hour Operating Conditions Outside of the Portland Metropolitan Area

	Land Use Type/Speed Limits					
	Inside Urban Growth Boundary				Outside Urban Growth Boundary	
Highway	STAs	MPO	Non-MPO outside of STAs where non-freeway speed limit <45 mph	Non-MPO where non freeway speed limit >=45 mph	Unincorporated Communities	Rural Lands
Interstate Highways and Statewide (NHS) Expressways	N/A	0.80	0.70	0.70	0.70	0.70
Statewide (NHS) Freight Routes	0.85	0.80	0.75	0.70	0.70	0.70
Statewide (NHS) Non-Freight Routes and Regional or District Expressways	0.90	0.85	0.80	0.75	0.75	0.70
Regional Highways	0.95	0.85	0.80	0.75	0.75	0.70
District/Local Interest Roads	0.95	0.90	0.85	0.80	0.80	0.75

Source: 1999 *Oregon Highway Plan* (OHP).

Interstates and Expressways shall not be identified as Special Transportation Areas (STAs). For the purpose of this mobility policy of volume-to-capacity ratio standards, the peak hour shall be the 30th highest annual hour. This approximates weekday peak hour traffic in larger urban areas.

- **Oregon 22, North Santiam Highway** is a Statewide Expressway and NHS Freight route, non-MPO within the UGB with a speed >45 mph. The maximum acceptable V/C ratio for this facility is 0.70.
- **The interchange ramps with Oregon 22 at Cascade Highway** have a maximum volume-to-capacity ratio of 0.85 given their categorization as District/Local Interest Roads and Inside Urban Growth Boundary, non-MPO where non-freeway speed limit <45 mph.
- **Cascade Highway at the interchange ramps with Oregon 22** have a maximum volume-to-capacity ratio of 0.75 given its categorization as Regional Highway and Inside Urban Growth Boundary, non-MPO where non-freeway speed limit >=45 mph.

City of Stayton

The intersections south of the Oregon 22 interchange are within City of Stayton jurisdiction.

The City of Stayton TSP, Section 3 (Transportation Goals and Policies) establishes level of service standards for the City of Stayton as follows:

- Signalized Intersections - Level-of-Service D
- Unsignalized Intersections - Level-of-Service E

City of Sublimity

The intersections north of the Sublimity Interchange are within the City of Sublimity jurisdiction. Marion County mobility standards were applied to these intersections.

- Signalized Intersections - Level-of-Service D
- 4-way Stop Controlled Intersections - Level-of-Service D
- 2-way Stop Controlled Intersections - Level-of-Service E

Existing Traffic Volumes

Manual turning movement counts were collected at eight intersections along Cascade Highway on February 3, 2005. The duration of each intersection count is shown below:

- Cascade Highway and 9th Street: 4 hours from 6 AM to 10 AM.
- Cascade Highway and Sublimity Boulevard: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Oregon 22 Eastbound ramps: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Oregon 22 Westbound ramps: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Golf Lane: 4 hours from 6 AM to 10 AM.
- Cascade Highway and Whitney Street: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Martin Drive: 4 hours from 6 AM to 10 AM.
- Cascade Highway and Shaff Road-Fern Ridge Road: 16 hours from 6 AM to 10 PM.

These intersections were included in the IAMP scope of work to represent the influence area of the Sublimity Interchange. In addition to these intersections, the Oregon 22 operations at the interchange entrance ramps were analyzed utilizing the ODOT highway traffic data. The vehicle turning movement data is compiled in Appendix C.

Peak hour turning movement counts were seasonally adjusted to represent the 30th Highest Hour design volumes based on ODOT's permanent Automatic Traffic Recorder (ATR) at station # 22-010, which is located on a segment of highway that closely resembles the traffic operations and geometric characteristics of Oregon 22.

The seasonal factor for volumes on Oregon 22 and Cascade Highway was interpolated from values between February 1 and February 15, 2003. The average seasonal factor was calculated to be 1.19.

The derived 30th Highest Hour design volumes were then balanced along Cascade Highway between adjacent study intersections. The directional traffic volumes were adjusted until the difference between them was less than 10 percent. The derived traffic volumes at the study intersections are shown in Figure 2-3.

Existing Intersection Operations

Existing (2005) V/C ratios, level-of-service and vehicle queues were computed for the eight study intersections and Oregon 22 entrance ramps based on the 30th Highest Hour design volumes. Table 2-2 shows the results of the existing operations analyses. All locations that do not meet the applicable jurisdiction's standards are highlighted in the table. Appendix D includes the traffic operations worksheets for the existing 30th highest hour conditions.

A Synchro model was constructed for the study area based on the collected traffic turning movement counts balanced to the 30th Highest Hour design volumes, peak hour factors, truck percentages and field observations.

The Synchro model uses the methodology in the 2000 Highway Capacity Manual to analyze both signalized and stop-controlled intersections. The model also computes the level-of-service (LOS) and volume-to-capacity (V/C) ratio necessary to determine whether the intersection meets the applicable mobility standards from the local municipalities and the Oregon Highway Plan.

TABLE 2-2
Existing Intersection Analysis Summary
2005 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Oregon 22 Approaches				**Ramp Approaches**			
Oregon 22 eastbound entrance ramp	0.70	0.30	-	-	0.85	0.40	-	4
Oregon 22 westbound entrance ramp	0.70	0.41	-	-	0.85	0.74	-	8
	Cascade Highway Approaches				**Cross Street Approaches**			
Cascade Highway at 9th Street	E	-	A	1	E	-	B	1
Cascade Highway at Sublimity Boulevard/ Oregon 22 westbound ramps	0.75	0.04	-	1	0.85	0.57	-	3
Cascade Highway at Oregon 22 westbound entrance ramp	0.75	0.46	-	-				
Cascade Highway at Oregon 22 eastbound ramps	0.75	0.30	-	2	0.85	>1.0	-	15
Cascade Highway at Golf Lane	E	-	A	1	E	-	D	1
Cascade Highway at Whitney Street	E	-	B	2	E	-	F	19
Cascade Highway at Martin Drive	-	-	-	-	E	-	B	1
Cascade Highway at Shaff Road-Fern Ridge Road	D	-	E	31	D	-	D	17

TABLE 2-2
Existing Intersection Analysis Summary
2005 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service.

2 Results are reported for approach with worst operational characteristics

3 ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

Existing Operational Deficiencies

The results of the existing operational analyses show that two stop-controlled intersection approaches to Cascade Highway, the Oregon 22 eastbound exit ramp and Whitney Street, operate below the required mobility standards. Both approaches are characterized by extensive vehicle queuing during the design hour. Additionally, although the overall intersection LOS of Cascade Highway at Shaff Road/Fern Ridge Road is at an acceptable LOS D, the Cascade Highway approaches operate at LOS E, with significant vehicle queuing.

Existing Safety Conditions

Accident and Safety Analysis

A summary of the accidents within the study area was prepared for the period between January 1, 1999 and December 31, 2003.

Table 2-3 summarizes the accidents along Oregon 22 between mileposts 12.00 and 14.50. For reference, the approximate locations of the existing Oregon 22 entrance and exit ramps are as follows:

- Eastbound Exit ramp - MP 13.0
- Eastbound Entrance ramp - MP 13.2
- Westbound Exit ramp - MP 13.4
- Westbound Entrance ramp - MP 13.5
- Fern Ridge Road intersection - MP 14.3

TABLE 2-3
Five-Year Accident History: January 1, 1999 through December 31, 2003
Oregon 22 Mainline Crash Rates and Severity of Accidents

Milepost			1999-2003 Average Annual Daily Traffic (AADT)	Number of Accidents (Over 5 Years)					Average Annual Crash Rate (Crashes per Million Vehicle-Miles)
From	To	Segment Features		Property Damage Only	Injury	Fatal	Total Crashes	Average Annual	
12.00	12.50	mainline section west of Sublimity Interchange	12,120	1	2	0	3	0.60	0.27
12.50	13.00	Eastbound exit ramp	11,880	1	0	1	2	0.40	0.18
13.00	13.50	Eastbound entrance ramp & westbound exit ramp	11,880	8	9	2	19	3.80	1.75
13.50	14.00	westbound entrance ramp	11,880	4	2	0	6	1.20	0.55
14.00	14.50	Fern Ridge Road intersection	11,060	3	8	0	11	2.20	1.09
12.00	**14.50**	-	**11,764**	**17**	**21**	**3**	**41**	**8.20**	**0.76**

A total of 41 crashes were reported along Oregon 22 between milepost 12.00 and 14.50 during the five year study period. Approximately half of the crashes occurred in the direct vicinity of the Sublimity Interchange and slightly over one-fourth occurred at the Fern Ridge Road intersection. Three fatality accidents occurred within the interchange vicinity during the study timeframe. The remainder of the accidents was roughly evenly split between property damage only and injury only.

The 2003 Crash Rates by Jurisdiction and Functional Classification table from the ODOT 2003 Crash Rate Tables indicates an average crash rate for "other freeways/expressways" as 0.87 crashes per million vehicle-miles. The half-mile segments immediately surrounding the Sublimity Interchange (between mileposts 13.00 and 13.50) and the Fern Ridge Road intersection (between mileposts 14.00 and 14.50) experience a higher than average crash rate (1.09.). However, the rate for the overall Oregon 22 area surrounding the Sublimity Interchange (0.76) remains below this average rate.

Tables 2-4 and 2-5 provide details of the conditions during the accidents as well as the type and severity.

TABLE 2-4
Five-Year Accident History: January 1, 1999 through December 31, 2003
Oregon 22 Crash Conditions

	Oregon 22 Mainline	
Condition	**Number of Accidents**	**Percentage of Total**
Weather		
Clear	28	68.3%
Cloudy	7	17.1%
Rain	4	9.8%
Snow	0	0.0%
Unknown	2	4.9%
Roadway Surface		
Dry	34	82.9%
Wet	5	12.2%
Ice	0	0.0%
Snow	0	0.0%
Unknown	2	4.9%
Light		
Day	28	68.3%
Dimly Lit	3	7.3%
Dark	6	14.6%
Dusk	3	7.3%
Dawn	1	2.4%

TABLE 2-5
Five-Year Accident History: January 1, 1999 through December 31, 2003
Oregon 22 Crash Descriptions

	Oregon 22 Mainline	
Condition	**Number of Accidents**	**Percentage of Total**
Collision Type		
Rear End	12	29.3%
Turning	6	14.6%
Fixed Object	8	19.5%
Sideswipe	3	7.3%
Struck at Angle	3	7.3%
Pedestrian	1	2.4%
Head On	3	7.3%
Other	5	12.2%
Severity		
PDO	17	41.5%
Injury only	21	51.2%
Fatality	3	7.3%
Crash Cause		
Failed to yield right-of-way	8	19.5%
Other - improper driving	1	2.4%
Speed too fast for conditions	18	43.9%
Followed too closely	5	12.2%
Made improper turn	2	4.9%
Alcohol or drugs involved	2	4.9%
Mechanical defect	1	2.4%
Drove on Wrong Side of 2-Way Rd	1	2.4%
No Code	3	7.3%

The majority of the accidents on Oregon 22 occurred during clear, dry, daylight conditions. A factor in many of the accidents involved speeding and failure to appropriately yield. The stop-controlled entrance ramp configuration is likely a large contributing factor to these accidents, as vehicles enter the highway from a complete stop.

Table 2-6 summarizes the accidents along Cascade Highway between milepoints 0.61 and 1.59. Marion County utilizes milepoints to represent distances on county roads; therefore, each 0.01 milepoint is approximately 50 feet. For reference, the approximate milepoint locations of intersections along Cascade Highway are listed below:

- Shaff Road/Fern Ridge Road - Milepoint 0.61
- Eastbound Entrance/Exit ramp - Milepoint 1.09
- Sublimity Blvd - Milepoint 1.20
- 9th Street - Milepoint 1.59

TABLE 2-6
Five-Year Accident History: January 1, 1999 through December 31, 2003
Cascade Highway Mainline Crash Rates and Severity of Accidents

Milepost			1999-2003 Average Annual Daily Traffic (AADT)	Number of Accidents (Over 5 Years)					Average Annual Crash Rate (Crashes per Million Vehicle-Miles)
From	To	Segment Features		Property Damage Only	Injury	Fatal	Total Crashes	Average Annual	
0.60	0.85	Shaff Road/ Fern Ridge Road	12,020	7	3	0	10	2.00	1.82
0.85	1.10	Eastbound entrance/exit ramp	11,780	2	1	0	3	0.60	0.56
1.10	1.35	Sublimity Blvd/westbound ramps	9,310	10	6	0	16	3.20	3.77
1.35	1.60	9th Street	7,920	2	2	0	4	0.80	1.11
0.60	**1.60**	-	**10,260**	**21**	**12**	**0**	**33**	**6.60**	**1.76**

A total of 33 crashes were reported along Cascade Highway between Shaff Road/Fern Ridge Road and 9th Street during the five year study period. Half of the accidents occurred near the intersection of Cascade Highway and Sublimity Boulevard/Oregon 22 Westbound exit ramp, and just under one-third of the total accidents occurred in the vicinity of the Shaff Road/Fern Ridge Road intersection. No fatality accidents occurred along the one mile study corridor within the study timeframe. Of the 33 crashes, approximately two thirds resulted in property damage only while the remaining one third resulted in injuries.

Cascade Highway north of Oregon 22 is categorized as an arterial. The average crash rate for Suburban Non-Freeway Arterials is 0.60 crashes per million vehicle-miles. Both quarter-mile segments north of the interchange experience accidents at a rate higher than average 2003 Oregon crash rates. The segment immediately north of the interchange (including the intersection with Sublimity Boulevard/Oregon 22 Westbound exit ramp) is over five times as great as this average. Cascade Highway south of Oregon 22 is categorized as a principal arterial. The average crash rate for this type of segment is 1.34 crashes per million vehicle-miles. The quarter-mile segment that includes the intersection of Shaff Road/Fern Ridge

Road experiences a higher than average crash rate, but overall, the southern portion of Cascade Highway remains below the average rate.

Tables 2-7 and 2-8 provide details of the conditions during the accidents as well as the type and severity of accidents along Cascade Highway.

TABLE 2-7
Five-Year Accident History: January 1, 1999 through December 31, 2003
Cascade Highway Crash Conditions

	Cascade Hwy Mainline	
Condition	**Number of Accidents**	**Percentage of Total**
Weather		
Clear	22	66.7%
Cloudy	6	18.2%
Rain	3	9.1%
Snow	0	0.0%
Unknown	2	6.1%
Roadway Surface		
Dry	27	81.8%
Wet	**6**	**18.2%**
Ice	**0**	**0.0%**
Snow	0	0.0%
Unknown	0	0.0%
Light		
Day	31	93.9%
Dimly Lit	1	3.0%
Dark	1	3.0%
Dusk	0	0.0%
Dawn	0	0.0%

TABLE 2-8
Five-Year Accident History: January 1, 1999 through December 31, 2003
Cascade Highway Crash Descriptions

	Cascade Hwy Mainline	
Condition	**Number of Accidents**	**Number of Accidents**
Collision Type		
Rear End	17	51.5%
Turning	8	24.2%
Fixed Object	0	0.0%
Sideswipe	1	3.0%
Struck at Angle	6	18.2%
Pedestrian	0	0.0%
Head On	1	3.0%
Other	0	0.0%
Severity		
Property damage only	21	63.6%
Injury only	12	36.4%
Fatality	0	0.0%
Crash Cause		
Failed to yield right-of-way	13	39.4%
Other - improper driving	0	0.0%
Speed too fast for conditions	15	45.5%
Followed too closely	4	12.1%
Made improper turn	0	0.0%
Alcohol or drugs involved	0	0.0%
Mechanical defect	1	3.0%
Drove on Wrong Side of 2-Way Rd	0	0.0%
No Code	0	0.0%

Similar to Oregon 22, the majority of the accidents on Cascade Highway occurred during clear, dry, daylight conditions. Over half of the accidents on Cascade Highway involved rear end collisions. Speed and failure to yield to the right-of-way were factors in almost eighty-five percent of the accidents.

Access management requirements and deficiencies for the Sublimity Interchange are described in Section 4 of this report.

Natural and Cultural Resources

The Sublimity IAMP study area contains land from three local jurisdictions: Marion County, the City of Sublimity, and the City of Stayton. Project improvements could therefore potentially trigger environmental protection regulations of any or all of these jurisdictions, as well as State and Federal regulations. This section examines the existence of natural and cultural resources in the study area and related potential project constraints presented.

The existence of any Goal 5 resources are addressed in this section. Goal 5 is a broad Oregon statewide planning goal that covers a variety of environmental and other resources. Goal 5 and related Oregon Administrative Rules (Chapter 660, divisions 16 and 23) describe how cities and counties are to plan and zone land to conserve resources listed in the goal.

Topography

The topography of the study area contains both flat and low rolling terrain. The main feature of the landscape is Mill Creek, which runs primarily east-west through the study area. Low ridges step up from the flatlands adjacent to the creek. Topography in the immediate vicinity of the Sublimity Interchange is described by quadrant below.

NE Quadrant of Interchange

From the point where it passes under Oregon 22 northward, Cascade Highway SE ascends approximately 50 feet in less than a quarter-mile, dips slightly, then rises again as it intersects with 9th Street in Sublimity.

SE Quadrant of Interchange

The southeast quadrant of the interchange contains the flat floodplain and wetland area adjacent to Mill Creek. A subdivision with new homes on fill materials is located in the floodplain depression. Moving southward toward the center of Stayton, a low ridge exists with an elevation gain of approximately 50 feet.

SW Quadrant of Interchange

The ridge that described in the NE Quadrant is present to the southwest of the interchange and presents a relatively steep grade. The existing two-way highway interchange ramp in this quadrant cuts through this ridge, with a resulting slight hill to the north of the ramp and a steeper hill to the south of the ramp.

NW Quadrant Interchange

The terrain to the northwest of the intersection of Oregon 22 and Cascade Highway SE rises approximately 30-40 feet. Sublimity Boulevard SE drops from this ridge to its intersection with Cascade Highway SE.

Project Relevant Issues

- **The northbound grade** on Cascade Highway SE and adjacent ridges present sight-distance issues for motorists at the two-way highway ramp intersections as well as the intersections of Sublimity Boulevard and Golf Lane. Closely-spaced slope changes have an adverse effect on safety in the interchange area. Interchange rehabilitation efforts will require more earthwork during construction and may require additional stabilization, which will have budget and schedule implications.

Hydrology

The project study area lies within the Willamette River Subbasin, in the Middle Willamette Subbasin, in the Mill Creek Watershed. Mill Creek, after passing through the study area, flows northwestward to its convergence with the Willamette River in the City of Salem. Within the study area for this IAMP, Mill Creek runs south of Oregon 22 from the west end of the study area. The creek passes through a culvert under Cascade Highway SE just south of Golf Lane and then traverses under Oregon 22 approximately a quarter-mile east of Cascade Highway.

Project Relevant Issues

- **There are hydrologic** features contained in the study area that are classified as Goal 5 Resources (as defined in Oregon Administrative Rules Division 23). Sublimity IAMP actions may be subject to State and/or local regulations that are in place to protect Goal 5 resources, as will be discussed in greater detail in the next section.

Riparian Corridors

The Mill Creek riparian corridor located inside the study area includes the perennially flowing Mill Creek, several intermittent streams, and a wetland area measuring just over one acre.

The section of Mill Creek running through the study area is included on the Department of Environmental Quality's (DEQ's) 303(d) list of water quality-limited streams. The DEQ 2003 303(d) list identifies the section of Mill Creek in the study area as water quality limited for Fecal Coliform.

According to the Oregon Department of Fish and Wildlife, the study area section of Mill Creek is spawning and rearing habitat for winter steelhead and fall Chinook, and is rearing and migration habitat for spring Chinook.

Project Relevant Issues

- **Sublimity IAMP actions** are subject to State Department of Land Conservation and Development (DLCD) Goal 5 ordinance regulations concerning land use actions inside the Mill Creek riparian corridor. Proposed Sublimity IAMP use actions are allowed in riparian corridors [per OAR 660-023-0090(8)(a)], provided that these actions "are designed and constructed to minimize intrusion into the riparian area."

- Highway runoff can be a source of Fecal Coliform. Improvements related to the Sublimity IAMP Project would need to avoid or mitigate stormwater impacts to Mill Creek to meet the requirements of DEQ National Pollutant Discharge Elimination System (NPDES) 1200-CA.

Floodplains

Portions of a river or stream channel and adjacent lands that are subject to floods with a one percent chance of being exceeded in any given year area identified as 100-year floodplains or Special Flood Hazard Areas (SFHA's). 100-Year floodplains are indicated on Flood Insurance Rate Maps (FIRMs), which are prepared by the Federal Emergency Management Agency (FEMA).

A large portion of the study area is located within the 100-year floodplain of Mill Creek. Only the northwest quadrant of the interchange is outside the FEMA floodplain boundaries. FEMA 100-year floodplain boundaries in the Sublimity IAMP study area are shown on Figure 2-4.

The portion of the floodplain area within the jurisdiction of Marion County is covered by Marion County's Floodplain Overlay District, with associated development restrictions.

The portion of the floodplain area within the jurisdiction of the City of Stayton is covered by Stayton's Floodplain Overlay District, with associated development restrictions.

Project Relevant Issues

- If the Sublimity IAMP project improvements enter the footprint of the 100-Year Floodplain, and if a NEPA process is followed, environmental documentation would be required to explain specific impacts of the project and the resources within the floodplain.
- In the event that Sublimity IAMP project improvements result in any increase in the 100-year flood water level, FEMA must review and comment on the project. This involves applying for a Certified Letter of Map Revision (CLOMR) from FEMA. All requests for CLOMRs must be supported by detailed flood hazard analyses prepared by a qualified professional engineer.
- Any project-related improvement development (i.e. placement of fill) in the Marion County Floodplain Overlay Zone is subject to conditional use review by the county via the submission of a Floodplain Development Permit.
- Per Marion County Rural Zoning Ordinance 178.050(E), any project related filling, grading, paving or excavation within the 500-year floodplain of the Mill Creek Basin Flood Hazard Area (MCBFHA) is subject to conditional use review by the county via the submission of a Floodplain Development Permit.
- Any project-related improvement development (i.e. placement of fill) in the City of Sublimity Floodplain Overlay Zone is subject to conditional use review by the county via the submission of a Floodplain Development Permit per Sublimity Code 17.16.190.

Floodway

The area of the 100-year floodplain is divided into floodway and floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order that the 100-year flood is carried without substantial increase in flood heights. As a minimum standard, the Federal Insurance Administration limits increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.[6]

A FEMA-designated floodway exists along Mill Creek in the Sublimity IAMP study area. This floodway lies within the jurisdictions of Marion County and the City of Stayton. The location of this floodway can be seen on the FEMA Flood Insurance Rate map, included in this report as Appendix E.

Project Relevant Issues

- Any project-related development improvements (including fill, new construction, and substantial improvements) in the floodway are prohibited unless a certified technical evaluation is submitted to FEMA demonstrating that such improvements will not result in an increase in flood levels during the occurrence of the base flood discharge. Upon FEMA approval, such improvements are then subject to applicable flood hazard reduction provisions of Marion County Rural Zoning Ordinance 178.060 and City of Stayton Code 17.16.190.

Wetlands

A number of National Wetland Inventory (NWI) wetland areas are present in the study area. A Local Wetland Inventory (LWI) commissioned by the City of Stayton delineated additional wetland areas in the study area. The boundaries of the delineated wetland area are seen in Figure 4-3. A portion of land delineated as wetland in the LWI, located in Stayton east of Cascade Highway, has since been filled to allow for the construction of a residential development (the aerial photo in Figure 2-4 predates the construction of the residential subdivision).

Project Relevant Issues

- The Sublimity IAMP will attempt to avoid actions that would impact identified wetlands. If impacts are unavoidable, ODOT will need to identify mitigation opportunities. Mitigation will need to be performed per the land development application requirements of the jurisdiction within which the wetland alteration is occurring. A wetland delineation and functional assessment need to be performed to determine the type and full extent of the potential wetland impacts.

Wildlife Habitat

The Sublimity IAMP does not impact a documented wildlife habitat area, as defined by OAR 660-023-0110.

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[6] Source: *City of Stayton Comprehensive Plan* (1995), p.15

Federal Wild and Scenic Rivers

Mill Creek, the only river flowing through the study area, is not a designated Federal Wild and Scenic river.

Oregon Scenic Waterways

Mill Creek, the only waterway flowing through the project study area, is not listed on the Oregon Department of State Lands list of designated scenic waterways.

Groundwater Resources

The entire study area lies within an area designated as a "groundwater restricted" zone by the Oregon Water Resources Department (OWRD). The entire study area also lies within Marion County's Sensitive Groundwater Overlay Zone. OAR 660-023-0030(5) states that local governments with jurisdiction in OWRD groundwater restricted areas must declare those areas Significant Natural Resource Areas. Per OAR requirements, these local governments must subsequently develop programs to protect the designated significant groundwater resources.

Project Relevant Issues

- Sublimity IAMP project actions must comply with existing Marion County, City of Sublimity, or City of Stayton local ordinances regulating development in a groundwater restricted area.

Approved Oregon Recreation Trails

The Sublimity IAMP does not impact an Oregon State Parks Department-designated recreational trail.

Natural Areas

The Sublimity IAMP does not impact an area listed on the Bureau of Land Management's Established Natural Areas of Oregon.

Wilderness Areas

The Sublimity IAMP does not take place in a designated Federal or local wilderness area.

Mineral and Aggregate Resources

There are no existing quarries or gravel sites located in the study area.

Energy Sources

There are no existing energy sources, as defined by OAR 660-023-0190(1)(a), in the study area.

Open Space

There are no existing open spaces, as defined by OAR 660-023-0220(1), in the study area.

Scenic Views and Sites

There are no publicly designated scenic views or sites in the study area.

Threatened or Endangered Species

According to the *Joseph Street EA*, a query of the Oregon Natural Heritage Database returned no specific listings for rare, threatened, or endangered plants and animals in the *Joseph Street EA* project area (which encompasses the Sublimity IAMP study area). The following Willamette Valley native grassland plant species were reported as possible in the general area of the project: *Aster curtis, Erigeron decumberns, Sidalcea nelsoniana, sidalcea campestris, Lomatium bradshawii, and Lathyrus holochlorus.*

Natural Hazards

According to the Oregon Department of Geology and Mineral Industries Relative Earthquake Hazard Map, much of the study area is classified as a "Zone C" (low/intermediate earthquake hazard risk) with pockets of "Zone D" (low earthquake hazard risk) and "Zone B" (intermediate/high earthquake hazard risk). The immediate Oregon 22/Cascade Highway SE interchange is classified as a "Zone C" low risk. The ridge which curves through the memo study area is where "Zone B" earthquake hazard conditions exist. The location of "Zone B" areas can be seen in Figure 2-4.

According to Marion County's Slide Hazards map, there are no Landslide Hazard Areas within the study area. However, there are existing areas with slopes greater than 20 percent. These "excessive slope areas" are shown in Figure 2-4.

Project Relevant Issues

- Project improvements will include earthwork. Cuts and fills located in areas of landslide or earthquake hazards can be unstable. Further analysis of natural hazards would need to be conducted during project design, as would the development of applicable avoidance and mitigation techniques.

Hazardous Substances

According to the Department of Environmental Quality's (DEQ) Environmental Cleanup Site Information (ECSI) database, there are no sites within the study area with known contamination from hazardous substances.

Air Quality

The study area is located in an area that is consistently in attainment with clean air levels set by the U.S. Environmental Protection Agency in the National Ambient Air Quality Standards.

Historic and Cultural Resources

- Within the study area there are no properties listed on the National Register of Historic Places (NRHP).
- The study area is not part of a National Historic District.

- Within the study area there are no properties listed on the National Register of Historic Places (NRHP), nor are there properties listed on the Oregon State Historic Preservation Office (OSHPO) Historic Inventory list.
- There is a Century Farm located in the northeast quadrant of the study area, but the farm was found to be ineligible for Historic Registry listing, per the *Joseph Street/Stayton North City Limits Revised Environmental Assessment.*[7]

[7] *Joseph Street/Stayton North City Limits Revised Environmental Assessment* (p. 14). Prepared by Oregon Department of Transportation (1995)

SECTION 3

Future Conditions Analysis

Land Use Analysis

Planned Land Development

According to the City of Sublimity and the City of Stayton, there are currently no known large-scale planned land developments in the Sublimity IAMP study area. The Santiam Station development in the southeast quadrant of the interchange has a few developable lots remaining, which are expected to be developed within the project timeframe.

Land Development Forecast

The potential for future land development varies among the four quadrants of the Sublimity Interchange study area. Although it is difficult to predict when and how intensively land will be developed in the vicinity of the interchange, a general picture of development constraints and/or potential in the immediate area surrounding the interchange is as follows.

NW Quadrant

No significant development constraints. Full build-out development scenarios under current zoning were integrated into traffic operations forecasts in the Forecasted Traffic Operations section.

NE Quadrant

Land use development potential is severely constrained by the following factors:

- A portion of this quadrant is within the boundaries of the 100-year floodplain, and therefore subject to applicable governmental regulations.
- A portion of this quadrant is within the boundaries of a delineated wetland, and therefore subject to applicable governmental regulations.
- The entire quadrant is outside the Sublimity UGB and is zoned Exclusive Farm Use (EFU). Oregon law does not allow new development in this zoning district, apart from a single dwelling unit and farm facility structures. However, the century-farm property in this quadrant is eligible to make a claim for development under Measure 37, given that the property was in the current owner's family prior to the enactment of Oregon land use laws (which established the EFU zone). The intensity of development that would be allowed to occur on this property under a successful Measure 37 claim is uncertain at this time.

SE Quadrant

Land use development potential is constrained by the following factors:

- A substantial portion of this quadrant is within the boundaries of the 100-year floodplain, and therefore subject to applicable governmental regulations (this is discussed in detail in the next section).
- A significant portion of this quadrant is within the boundaries of a delineated wetland, and therefore subject to applicable governmental regulations (this is discussed in detail in the next section).
- A portion of this quadrant is zoned Exclusive Farm Use (EFU). This land is not believed to be eligible for a development claim under Measure 37.
- Most of the quadrant is owned by ODOT (park and ride lot, future interchange ramp, wetland mitigation site).

Southwest Quadrant

- No significant development constraints. Full build-out development scenarios under current zoning were integrated into traffic operations forecasts in the Forecast Traffic Operations section.

Forecasted Traffic Operations

Traffic Forecasting Methodology

Land use and associated traffic generation for the forecast year 2025 were estimated based on the City of Stayton's Transportation Demand Model prepared for the Transportation System Plan (April 2004).

The household and employment data projections used in the model are shown in Tables 3-1 and 3-2. Overall population and employment are projected to increase by approximately 1.8 percent per year between 2000 and 2025.

TABLE 3-1
Population/Household Forecast

Area	2000 Population	2025 Population	2000 Households	2025 Households
Stayton UGB	6,816	10,213	2,654	3,977
Sublimity	2,148	4,082	711	1,351
Other Surrounding Area	836	1,080	269	348
Total	**9,800**	**15,375**	**3,634**	**5,676**

Source: *City of Stayton Transportation System Plan*, April 2004.

TABLE 3-2
Employment Forecast

Area	2000 Employment	2025 Employment
Agriculture	33	33
Industrial	873	1,370
Retail	516	810
Service	769	1,206
Education	358	562
Government	47	74
Other	820	1,286
Total	**3,416**	**5,341**

Source: *City of Stayton Transportation System Plan*, April 2004.

The resultant traffic volume growth rate between the existing and Year 2025 No Build peak hour traffic volumes was calculated along the study corridor. An average growth rate for the entire area of 1.5 percent was calculated.

This growth rate was applied to the 2005 turning movement counts and compounded annually to derive the Year 2025 traffic volumes for the 30th highest hour. Figure 2-3 depicts the design hour traffic volumes for Year 2025.

Future No Build (2025) Operations

The No Build operations scenario assumes that the existing roadway lane configurations and traffic control are maintained, with one exception. Golf Lane would be realigned so that it forms a four-leg intersection with Whitney Street and Cascade Highway. The new intersection would be signalized and have left-turn pockets on all legs. Figure 3-1 depicts both existing and Year 2025 no build lane geometry and traffic control.

The forecast Year 2025 V/C ratios, level-of-service and vehicle queues were computed for the eight study intersections and Oregon 22 entrance ramps based on the 30th Highest Hour design volumes. Table 3-3 shows the results of the operations analyses. Locations that do not meet the applicable mobility standards are highlighted. Figure 3-2 depicts the Year 2025 turning movement volumes at the study intersections.

Appendix F includes the traffic operations worksheets for the Year 2025 No Build 30th highest hour conditions.

TABLE 3-3
No Build Intersection Analysis Summary
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Oregon 22 Approaches				**Ramp Approaches**			
Oregon 22 eastbound entrance ramp	0.70	0.40			0.85	0.75	-	5
Oregon 22 westbound entrance ramp	0.70	0.55			0.85	>1.0	-	11
	Cascade Highway Approaches				**Cross Street Approaches**			
Cascade Highway at 9th Street	E	-	A	1	E	-	C	2
Cascade Highway at Sublimity Boulevard/ Oregon 22 westbound ramps	0.75	0.06	-	1	**0.85**	>1.0	-	5
Cascade Highway at Oregon 22 westbound entrance ramp	**0.75**	0.62			-	-	-	
Cascade Highway at Oregon 22 eastbound ramps	0.75	0.41	-	3	**0.85**	>1.0	-	20
Cascade Highway at Golf Lane/Whitney Street	D	-	C	19	D	-	E	8
Cascade Highway at Martin Drive	-	-	-	-	E	-	C	1
Cascade Highway at Shaff Road-Fern Ridge Road	D	-	F	51	D	-	F	30

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service.

2 Results are reported for approach with worst operational characteristics.

3 ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

Year 2025 No Build Deficiencies

The results of the No Build operational analysis show that all of the cross streets south of and including the interchange will operate beyond the required mobility standards. The only intersection approach that will operate at an adequate level of service is the right-in/right-out movement of Martin Drive. Additionally, the westbound entrance ramp to Oregon 22 will decline below the applicable mobility standards by the forecast year 2025.

An area with growth potential within the study area is located in the northeast quadrant of the interchange. The area is designated as Exclusive Farm Use (EFU). There are no known plans for development on the EFU properties, and they were not included in the land use

forecasts. If, however, these lands are developed under a Measure 37-type claim, the study area intersection operations will be further deteriorated. The extent of impacts resulting from the properties would depend on the type and level of use. Development of the EFU lands would likely result in an increase of heavy vehicles at the interchange. Thus, accident rates could also increase due to heavy vehicles utilizing the stop-controlled access to Oregon 22.

Future Build (2025) Operations

The Build scenario assumes that the ODOT Phase 1 improvements for the Sublimity Interchange are constructed. Phase 1 includes construction of a new loop ramp in the northeast quadrant of the interchange for the westbound entrance ramp. It also includes a new ramp in the southeast quadrant for the eastbound entrance ramp. Both of the reconstructed entrance ramps would have acceleration lanes to allow a merge movement for entering the Oregon 22 traffic stream. In addition, Cascade Highway will be widened to five lanes from the Sublimity Boulevard intersection to the south. As with the No Build scenario, Golf Lane will also be realigned to create a four-leg intersection with Whitney Street and Cascade Highway. The new Golf Lane/Whitney Street intersection will be signalized, as well as both of the ramp termini. The revised roadway configuration, traffic control and channelization are shown in Figure 3-3.

The ultimate configuration for Oregon 22 is a four-lane divided highway. Completion of the ultimate configuration has been assumed to be beyond the limits of this study timeframe.

Table 3-4 summarizes the Build intersection analysis. Figure 3-4 depicts the turning movement volumes for the Year 2025 Build scenario. It is identical to the No Build conditions, except at the new eastbound entrance ramp movement. Appendix G includes the traffic operations worksheets for the 30th highest hour conditions.

TABLE 3-4
Build Intersection Analysis Summary
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Oregon 22 Approaches				**Ramp Approaches**			
Oregon 22 eastbound entrance ramp	0.70	0.40			0.85	0.19		
Oregon 22 westbound entrance ramp	0.70	0.55			0.85	0.28	-	-
	Cascade Highway Approaches				**Cross Street Approaches**			
Cascade Highway at 9th Street	E	-	A	1	E	-	C	2
Cascade Highway at Sublimity Boulevard/Oregon 22 westbound ramps	0.75	0.40	-	7	0.85	0.35	-	3
Cascade Highway at Oregon 22 westbound ramps	0.75	0.33			-	-	-	-
Cascade Highway at Oregon 22 eastbound ramps	0.75	0.64	-	12	0.85	0.91	-	8
Cascade Highway at Whitney Street/Golf Lane	D		C	13	D		D	5
Cascade Highway at Martin Drive	-	-	-	-	E	-	B	1
Cascade Highway 30 at Shaff Road-Fern Ridge Road	D		D	16	D		E	24

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service.

2 Results are reported for approach with worst operational characteristics.

3 ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

Year 2025 Build Deficiencies

The results of the Build operational analysis show improved operations for the Oregon 22 entrance ramps with the construction of acceleration lanes to access the highway's stream of traffic. Both ramps will operate well within the mobility standard thresholds.

Operations along Cascade Highway will remain within all jurisdictional mobility standards. The queue analyses depict that vehicle queuing from adjacent intersections will not interfere with the operations of the interchange.

Intersection approaches to Cascade Highway also operate better under the Build conditions. However, two of the cross streets (the eastbound exit ramp and Shaff Road/Fern Ridge Road) would not meet the required mobility standards.

The interchange area traffic operations would likely remain similar to the Build scenario even if the EFU properties were developed. However, as discussed previously, the type and level of development would need to be considered. At the time of development, trip generation, operation and traffic mitigation, should be analyzed. The revised entrance ramp configuration would allow for safer access onto the freeway, especially for any heavy vehicles generated by the EFU properties in the future.

Conclusions

Current operating conditions along Oregon 22 meet ODOT's applicable mobility standards. However, accidents along the highway exceed the state's average rate in the vicinity of the interchange. The geometry of the roadway and the stop sign-controlled access likely contributed to the accidents, as the majority of incidents occurred during clear, dry, daylight conditions.

Along Cascade Highway, the stop sign-controlled Oregon 22 eastbound exit ramp and Whitney Street fall below the recommended operating standards. Additionally, the Cascade Highway /Shaff Road-Fern Ridge Road intersection operates poorly with extensive vehicle queuing. Accidents along the highway generally occur at a higher rate than the statewide average for similar facilities. Similar to the Oregon 22 crashes, most incidents on Cascade Highway occurred during clear, dry, daylight conditions.

By the year 2025, the Sublimity Interchange area would largely be operating beyond the required mobility standards set for the study intersections under current geometric and traffic control measures. With higher levels of congestion, accident rates are also likely to increase.

Various projects are planned to address the geometric and operational deficiencies. The Oregon Department of Transportation's plans for the Sublimity Interchange include revision of the Oregon 22 entrance ramps to a standard merge configuration. In conjunction with the ODOT improvements, the preferred transportation system improvements for Cascade Highway, outlined in the Stayton Transportation System Plan assumes the widening of Cascade Highway from Sublimity Boulevard to Regis Street (five lane section).

Implementation of these improvements results in improved operations during the 2025 forecast year. Both Oregon 22 entrance ramps would operate within ODOT's requirements.

Accidents along Oregon 22 will likely decrease in the vicinity of the interchange as a result of installing the standard merge configuration.

Operations along Cascade Highway will also meet all mobility standards and will not result in interchange impacts due to queuing on the highway.

The Oregon 22 eastbound exit ramp operates slightly over the v/c standard of 0.85. It can likely be accommodated by monitoring of the traffic signal timing through most of the study timeframe. If full buildout volumes are achieved, an additional right-turn lane would accommodate the traffic demand at the intersection.

Overall the Cascade Highway/Shaff Road-Fern Ridge Road intersection operates at LOS D, meeting the mobility requirements of the City of Stayton. However, the Shaff Road approach to Cascade Highway operates at LOS E during the design year. Construction of right-turn pockets on Shaff Road and Fern Ridge Road would allow all of the approaches to the intersection to operate at the required mobility standard.

Insert Figures 3-1 through 3-4 (11x17)

SECTION 4

Alternatives Development and Analysis

Introduction

Sublimity Interchange Improvements

The Sublimity Interchange is programmed for improvements in the 2006-2009 STIP. As proposed, this STIP project will involve partially reconstructing the interchange. Figure 4-1 shows programmed Sublimity Interchange improvements.

The entrance ramps in both directions will be rebuilt to a standard merge configuration, replacing the existing stop-sign controlled ramps. The ramp termini intersections with Cascade Highway will be aligned with their current locations. Both ramp terminals at Cascade Highway are proposed to be signalized. Figure 4-1 depicts the Sublimity Interchange Phase 1 improvements.

In preparation for this project, a frontage road (Golf Lane Road) has already been constructed that eliminated all private access to the Oregon 22 between Golf Club Road and Cascade Highway.

The ultimate configuration of the highway and interchange will include two lanes in each direction of travel on Oregon 22. This improvement is expected to occur beyond the timeframe of this IAMP.

Access Management Requirements

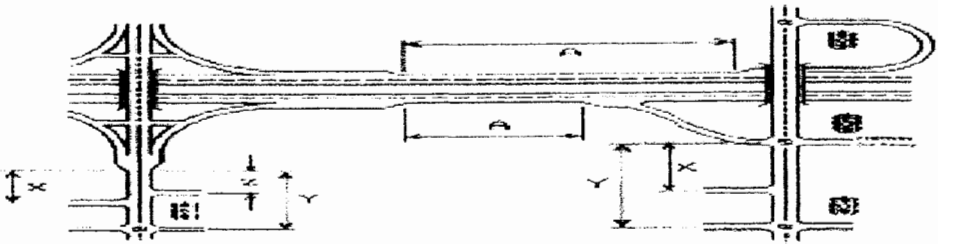
The purpose of the ODOT access management and spacing standards is to provide a safe and efficient transportation system by protecting highway traffic from the hazards of unrestricted and unregulated entry from adjacent properties. ODOT standards are outlined in the OAR (OAR 734-051). The applicable standards are summarized in Table 4-1.

TABLE 4-1
Minimum Spacing Standards Applicable to Freeway Interchanges

Cascade Highway Configuration	Spacing Dimension			
	A	X	Y	Z
Two-lane	1 mile	1,320 feet	1,320 feet	990 feet
Multi-lane	1 mile	1,320 feet	1,320 feet	1,320 feet

Source: Tables 5 and 6 in OAR 734-051-0125.

A = The distance between the start and end of tapers of adjacent interchanges along Oregon 22.
X = The distance to the first approach on the right; right in/right out only.
Y = The distance to the first intersections where left-turns are allowed.
Z = The distance between the last right in/right out approach road and the start of the taper for the entrance ramp.



In terms of access management, the goal of any interchange modernization project is to improve spacing and safety either by meeting or moving in the direction of applicable standards. The existing ramp configurations on Oregon 22 meet the ODOT access management spacing standards shown in Table 4-1. This is because the Golf Club Road Interchange to the west and the Fern Ridge Road intersection to the east are more than one mile apart.

Currently there are both public and private approaches onto Cascade Highway that violate the minimum access spacing requirements of the Oregon 22 ramp terminals. Cascade Highway is currently a two-lane facility. The City of Stayton TSP, however, recommends widening the highway to five lanes from Sublimity Boulevard to Regis Street (south of Shaff Road-Fern Ridge Road) in its Year 2025 Preferred Alternative. Therefore, a 1320-foot spacing (multi-lane) requirement between the ramp termini and adjacent access points was assumed for Cascade Highway.

Table 4-2 lists existing approaches along Cascade Highway within the IAMP study area. Figure 4-2 depicts the corresponding locations of these approaches.

The following sections discuss access management alternatives for the IAMP area including spacing deficiencies, queuing and traffic operations.

TABLE 4-2
Existing Approaches along Cascade Highway

Figure 4-2 Approach #	Mile Point*	Tax Lot(s) Served	Approach Type
West Side of Cascade Highway (North of Oregon 22)			
	1.32	091W03BA03300	Single-Family Residence/ Commercial Use
	1.30	091W03BA03400	Single-Family Residence/ Commercial Use
3	1.26	091W03BA03700	Business
	1.21	091W03B00500	Single-Family Residence/ Commercial Use
	1.20	091W03B00700	Single-Family Residence/ Commercial Use
6	1.10	Sublimity Blvd.	Public Road
West Side of Cascade Highway (South of Oregon 22)			
7	0.89	OR-22 Ramp Terminal	Public Road
8	0.83	Golf Lane	Public Road
East Side of Cascade Highway (South of Oregon 22)			
9	0.74	Whitney Street	Public Road
10	0.83	091W03DB00300; 091W03DB00200	Park and Ride lot; Wetland Site
East Side of Cascade Highway (North of Oregon 22)			
11	1.03	OR-22 Ramp Terminal	Public Road
12	1.09	OR-22 Ramp Terminal	Public Road
13	1.23	091W03A00300	Single-Family Residence/ Commercial Farm
14	1.30	091W03A00200; 091W03A00100	Single-Family Residence; Commercial Farm

*Milepoint given represents approximate midpoint of approach

Alternatives

This section describes how alternative solutions were developed and analyzed to remedy IAMP-identified deficiencies, which were predominantly access-related in nature. Sublimity Interchange modernization plans and ODOT access management standards for freeway interchanges are outlined here as part of this description.

Alternatives for the IAMP study area were considered in three parts:

1) Along Oregon 22

2) Cascade Highway - Stayton (south of the interchange)

3) Cascade Highway - Sublimity (north of the interchange)

Along Oregon 22

The ODOT Sublimity Interchange Phase 1 design was assumed as the preferred alternative for the Oregon 22 Mainline.

Oregon 22 Preferred Alternative

The recommendation for mainline Oregon 22 in the IAMP study area is for ODOT to consider closing the Fern Ridge Road at-grade intersection access to Oregon 22. Further analysis should be conducted to evaluate the demand and/or need for the Fern Ridge Road access, due to the applicable spacing requirements of the Sublimity Interchange and because at-grade intersections are not typically utilized along freeway segments. The Fern Ridge Road at-grade intersection with Oregon 22 is located at approximately MP 14.30. The revised eastbound entrance ramp merge places this intersection within the minimum (1 mile) spacing requirement of the Sublimity Interchange improvements. The distance measured from the acceleration lane to the intersection is approximately 0.5 miles (2,550 feet).

Otherwise, proposed Sublimity Interchange improvements[8] achieve the operational mobility standards for both the Oregon 22 mainline and the new entrance ramps. Table 4-3 summarizes the forecast year 2025 operations on Oregon 22.

[8] Interchange physical improvements were proposed in the *Joseph Street-Stayton North City Limits Environmental Assessment* (prepared by ODOT, March, 1995)

TABLE 4-3
Oregon 22 Traffic Operations Analysis Summary
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio	Mobility Standard[1]	V/C Ratio
	Oregon 22 Approaches		Entrance ramp Merge	
Oregon 22 eastbound entrance ramp	0.70	0.40	0.85	0.19
Oregon 22 westbound entrance ramp	0.70	0.55	0.85	0.28

[1] ODOT mobility standards are based on volume-to-capacity ratios.

Cascade Highway – Stayton (South of Interchange)

The ODOT Sublimity Interchange Phase 1 design was assumed as the preferred alternative for the Oregon 22 Mainline.

The City of Stayton's preferred alternative roadway network concept (*City of Stayton Transportation System Plan,* April 2004) was analyzed for Cascade Highway south of Oregon 22.

Stayton Preferred Alternative

The 2004 Stayton TSP roadway concept incorporates ODOT's plans for improving the Oregon 22 Sublimity Interchange in its preferred Year 2025 alternative. The supporting local street network improvements for the preferred alternative include the following:

- Widen Cascade Highway to five lanes (two lanes in each direction with left-turn pockets) between and including the Sublimity Boulevard and Regis Street intersections.
- Realign Golf Lane to form a four-legged intersection with Whitney Street (City of Stayton has entered into a memorandum of understanding for this improvement with Marion County).
- Install traffic signal and eastbound/westbound left turn lanes at the Golf Lane/Whitney Street intersection.

Figure 4-3 shows proposed access management south of Oregon 22, representing the preferred alternative from the Stayton TSP.

The City of Stayton has also provided a $50,000 match in conjunction with work recently completed for the interchange modernization project, further emphasizing their commitment to the project.

The City of Stayton's TSP supports improvements to the Golf Club Road corridor (west of the study area) by widening Golf Club Road to five lanes from Oregon 22 to Shaff Road, and signalizing the major intersections along the roadway. These improvements have the potential to relieve a portion of the travel demand on the Cascade Highway corridor.

However, as a conservative analysis approach, such vehicle diversions were not assumed in the analysis.

The three existing access deficiencies listed in Table 4-2 (Golf Lane, Park-and-Ride lot and Whitney Street) would all remain deficient with the proposed configuration.

The realignment of Golf Lane, across from Whitney Street, would increase the spacing of the roadway from the Oregon 22 eastbound ramps by approximately 500 feet, but still would not meet the access management spacing standards of 1320 feet. The new, signalized, four-legged intersection is expected to operate at an overall V/C ratio of 0.66. The critical movement in regards to the Sublimity Interchange operations is the southbound direction of travel. It is projected to produce queues of up to 315 feet. Queues of this magnitude would not interfere with the interchange's eastbound ramp operations. Potential queue conflicts with the eastbound ramps can be further minimized by incorporating timing and phasing coordination between the new traffic signals along the Cascade Highway corridor. Figure 4-4 shows the anticipated vehicle queuing along Cascade Highway, south of the interchange, during the Year 2025 design hour. All traffic signals are assumed to be coordinated and optimized.

Neither the horizontal nor vertical alignment of Cascade Highway south of the interchange result in sight distance restrictions. The reconfigured intersection will have adequate stopping and decision time for drivers.

The Park-and-Ride lot access would remain at its current location, approximately 600 feet south of the eastbound ramp terminal. Relocation of this driveway would impact adjacent wetlands and Mill Creek, which would be both undesirable and costly. The demand/usage of the park-n-ride was observed to be between 10-20 parked vehicles. The current low usage is due to the limited transit opportunities in the Stayton and Sublimity area. Trip generation rates for park-n-rides with bus service were researched to estimate the potential trips emanating from this access if transit service were made available. Slightly over 50 trips would be generated at the access during the peak traffic hour.

A potential area for relocation of the park-n-ride lot is adjacent to the re-aligned Golf Lane Road. If substantial improvements to transit and park-and-ride services are envisioned, relocation of the lot may be an alternative. Alteration of the access to a right-in/right-out only driveway may also lessen access impacts within the interchange access management area but could limit the transit service into and out of the lot.

Table 4-4 shows the study intersection operations south of Oregon 22 under the preferred Stayton alternative.

TABLE 4-4
Stayton Traffic Operations Analysis Summary—Four-Lane Cascade Highway
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at Oregon 22 eastbound ramps[4]	0.75	0.64	-	12	0.85	0.91	-	8
Cascade Highway at Park-n-Ride Access			A	1	E	-	C	1
Cascade Highway at Golf Lane Road/ Whitney Street[4]	D	-	C	13	D	-	D	5
Cascade Highway at Martin Drive	-	-	-	-	E	-	B	1
Cascade Highway 30 at Shaff Road-Fern Ridge Road[4]	D		D	16	D	-	E	24

[1] ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service (see *Sublimity Interchange Area Management Plan: Oregon 22 with Cascade Highway Data Collection and Operational Analyses* for Mobility Standard definitions).

[2] Results are reported for approach with worst operational characteristics.

[3] Vehicle queue results at ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

[4] Signalized intersection.

An interim condition for Cascade Highway in which the Oregon 22 overpass of Cascade Highway will not be extended due to funding constraints was also examined. If the overpass is not extended, the section of Cascade Highway between the Oregon 22 ramp intersections would not be widened to five lanes. Under this constrained condition, left-turn pockets are still recommended to be constructed at the Oregon 22 entrance ramps. The turn lane and taper at the east bound entrance ramp will be limited to approximately 200 feet by the Oregon 22 overpass. Operations along Cascade Highway would exceed the ODOT mobility standards at the eastbound ramp intersection. Vehicle queues will not impede operations through the adjacent westbound ramp/Sublimity Boulevard intersection. However, the northbound queue may impede turn movements at the Park-and-Ride lot access. Table 4-5 summarizes conditions without the Cascade Highway widening, and Figure 4-5 depicts the estimated queue length.

TABLE 4-5
Stayton Traffic Operations Analysis Summary – Two Lane Cascade Highway
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at Oregon 22/Sublimity Boulevard/ westbound ramps[4]	0.75	0.65	-	18	0.85	0.62	-	3
Cascade Highway at Oregon 22 eastbound ramps[4]	0.75	0.92	-	24	0.85	0.96	-	14

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service (see *Sublimity Interchange Area Management Plan: Oregon 22 with Cascade Highway Data Collection and Operational Analyses* for Mobility Standard definitions).

2 Results are reported for approach with worst operational characteristics.

3 Vehicle queue results at ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

4 Signalized intersection.

Cascade Highway – Sublimity (North of Interchange)

The PMT developed a preferred alternative for Cascade Highway north of Oregon 22 based on preliminary access management layouts.

Access management alternatives for the north side of the interchange were compiled based upon input from the affected residents, project management and consultant teams as well as local government officials. All proposed alternatives were evaluated by the consultant team. A previous plan to realign Sublimity Boulevard was rejected by the City of Sublimity; thus, none of the alternatives considered that plan as an option. An access deviation will be needed for the Sublimity Boulevard approach, as all of the interchange designs maintain the connection to this approach (opposite from the westbound interchange ramps).

The widening of Cascade Highway to a five lane section through the Sublimity Boulevard/Oregon 22 ramp intersection is assumed in all alternatives. The intersection is also assumed to be signalized in all alternatives.

Sublimity Alternative 1

The elements of Sublimity Alternative 1 are shown in Figure 4-6. The long-term strategy removes all private approach access points along Cascade Highway within the management area. It creates a new intersection 1,320 feet north of the Oregon 22 westbound ramps. The existing properties in the northwest quadrant of the interchange will be served from an internal roadway connecting to the new intersection and to Sublimity Boulevard (300 feet west of Cascade Highway). The new roadway will be located near the western property line of the affected parcels. To further enhance circulation alternatives, an additional connection could also be constructed to the west when Sublimity Boulevard is extended.

The two properties in the northeast quadrant of the interchange will also access Cascade Highway at the new intersection. The existing access points for these properties will be closed. A frontage road, top be built adjacent to Cascade Highway, will connect the existing driveways to the new intersection.

The new intersection on Cascade Highway is located along a crest vertical curve, with sight distance half the required 610 feet. In order to provide adequate sight distance at this location, it would be necessary to modify the vertical profile of Cascade Highway. This modification would be at substantial cost and would adversely impact the access to the properties fronting on Cascade Highway.

The new access along Sublimity Boulevard may be affected by queuing from the Cascade Highway signalized intersection. However, this would occur infrequently. The vehicle queue estimates for the Year 2025 design year are approximately 60 feet for the westbound Sublimity Boulevard traffic.

Currently, all properties within the access management area are residential (one residence contains a home occupation and parking lot) and/or farm use. Trip generation is and will remain low with these land uses. The parcels, however, are zoned for commercial use on the west side of the highway. Table 4-6 summarizes operations north of Oregon 22 assuming build-out of the properties as commercial businesses. (Note: Further analyses should be performed upon redevelopment of properties, when detailed information is available) The new access along Cascade Highway is projected to operate poorly at LOS F. The stop controlled approaches could be improved to meet the mobility standards by providing left-turn pockets for both the north and eastbound vehicles.

The new roadway would provide safer access to/from Cascade Highway, good circulation and access options. The roadway will be more suitable to serve the commercial land use upon re-development of the properties.

TABLE 4-6
Sublimity Traffic Operations Analysis Summary – Alternative 1
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at 9th Street	E	-	A	1	E	-	C	2
Cascade Highway at new intersection 1320' north of Westbound ramps	E	-	A	1	E		F	3
Cascade Highway at Sublimity Boulevard/Oregon 22 Westbound ramps[4]	0.75	0.40	-	7	0.85	0.35	-	3

[1] ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service (see *Sublimity Interchange Area Management Plan: Oregon 22 with Cascade Highway Data Collection and Operational Analyses* for Mobility Standard definitions).

[2] Results are reported for approach with worst operational characteristics.

[3] Vehicle queue results at ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

[4] Signalized intersection.

Sublimity Alternative 2

This alternative includes an internal connection between the properties fronting Cascade Highway in the northwest quadrant of the interchange. This alternative would connect the properties served by Approaches #5 to #2 listed in Table 4-2 and shown in Figure 4-2. Figure 4-7 depicts the proposed alignment of this alternative. Full access is proposed to occur at two locations; on Cascade highway at the north end of Tax Lot #091W03BA03400 (1100 feet north of the interchange), and on Sublimity Boulevard through the south side of Tax Lot #091W03BA03400 (300 feet west of the interchange). An additional right-in/right-out only access on Cascade Highway is proposed between Tax Lots #091W03B00500 and #091W03B00900 (550 feet north of the interchange). The consolidated access points remain within the access management area of the interchange. The internal roadway severely impacts the property served by Approach #5. However, this roadway would provide an alternative route for drivers when the Sublimity Boulevard/Cascade Highway intersection is operating at congested levels.

The new intersection on Cascade Highway is located along a crest vertical curve, with sight distance of slightly less than the required 610 feet.

The new access along Sublimity Boulevard may be affected by queuing from the Cascade Highway signalized intersection. However, this would not occur frequently. Queue estimates for the Year 2025 design year are approximately 60 feet for the westbound Sublimity Boulevard traffic.

The two private driveways in the northeast quadrant of the interchange are proposed to remain in their current locations, within the 1,320 feet access management area. The

residential/farm trip generation is expected to remain low, thus should not create operational problems. Mitigation for the accesses on the east side of Cascade Highway could include construction of a large radius driveway approach or widened shoulder to allow vehicles to slow down out of the travel lane.

Table 4-7 summarizes operations north of Oregon 22 assuming build-out of the commercial properties (Note: Further analyses should be performed upon redevelopment of properties, when detailed information is available). All of the access points along Cascade Highway are projected to operate within the required mobility standards and are characterized by minimal queuing.

TABLE 4-7
Sublimity Traffic Operations Analysis Summary – Alternative 2
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at 9th Street	E	-	A	1	E	-	C	2
Cascade Highway @ Private Driveway 5	E	-	A	0	E	-	D	1
Cascade Highway @ Private Driveway 7	E	-	A	0	E	-	D	1
Cascade Highway at consolidated Driveways #1 through #4	E	-	A	0	E	-	B	1
Cascade Highway @ Private Driveway 6	E	-	A	0	E	-	B	1
Cascade Highway at Sublimity Boulevard/Oregon 22 Westbound ramps[4]	0.75	0.40	-	7	0.85	0.35	-	3

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service (see *Sublimity Interchange Area Management Plan: Oregon 22 with Cascade Highway Data Collection and Operational Analyses* for Mobility Standard definitions).

2 Results are reported for approach with worst operational characteristics.

3 Vehicle queue results at ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

4 Signalized intersection.

Sublimity Alternative 3

This alternative combines aspects of the previous alternatives. Driveway consolidation is incorporated into the scenario, while minimizing impacts to the affected properties. The elements of Sublimity Alternative 1 are shown in Figure 4-8.

In the northeast quadrant of the interchange, Approaches #13 and #14 are proposed to be consolidated, with access at the existing #14 location (1100 feet north of the interchange).

Although within the access management area, travel demand for these two properties is expected to remain low. Sight distance at this location meets the 610 foot requirement. Mitigation could include construction of a large radius driveway approach or widened shoulder to allow vehicles to slow down out of the travel lane.

In the northwest quadrant, the southern properties would be served by a common access easement connecting to Sublimity Boulevard, approximately 300 feet west of Cascade Highway. The new access on Sublimity should not be affected by vehicle queues at the Cascade Highway traffic signal. Ninety-fifth percentile queues are estimated to be 60 feet. The northern properties are served by an access road connecting to a new intersection 1320 feet north of the interchange. This configuration will decrease the amount of right-of-way acquisition and roadway construction needed to service the properties. This alternative will also maintain lower traffic volumes behind the residential properties, and reduce safety conflicts.

Table 4-8 summarizes operations north of Oregon 22 assuming build-out of the commercial properties. (Note: Further analyses should be performed upon redevelopment of properties, when detailed information is available). Although characterized by short vehicle queues, the consolidated driveway access points would operate poorly at LOS F.

TABLE 4-8
Sublimity Traffic Operations Analysis Summary – Alternative 3
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at 9th Street	E	-	A	1	E	-	C	2
Cascade Highway @ Consolidated Driveway 1320' north of Westbound ramps	E	-	A	0	E	-	F	1
Cascade Highway @ Private Driveway 6/7	E	-	A	0	E	-	F	1
Cascade Highway at Sublimity Boulevard/Oregon 22 Westbound ramps[4]	0.75	0.40	-	7	0.85	0.35	-	3

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service (see *Sublimity Interchange Area Management Plan: Oregon 22 with Cascade Highway Data Collection and Operational Analyses* for Mobility Standard definitions).

2 Results are reported for approach with worst operational characteristics.

3 Vehicle queue results at ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

4 Signalized intersection.

Sublimity Preferred Alternative

The three Sublimity alternatives were presented at a June 2005 PMT meeting. The benefits and impacts of each were discussed, and a preferred alternative was derived. Figure 4-9 shows the preferred alternative.

Two new access roadways will be created, respectively serving properties on the east and west side of Cascade Highway. Both roadways will access Cascade Highway at a new intersection, located approximately 1,580 feet from the interchange. The intersection will be established according to AASHTO standards and located to meet access management spacing requirements, provide adequate sight distance and maximize safety. This new intersection will be unsignalized and allow for full movement.

A technical memo describing the rationale for IAMP-recommended intersection placement is included in Appendix H.

On the west side of Cascade Highway, a backage road will extend behind the existing properties (served by Approaches 1 through 5) and through a currently unimproved lot (ID #091W03B00900) to an unsignalized, full movement intersection with Sublimity Boulevard. This intersection would be located approximately 470 feet west of the Sublimity Boulevard/Cascade Highway intersection. On the east side, a frontage road will connect the new intersection to the two existing driveways.

This alternative removes all private driveways along Cascade Highway within the Interchange Access Management Limit area, and places the new highway access at a location with the maximum sight distance. This alternative also minimizes potential impacts along Sublimity Boulevard in the vicinity of the intersection with Cascade Highway and the Oregon 22 ramp termini.

Currently, all properties within the access management area are residential (one residence contains a home occupation) and/or farm use. Trip generation is and will remain low with these land uses. The parcels, however, are zoned for commercial use on the west side of the highway. Table 4-9 summarizes operations north of Oregon 22 assuming build-out of the properties as commercial businesses. (Note: Further analyses should be performed upon redevelopment of properties, when detailed information is available).

The new access along Cascade Highway is projected to operate poorly at LOS F. The stop controlled approaches could be improved to meet the mobility standards by providing left-turn pockets for both the north and eastbound vehicles.

TABLE 4-9
Sublimity Traffic Operations Analysis Summary – Preferred Alternative
2025 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at 9th Street	E	-	A	1	E	-	C	2
Cascade Highway at new intersection 1320' north of WB ramps	E	-	A	1	E	-	F	3
Cascade Highway at Sublimity Boulevard/Oregon 22 Westbound ramps[4]	0.75	0.40	-	7	0.85	0.35	-	3

1 ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service (see *Sublimity Interchange Area Management Plan: Oregon 22 with Cascade Highway Data Collection and Operational Analyses* for Mobility Standard definitions).

2 Results are reported for approach with worst operational characteristics.

3 Vehicle queue results at ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

4 Signalized intersection.

Summary

A summary of the preferred access management alternatives detailed in this section is as follows:

Along Oregon 22, proposed ODOT interchange improvements will situate the Fern Ridge intersection within the minimum spacing requirements of the new eastbound Oregon 22 eastbound entrance ramp. An evaluation of the need for this at-grade intersection along an expressway should be made.

- The preferred Stayton alternative does not meet all access management requirements. However, existing deficiencies are being mitigated by realigning Golf Lane Road across from Whitney Street. Additionally, the intersection is proposed to be signalized to accommodate the forecast traffic demand. Adequate sight distance is provided at this modified intersection. The Park-and-Ride lot driveway will also remain within the access management area. Sight distance is also adequate at this location, and due to the limited transit opportunities, traffic demand remains low.

- The preferred Sublimity alternative, with the exception of the Sublimity Boulevard intersection, meets access management requirements along Cascade Highway. In addition adequate sight distance at the new Cascade Highway intersection is provided. The new access point along Sublimity Boulevard is also situated with the furthest distance from the interchange, minimizing impacts at the westbound ramp intersection.

Table 4-10 summarizes all of the alternatives in tabular form. See Figure 4-2 for corresponding access locations.

TABLE 4-10
Access Management Alternatives Summary

Alternative	Description	Access Standard (feet)	Deficient Access	Distance (feet)	IAMP Figure
Along Oregon 22					
Existing Sublimity Interchange Configuration	Stop controlled Oregon 22 entrance ramps.	5,280	Fern Ridge Road.	-	2-2
Proposed Sublimity Interchange Configuration	Entrance ramps with merge configuration.	5,280	Fern Ridge Road	3,300	4-1
South of Interchange – Stayton (South of Interchange)					
Existing Stayton	Unsignalized, full movement intersections at Golf Lane Road, Park-and-Ride driveway and Whitney Street.	1,320	Golf Lane Road	600	2-2
		1,320	Park-and-Ride lot	600	
		1,320	Whitney Street	1,100	
Preferred Stayton Alternative	Realignment of Golf Lane Road, across from Whitney Street.	1,320	Park-and-Ride lot	600	4-3
		1,320	Golf Lane Road/Whitney Street	1,100	
North of Interchange – Sublimity (North of Interchange)					
Existing Sublimity	Sublimity Boulevard across from westbound ramp intersection & numerous private driveway access on Cascade Highway	1,320	Approach #5 (private)	500	2-2
		1,320	Approach #4 (private)	600	
		1,320	Approach #3 (private)	900	
		1,320	Approach #2 (private)	1,100	
		1,320	Approach #1 (private)	1,250	
		1,320	Approach #13 (private)	700	
		1,320	Approach #14 (private)	1,100	
Sublimity Alternative 1	Sublimity Boulevard across from westbound ramp intersection & new intersection 1320 feet from interchange servicing all property access.	1,320	Sublimity Boulevard	0	4-6

TABLE 4-10
Access Management Alternatives Summary

Alternative	Description	Access Standard (feet)	Deficient Access	Distance (feet)	IAMP Figure
Sublimity Alternative 2	Sublimity Boulevard across from westbound ramp intersection & private driveway access consolidated onto an internal road for driveways within 1000 feet of the interchange.	1,320	Sublimity Boulevard	0	4-7
		1,320	New right-in/right-out approach	550	
		1,320	Approach #13 (private)	700	
		1,320	New consolidated approach	1,000	
		1,320	Approach #14 (private)	1,100	
		1,320	Approach #1 (private)	1,250	
Sublimity Alternative 3	Sublimity Boulevard across from westbound ramp intersection, east parcels combined access, west parcels split into two combined accesses (one on Cascade, one on Sublimity).	1,320	Sublimity Boulevard	0	4-8
		1,320	New consolidated approach	1,100	
Preferred Sublimity Alternative	Sublimity Boulevard across from westbound ramp intersection, new intersection ~1620 feet north of interchange servicing all properties. Internal roadway connection to the existing Sublimity Boulevard termini.	1,320	Sublimity Boulevard	0	4-9

Insert Figures 4-1 through 4-9 (11x17)

SECTION 5

Interchange Area Management Plan

Selected Alternative and Findings

The preferred alternative package consists of a recommended access management plan as well as transportation improvement and traffic management recommendations.

Recommendations and associated findings are presented in this section.

Access Management Plan

As part of the Sublimity IAMP, future access locations and public street connections were evaluated for properties along Cascade Highway. The intent of the Access Management Plan is to identify the location of driveways and internal circulation routes for properties whose accesses will need to be relocated to achieve the safety and mobility objectives of the Access Management Standards. The plan, as described in the following paragraphs, shall be applied by ODOT, Marion County, the City of Sublimity, and the City of Stayton in future land use decisions involving the properties located within the IAMP study area.

It should be noted that the strategies below mostly apply to areas of new development or redevelopment; existing accesses are allowed to remain as long as the land use does not change. As a result, access management is a long-term process in which the desired access spacing to a street slowly evolves over time as redevelopment occurs. It should also be kept in mind that parcels cannot be land-locked, and must have some way of accessing the public street system. This may mean allowing shorter access spacing then would otherwise be allowed.

Access management strategies for approaches located within the Interchange Access Management Limit are described in this section.

Figure 5-1 contains a detailed inventory of all properties and approaches in the Access Management Plan impact area, with short and medium/long-term actions described for each. Figure 5-2 depicts corresponding approaches and properties.

Cascade Highway (West Side of Roadway, North of Oregon 22)

Short-Term Access Actions

Existing private driveway approaches will continue to be allowed individual access to Cascade Highway. Access deviations will be requested for all of these private approaches.

Sublimity Boulevard will continue to access Cascade Highway. An access deviation will be requested. As part of IAMP physical improvements, a traffic signal will be installed at the Sublimity Boulevard/Cascade Highway intersection, directly across from the realigned Oregon 22 termini.

The City of Sublimity will adopt an Interchange Overlay zoning district in its Development Code and amend sections of Code language. The new overlay zone will prohibit development from occurring at the properties on this part of Cascade Highway without the presence of an alternate roadway to access. Proposed changes to the City of Sublimity's Development Code are provided as Appendix I.

Medium/Long-Term Access Management

Under the guidance of this IAMP, properties located on this part of Cascade Highway will take future access via the access backage road described in Section 4 of this report and illustrated on Figure 4-9. During the IAMP planning process, the Project Management Team (PMT) strongly considered whether this backage road should be constructed as a short-term improvement. The PMT concluded that the timing and precise route of this access road should be guided by the future commercial development of the properties.

The backage access road (and new driveways necessary to connect to this access road) will most likely be constructed as a condition of one or more commercial developments in the medium-to-long-term future.

Cascade Highway (West Side of Roadway, South of Oregon 22)

Short-Term Access Actions

Golf Lane will continue to access Cascade Highway. An access deviation will be requested.

Medium/Long-Term Access Management

Under an existing Memorandum of Understanding (MOU) between the City of Stayton and Marion County, Golf Lane will be realigned at such time that the existing Golf Lane/Cascade Highway intersection warrants signalization or fails to meet Marion County standards for safety and/or operations. The realigned Golf Lane approach would intersect with Cascade Highway directly across from Whitney Street, approximately 470 feet south of its existing location.

The aforementioned MOU is provided as Appendix J.

Cascade Highway (East Side of Roadway, South of Oregon 22)

Short-Term Access Actions

Whitney Street will continue to access Cascade Highway. An access deviation will be requested.

The Park-and-Ride lot will continue to be allowed access to Cascade Highway. An access deviation will be requested.

Medium/Long-Term Access Management

As part of Stayton TSP physical improvements, a traffic signal will be installed at the Whitney Street/Cascade Highway intersection.

Cascade Highway (East Side of Roadway, North of Oregon 22)

Short-Term Access Actions

Approach #13 (see Figure 4-2) will be closed and alternate access will be provided via Approach #14. ODOT will construct a frontage road extending from the driveway at Approach #13 to the driveway at Approach #14 to allow for this consolidation of driveways.

Approach #14 will continue to be allowed access to Cascade Highway. An access deviation will be requested.

ODOT will purchase access control along entire property road frontage of Tax Lot# 091W03A00100. This proposed line of access control purchase is depicted on Figure 5-2.

Medium/Long-Term Access Management

Approach #14 will be closed and alternate access will be provided via a frontage road that will access Cascade Highway at a new intersection located directly across from the new backage access road described earlier.

Access Management Deviations

In the short-term, IAMP actions reduce by one the number of approaches to Cascade Highway within the Interchange Access Management Limits. In the medium-to long-term, however, the actions performed as part of this IAMP will reduce the number of approaches by six. Under OAR 734-051-0135(5) the ODOT Region Access Management Engineer *"shall require any deviation for an approach located in an interchange access management area as defined in the Oregon Highway Plan, to be evaluated over a 20-year horizon from the date of application and may approve a deviation for an approach located in an interchange access management area if:... (b) The approach is consistent with an access management plan for an interchange that includes plans to combine or remove approaches resulting in a net reduction of approaches to the highway".* Deviations identified in this IAMP are consistent with this statute.

Table 5-1 addresses all approach locations where access deviations will be required and provides a rationale for why the deviations should be granted. See Figure 4-2 for corresponding depiction of approach locations.

TABLE 5-1
IAMP Access Deviations

Approach #	Tax Lot(s) Served	Deviation Request Rationale
1	091W03BA03300	As part of this IAMP, the City of Sublimity will be establishing an "Interchange Overlay" zone, encompassing all of these properties. This zone will prohibit development that increases vehicle trip generation onto Cascade Highway and will require future development of any of these properties to access onto a local backage road in the rear of the property. This action moves in the direction of ODOT Access Management Standards. The aforementioned future backage road was considered as a potential physical improvement to be created as part of this IAMP. However, it was concluded that the precise route and construction timing of this future backage road should be guided by the development of these properties. Therefore, a deviation should be
2	091W03BA03400	
3	091W03BA03700	

TABLE 5-1
IAMP Access Deviations

Approach #	Tax Lot(s) Served	Deviation Request Rationale
4	091W03B00500	approved per OAR 734-051-0080(2), since these private accesses have no reasonable alternate access to their properties. These properties currently produce very few vehicle trips. Analysis performed for this IAMP concluded that the presence of these approaches is consistent with the safety factors listed under OAR 734-051-0080(9). These approaches have only a slight effect on Cascade Highway safety and a negligible effect on mobility. Therefore, a deviation should be approved per OAR 734-051-0135(1).
5	091W03B00700	
6	Sublimity Blvd.	The intersection of Sublimity Boulevard and Cascade Highway was aligned with the westbound ramp terminal in the original design of the interchange. This location was selected after a review of alternatives, all of which were determined to be infeasible. The location was consistent with the access management rules in effect at the time and the layout was approved by ODOT and FHWA through the adoption of the Environmental Assessment and Finding of No Significant Impact (FONSI).
8	Golf Lane	An existing Memorandum of Understanding (MOU) between the City of Stayton and Marion County calls for the realignment of Golf Lane at such time that Golf Lane warrants signalization or fails to meet Marion County standards for safety and/or operations. The realigned Golf Lane approach would intersect with Cascade Highway directly across from Whitney Street, approximately 470 feet south of its existing location. By relocating an existing access point further from the interchange ramp terminal, this action moves in the direction of ODOT Access Management Standards. Analysis performed for this IAMP concluded that the presence of this approach is consistent with the safety factors listed under OAR 734-051-0080(9). Therefore, a deviation should be approved per OAR 734-051-0135(1).
9	Whitney Street	The 2004 traffic study done for the City of Stayton TSP revealed that this intersection operates at LOS A and LOS C, respectively, for the southbound left and westbound approach. Whitney Street is identified in an integral part of Stayton's circulation system.
10	091W03DB00300; 091W03DB00200	This park and ride access provides a carpool alternative, helping to decrease the number of vehicles using the interchange at peak periods, thereby improving operational and safety conditions - the overall objective of Access Management Standards. Park and Ride lots serve the multi-modal objectives of Goal 12. Alternate access to the park and ride lot is infeasible due to the existence of wetlands adjoining the lot.
14	091W03A00200; 091W03A00100	As part of this IAMP, Approach #13 will be closed and consolidated with Approach #14. Therefore, a deviation should be approved per OAR 734-051-0135(3)(b). Additionally, access control will be purchased along entire property road frontage of Tax Lot# 091W03A00100.

Physical Improvement Recommendations

Based on the level of traffic demand associated with the proposed development in Stayton and Sublimity, specific improvements are required by the design year, 2025. In its current configuration, the interchange exit ramps and westbound entrance ramp would operate beyond capacity. In addition, all of the approaches to Cascade Highway would operate beyond their applicable mobility standards with the exception of Martin Drive which is restricted to a right-turn-in-right-turn-out access.

Implementing the proposed ODOT interchange improvements and the City of Stayton's preferred transportation plan would entail the following improvements within the interchange management area:

- Reconstruct the Oregon 22 entrance ramps to provide standard merge operations onto Oregon 22.
- Widen Cascade Highway from and including Sublimity Boulevard through the Shaff Road/Fern Ridge Road intersection.
- Realign Golf Lane across from Whitney Street.
- Signalize the Oregon 22 ramp termini - Sublimity Boulevard/Cascade Highway intersection (north of interchange).
- Signalize the Oregon 22 ramp termini/Cascade Highway intersection (south of intersection).
- Signalize the Whitney Street - Golf Lane/Cascade Highway intersection.

In addition to these improvements the following are recommended to accommodate the forecasted travel demand through the design year:

1. Coordinate traffic signal operations along Cascade Highway due to the close spacing of signalized intersections.
2. When traffic demand requires, install a right-turn pocket on the eastbound Oregon 22 exit ramp approach to Cascade Highway.
3. When traffic demand requires, install right-turn pockets on the Shaff Road/Fern Ridge Road approaches to Cascade Highway.

The incorporation of these infrastructure improvements would result in acceptable operations within the Sublimity IAMP area.

Traffic Management Recommendations

A park-and-ride facility is located within the IAMP area. Currently the facility is not served by bus routes or formal carpool programs. Expansion of service to this facility is not currently planned, but could aide in managing traffic demand through the IAMP area.

Another inherent traffic management mechanism is the availability of alternate access to Stayton and Sublimity. An additional access point to the Cities of Stayton and Sublimity is provided at the Golf Club Road interchange to the west. Improvements to Golf Club Road are also programmed into the City of Stayton's TSP, thus providing an attractive alternative route to Stayton.

To a lesser extent, Fern Ridge Road and Santiam Street provide alternative access points at at-grade intersections along Oregon 22 to the east of the Sublimity Interchange. These locations, however, should be modified or eliminated both for access management and safety improvement along Oregon 22.

Adoption and Implementation Process

Adoption and implementation of the Sublimity IAMP will occur at several levels of government. It is necessary for the City of Sublimity, the City of Stayton, and Marion County to amend their respective Transportation System Plans to incorporate the elements of the Sublimity IAMP. This amendment process will include Planning Commission/City Council hearings at the City level and Planning Commission/County Commission hearings at the County level. Following successful adoption at the City and County levels, the Sublimity IAMP will be presented to the OTC for review and approval.

ODOT IAMP adoption occurs when the OTC formally adopts the plan as an ODOT facility plan. Notwithstanding consultation with the OTC on preliminary recommendations, local government adoption should precede OTC adoption. Formal approval of the IAMP is required by the OTC prior to starting project construction.

Implementation Authority

Development, adoption, and implementation of this IAMP are determined by regulatory authority. Local agency authority comes through state statutes, and city and county comprehensive plans and development codes. State of Oregon authority comes in the form of policy and administrative rules governing authority over federal and state systems, as granted through the following:

- State Agency Coordination Rule and Agreement (SAC 1990—OAR 731-015) - The purpose of this rule is to define what ODOT actions are land use actions and how ODOT will meet its responsibilities for coordinating these activities with the statewide land use planning program, other state agencies, and local government.
- Transportation Planning Rule (OAR 660-012) - This rule is one of several statewide planning rules that provides protection of the long-term livability of Oregon's communities for future generations. The rule requires multi-modal transportation plans to be coordinated with land use plans. In satisfying the goal, state and local governments must satisfy requirements that lead to implementation of a transportation system that functions consistent with the planned land uses.

Access Management Rule (OAR 734-051) - This rule applies to the location, construction, maintenance and use of approaches onto the state highway rights-of-way and properties under the jurisdiction of ODOT. These rules also govern closure of existing approaches, spacing standards, medians, deviations, appeal process, grants of access, and indentures of access.

Implementation Steps and Responsibilities

City of Sublimity Actions:

- Adopt IAMP, through City ordinance, as a refinement element to City's TSP and Comprehensive Plan. This ordinance is provided as Appendix K.
- Amend Development Code Chapter 2.103.05, through City ordinance, to support the creation of an Interchange Management Area Overlay Zone and IAMP access recommendations. This ordinance is provided as Appendix L.

- Amend Development Code, through City ordinance, to include a new chapter - Chapter 2.106. Chapter 2.106 will establish the creation of an Interchange Management Area Overlay Zone. This ordinance is provided as Appendix M.
- Amend Development Code Chapter 2.202.03, through City ordinance, to support the creation of an Interchange Management Area Overlay Zone and IAMP access recommendations. This ordinance is provided as Appendix N.
- Amend City's Zoning Map, through new City ordinance, to include the boundaries of the Interchange Management Area Overlay zone. This ordinance is provided as Appendix O. The proposed boundary of the Interchange Management Overlay zone is shown in Appendix P.

City of Stayton Actions:

- Adopt IAMP, through City ordinance, as a refinement element to City's TSP and Comprehensive Plan. This ordinance is provided as Appendix Q.

Marion County Actions:

- Adopt IAMP, through new County ordinance, as a refinement element to County's TSP and Comprehensive Plan. This ordinance is provided as Appendix R.

Mid-Willamette Valley Council of Governments (MVCOG) Actions:

- Provide comments and technical support as relevant.

State/ODOT Actions:

- OTC adoption of IAMP as a facility plan
- Develop and fund IAMP-identified transportation system improvements

  Close identified approaches as described in the IAMP
- Consolidate identified approaches as described in the IAMP
- Construct IAMP-identified transportation system improvements including installation of traffic signal and control devices
- Purchase access control along east side of Cascade Highway (north of interchange) from current point of access control northwards to encompass entirety of Interchange Access Management Limit area. This entails purchasing access rights from one private property owner (Tax Lot# 091 W03A00100).
- Participate and comment on local land development actions with the potential to affect the interchange

Department of Land Conservation and Development Actions:

Acknowledge any TSP refinements made as part of IAMP implementation

- Review IAMP

Insert Figures 5-1 and 5-2 (11x17)

APPENDIX A

Public Involvement

Public Involvement

Roles and Responsibilities of Key Jurisdictions and Groups

Decision making for the Oregon Highway 22/Cascade Highway Interchange Area Management Plan was shared among the Cities of Sublimity and Stayton, Marion County, the Federal Highway Administration and ODOT through a Project Management Team (PMT). The PMT had responsibility for oversight of the public process and for ensuring that any alternatives considered the policies and needs of the jurisdictions. Ultimately, the city councils were responsible for adopting the Interchange Area Management Plan as part of their transportation system plans. The PMT liaisons from each jurisdiction briefed the elected officials during work sessions at key decision points in the project. At these meetings, the PMT presented information generated by the PMT and the community.

ODOT was responsible for managing and funding the project, soliciting and receiving public comment, and ensuring that the alternatives generated by the public and PMT were technically sound and consistent with state policies. ODOT developed the draft plan for presentation and adoption by the city councils. Following action by the city councils, ODOT presented the plan to the OTC for formal approval. ODOT and city councils approval are necessary before ODOT will adopt a project plan.

Project Management Team

The PMT responsibilities included the following:

- Definition of project scope and applicable standards
- Management of project scope, schedule and budget
- Receive public comment
- Informal briefing with the Stayton and Sublimity City Councils at major milestones.
- Direction, production and quality assurance of technical and public/agency involvement work

The PMT members are:

- Dan Fricke, ODOT
- Lisa Ansell, ODOT
- Mike Faught, City of Stayton
- Gene Ditter, City of Sublimity
- Mike McCarthy, Marion County
- Anthony Boesen, FHWA

The PMT met in person to review deliverables and to plan upcoming activities. Other technical resource people were included in these meetings, as needed.

Public Involvement Program

The PMT conducted a public involvement program targeted to affected property owners and businesses. The purpose of the program was to:

- Elicit and facilitate *public discussion* of the needs and issues affecting the land uses and access changes in the four quadrants of the Oregon Highway 22 and Cascade Highway interchange.
- Generate a *collaborative problem solving process* to help identify solutions that address access issues.
- Build *broad public understanding* of the project needs, access requirements, and other issues.
- Nurture and strengthen the *credibility of the partners* (ODOT and the Cities of Stayton and Sublimity) and the legitimacy of the process.

Program Elements

The public involvement program incorporated the following major elements:

- Research to identify affected property owners and business
- One-on-one and small group meetings with affected property owners, businesses and community services (i.e. police, fire, EMS, School transport.)
- Mailing list
- City council briefings
- Phone calls and mailings
- Fact Sheet

TABLE 4-1
Table Public Involvement Activity Summary

Date	Event or Activity	Purpose	Outcome
May 12, 2005	Three Small Group Meetings with Affected Property Owners (8 people attending.)	Introduction of the project; solicitation of input on problems and issues related to access and land use; opportunity to suggest alternatives	Identification of issues and concerns; suggestions for alternatives to consider
May 16, 2005	Two Small Group Meetings with Affected Property Owners (16 people attending.)	Introduction of the project; solicitation of input on problems and issues related to access and land use; opportunity to suggest alternatives	Identification of issues and concerns; suggestions for alternatives to consider
July 25, 2005	Small Group Meeting with Northwest and Northeast property owners (16 people attending.)	Presentation of access requirements; updated interchange concept; discussion of access alternatives.	Agreement on an access alternative for the north west quadrant.

TABLE 4-1
Table Public Involvement Activity Summary

Date	Event or Activity	Purpose	Outcome
August 2005	Mailing to mailing list	Summarize information gathered-to-date and outline next steps. Inform of public hearing dates.	
Throughout	Single point-of-contact	Answer questions and provide information for the public.	
Throughout	Mailing list (property owners, business owners and meeting attendees)	To be notified of meetings and city council hearings. Information will be given to project leader for the interchange project.	
Throughout	City Council briefings for the cities of Stayton and Sublimity		

APPENDIX B

Compliance with State and Local Plans, Policies and Regulations

Compliance with State and Local Plans, Policies, and Regulations

Documents Reviewed

The following state and local plans, policies and regulations were reviewed as part of the Sublimity IAMP process. The remainder of this section summarizes the objectives of each of these documents and identifies sections relevant to the Sublimity IAMP.

- Statewide Planning Goals
- Oregon Transportation Plan
- Oregon Highway Plan
- Transportation Planning Rule
- **Oregon Administrative Rule** 734-051 (Access Management)
- Marion County Comprehensive Plan
- Marion County Rural Transportation System Plan
- Marion County Urban and Rural Zoning Ordinance
- City of Stayton Comprehensive Plan
- City of Stayton Transportation System Plan

  City of Stayton Land Use and Development Code
- City of Sublimity Comprehensive Plan
- City of Sublimity Transportation System Plan
- City of Sublimity Development Code
- Joseph Street - Stayton North City Limits Environmental Assessment / Revised Environmental Assessment

State Plans and Policies

Oregon's Statewide Planning Goals

The State of Oregon has established 19 statewide planning goals to guide local and regional land use planning. The goals express the state's policies on land use and related topics. Goals expressly relevant to the Sublimity IAMP are as follows:

- **Goal 2 – Land Use Planning:** Establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land to assure an adequate factual base for such decisions and actions.
- **Goal 11 – Public Facilities and Services:** Plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

  Goal 12 – Transportation: Provide and encourage a safe, convenient and economic transportation system.
- **Goal 14 – Urbanization:** Provide for an orderly and efficient transition from rural to urban land use.

The Oregon Department of Land Conservation and Development has acknowledged that the Marion County Comprehensive Plan, Stayton Comprehensive Plan, and the Sublimity Comprehensive Plan are in compliance with the statewide planning goals. Each of these three comprehensive plans are reviewed in this section.

Oregon Transportation Plan

The Oregon Transportation Plan (OTP) is a long-range policy document to address federal and state mandates for systematic statewide transportation system planning. It is developed by the Oregon Department of Transportation. The goal of the OTP is to promote a safe, efficient, and convenient transportation system over the next 40 years that improves livability and facilitates economic development for residents of the state. The OTP's goals, policies and actions integrate all modes of transportation with the intention of encouraging the most appropriate mode for each type of travel. The Plan's System Element identifies a coordinated multimodal transportation system, to be developed over the next 20 years, which is intended to implement the goals and policies of the Plan. The goals and policies of the OTP cover a broad range of issues. Those goals and policies most directly applicable to the Sublimity IAMP and its associated actions are as follows:

Goal 1: Characteristics of the System

Policy 1B – Efficiency

- *Action 1B.1* –calls for the consideration of economic, social, energy and environmental impacts in transportation planning and design processes.
- *Action 1B.4* – corridors should be preserved for transportation development.

Policy 1G – Safety

- *Action 1G.4* – resources should be targeted to dangerous routes and locations in cooperation with local and state agencies.
- *Action 1G.9* – calls for the transportation system to be built, operated, and regulated so that users feel safe and secure as they travel.

Goal 2: Livability

Policy 2A – Land Use

- *Action 2A.1* – supports local land use planning as part of system planning to minimize automobile trips per capita and automobile miles traveled.

Policy 2C – Relationship of Interurban and Urban Mobility

- *Action 2C.1* – interurban corridors in and near urban areas should be planned and designed to preserve their utility for interurban travel.

Goal 3: Economic Development

Policy 3B – Linkages to Markets

- *Action 3B.3* – the highway system should be maintained, preserved, and improved in order to provide infrastructure for the efficient movement of goods by truck and bus.

Goal 4: Implementation

Policy 4G – Management Practices

- *Action 4G.1* – calls for preserving, maintaining, and improving transportation infrastructure and services that are of statewide significance.
- *Action 4G.2* – access control be a part of transportation system projects to achieve reasonable levels of service.
- *Action 4G.4* – calls for controlled accesses to statewide transportation corridors and facilities.

Oregon Highway Plan

The 1999 Oregon Highway Plan is a modal element of the 1992 OTP and defines policies and investment strategies for Oregon's state highway system over the next 20 years. The plan contains three elements—a vision element that describes the broad goal for how the highway system should look in 20 years; a policy element that contains goals, policies, and actions to be followed by state, regional, and local jurisdictions; and a system element that includes an analysis of needs, revenues, and performance measures.

The policy element contains several policies and actions, described below, that are relevant to the Sublimity IAMP and its associated recommended actions.

Policy 1A: State Highway Classification System

Policy 1A develops a state highway classification system to guide ODOT priorities for system investment and management.

Action 1A.1 defines five categories of state highway facilities – interstate highways, statewide highways, regional highways, district highways, and local interest roads. Two of these (interstate and statewide highways) are part of the national highway system.

Interstate highways provide connections to major cities and regions within the state and facilitate movement to and from other states. The management objective for interstate highways is to provide safe and efficient high-speed travel in urban and rural areas.

Statewide highways provide inter-urban and inter-regional mobility and connections to larger urban areas, ports, and major recreation areas not directly served by Interstate Highways. Statewide highways also provide connections for intra-urban and intra-regional trips. The management objective for statewide highways is to provide safe and efficient, high-speed, continuous-flow operation along the corridor, with minimal interruptions to flow in constrained or urban areas.

Action 1A.2 defines and classifies expressways as a subset of statewide, regional, and district highways. The function of expressways is to provide safe and efficient high speed and high volume traffic movements with minimal interruptions, for interurban travel and connections to ports and major recreation areas. Along expressways, private access is discouraged, connections to public roads are highly controlled, traffic signals (rural areas only) are discouraged, and nontraversable medians are encouraged.

Policy 1B: Land Use and Transportation

Policy 1B directs the state to work with regional agencies and local jurisdictions to consider land use when planning transportation systems and projects. Action 1B.7 gives special designations for certain land use patterns off the freeway to foster compact development patterns in communities. The three designations provided are special transportation area, commercial center, and urban business area.

Policy 1C: State Highway Freight System

Policy 1C states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes.

Policy 1F: Highway Mobility Standards

Action 1F.1 requires that highways operate at a certain level of mobility, depending on their location and classification. Part of this action requires that freeway interchanges be managed to maintain safe and efficient operation of the freeway through the interchange area.

Policy 1G: Major Improvements

Action 1G.1 directs agencies to make the fewest number of structural changes to a roadway system to address its identified needs and deficiencies, and to protect the existing highway system before adding new facilities to it. The action ranks four priorities of projects, as follows:

- 1. Preserving the functionality of the existing system
- 2. Making minor improvements to improve the efficiency and capacity of the existing system

- 3. Adding capacity to the existing system
- 4. Building new transportation systems

Policy 2F: Traffic Safety

Policy 2F identifies the need for projects in the state to improve safety for all users of the state highway system.

Policy 3A: Classification and Spacing Standards

Policy 3A addresses the location, spacing and type of road and street intersections and approach roads on state highways. It includes spacing standards for each highway classification. Appendix C of the OHP provides tables of access management spacing standards.

Policy 3B: Medians

This policy establishes the state's criteria for the placement of medians. Action 3B.2 calls for the construction of nontraversible medians to be considered as part of modernization projects for urban, multi-lane Statewide Highways when certain factors related to traffic volume, topography, and crash rate are present.

Policy 3C: Interchange Access Management Areas

Policy 3C calls for the planning and management of grade-separated interchange areas to ensure safe and efficient operation between connecting roadways. Action 3C.1 requires agencies to develop Interchange Area Management Plans to protect the function of interchanges over the long-term. The intention of an Interchange Area Management Plan is to minimize the need for major interchange improvements.

Transportation Planning Rule

The Transportation Planning Rule (TPR) implements Oregon Statewide Planning Goal 12, which encourages construction of transportation facilities that are safe and efficient and designed to reduce automobile reliance. The objective of the TPR is to reduce air pollution, congestion, and other livability problems found in urban areas.

The TPR requires the preparation of regional transportation systems plans (TSP's) by MPO's or counties and local TSP's by counties and cities. Through TSP's, the TPR provides a means for regional and local jurisdictions to identify long-range (20-year) strategies for the development of local transportation facilities and services for all modes, to integrate transportation and land use, to provide a basis for land use and transportation decision-making, and to identify projects for the State Transportation Improvement Program. TSP's need to be consistent with the State Transportation Plan and its modal and multimodal elements. The TSP's of the three jurisdictions inside the Sublimity IAMP area are reviewed in this document (Marion County, Stayton, and Sublimity).

Access Management Rules OAR 734-051

The intention of the Access Management Rules is to balance the safety and mobility needs of travelers along state highways with the access needs of property and business owners.

ODOT's rules manage access to the state's highway facilities to the degree necessary to maintain functional use, highway safety, and the preservation of public investment consistent with the 1999 OHP and local comprehensive plans. Access management is the most pivotal transportation planning tool being utilized in this IAMP to ensure safe and operationally efficient conditions in the vicinity of the interchange.

Sections of the Access Management Rules that are particularly relevant to the Sublimity IAMP are addressed below.

734-051-0125, Access Management Spacing Standards for Approaches in an Interchange Area

1) Access management spacing standards for approaches in an interchange area:

(a) Are based on classification of highway and highway segment designation, type of area, and posted speed;

Project Relevance: Based on the Oregon Highway Plan, the applicable access spacing standard for the Sublimity Interchange is 1,320 feet. Correspondingly, it is a primary objective of this IAMP to remove a number of approaches along Cascade Highway within 1,320 feet of the interchange ramp terminals.

(c) Do not apply to approaches in existence prior to April 1, 2000 except where any of the following occur:

(A) These standards will apply to private approaches at the time of a change of use.

(B) If infill development or redevelopment occurs, spacing and safety factors will improve by moving in the direction of the access management spacing standards, with the goal of meeting or improving compliance with the access management spacing standards.

(C) For a highway or interchange construction or modernization project or other roadway or interchange project determined by the Region Manager, the project will improve spacing and safety factors by moving in the direction of the access management spacing standards, with the goal of meeting or improving compliance with the access management spacing standards.

Project Relevance: The preparation of this IAMP was necessitated by planned modernization improvements to the Sublimity Interchange. It is a main objective of this plan to provide implementable recommendations that will reduce the number of approaches to Cascade Highway in the interchange area. Recommendations include the provision of a backage road for properties along the west side of Cascade Highway (north of the interchange) to connect driveways to and local land use ordinances that will disallow access to Cascade Highway when one of these properties is redeveloped.

(2) Spacing standards in Tables 5, 6, 7, and 8 and Figures 1, 2, 3, and 4, adopted and made a part of this rule, identify the spacing standards for approaches in an interchange area.

Project Relevance: As noted earlier, based on the Oregon Highway Plan, the applicable access spacing standard for the Sublimity Interchange is 1,320 feet.

(4) Deviations must meet the criteria in OAR 734-051-0135

Project Relevance: This IAMP is recommending deviations for two approaches in the project area (Sublimity Boulevard and the driveway to state-owned park-and-ride), as will be discussed in the review of OAR 734-051-0135.

(5) Location of traffic signals within an interchange management area must meet the criteria of OAR 734-020-0400 through 734-020-0500.

Project Relevance: This IAMP is recommending the installation of two traffic signals (at Cascade Highway and Sublimity Boulevard, and at the proposed intersection of Cascade Highway and Whitney Boulevard). The installation of these traffic signals will be in accordance with the criteria in OAR 734-020-0400 through 734-020-0500.

(6) The Department should acquire access control on crossroads around interchanges for a distance of 1320 feet. In some cases it may be appropriate to acquire access control beyond 1320 feet.

Project Relevance: This IAMP is recommending the long-term acquisition of access control along all sides of Cascade Highway for at least 1,320 feet, except at Sublimity Boulevard, where an access deviation is expected to be permanent.

734-051-0135, Deviations from Access Management Spacing Standards

1) A deviation will be considered when an approach does not meet spacing standards and the approach is consistent with safety factors in OAR 734-051-0080(9).

Project Relevance: As noted earlier, this IAMP is recommending access management standard deviations for two approaches in the project area. These two approaches have been deemed to be consistent with the safety factors in OAR 734-051-0080(9), which are as follows: roadway character; traffic character; geometric character; environmental character; and operational character.

734-051-0155, Access Management Plans, Access Management Plans for Interchanges, and Interchange Area Management Plans

(1) The Department encourages the development of Access Management Plans, Access Management Plans for Interchanges, and Interchange Area Management Plans to maintain highway performance and improve safety by improving system efficiency and management before adding capacity consistent with the 1999 Oregon Highway Plan.

(5) The Department encourages the development of Interchange Area Management Plans to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways:

(a) Interchange Area Management Plans are developed by the Department and local governmental agencies to protect the function of interchanges by maximizing the capacity of the interchanges for safe movement from the mainline facility, to provide safe and efficient operations between connecting roadways, and to minimize the need for major improvements of existing interchanges;

(c) Priority should be placed on those facilities on the Interstate system with cross roads carrying high volumes or providing important statewide or regional connectivity.

(6) *Interchange Area Management Plans are required for new interchanges and should be developed for significant modifications to existing interchanges consistent with the following:*

(a) Should be developed no later than the time an interchange is designed or is being redesigned;

(b) Should identify opportunities to improve operations and safety in conjunction with roadway projects and property development or redevelopment and adopt strategies and development standards to capture those opportunities;

(c) Should include short, medium, and long-range actions to improve operations and safety in the interchange area;

(d) Should consider current and future traffic volumes and flows, roadway geometry, traffic control devices, current and planned land uses and zoning, and the location of all current and planned approaches;

(e) Should provide adequate assurance of the safe operation of the facility through the design traffic forecast period, typically 20 years;

(f) Should consider existing and proposed uses of the all property in the interchange area consistent with its comprehensive plan designations and zoning;

(g) Are consistent with any adopted Transportation System Plan, Corridor Plan, Local Comprehensive Plan, or Special Transportation Area or Urban Business Area designation, or amendments to the Transportation System Plan unless the jurisdiction is exempt from transportation system planning requirements under OAR 660-012-0055;

(h) Are consistent with the 1999 Oregon Highway Plan; and

(i) Are approved by the Department through an intergovernmental agreement and adopted by the local government, and adopted into a Transportation System Plan unless the jurisdiction is exempt from transportation system planning requirements under OAR 660-012-0055.

Project Relevance: This IAMP was prepared in accordance with the most current guidance offered by ODOT for the creation of IAMP's[1]. By following this guidance, which encapsulates the requirements of 734-051-0155, this IAMP will be in conformance with the entirety of the rule.

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[1] *Transportation Planning Guidance for Interchange Area Management Plans Revised Draft Working Paper #2* (David Evans and Associates. May, 2005)

Marion County Plans and Policies

Marion County Comprehensive Plan (1994)

The Sublimity IAMP has been found to be compliant with applicable sections of the Marion County Comprehensive Plan as provided in the following table:

Marion County Comprehensive Plan Element	Relevant Goals/Policies/Comments
Agricultural Lands	To preserve and maintain agricultural lands for farm use consistent with the present and future need for agricultural products, forest and open space.
	Preserve lands designated as Primary Agriculture by zoning them EFU. Lands designated as Special Agriculture should be protected by the corresponding SA zone and farmland in the Farm/Timber designation should be protected by the Farm/Timber zone.
Economic Development	Provision of increased employment opportunities for all residents of the County.
	Provision of sufficient areas for future industrial land use.
	Development of a transportation system for the safe and efficient movement of persons and goods for present needs.
	Coordination of planning and development of public facilities
Urbanization	Basic planning goal is the conservation and intelligent use of land and related resources.
(Urban Land Use)	To provide an orderly transition from rural to urban land use.
(Urban Area Planning)	Orderly and economic provision for public facilities and services
	Maximum efficiency of land uses within and on the fringe of the existing urban area.
	Compatibility of the proposed urban uses with nearby agricultural activities.
(Urban Growth)	The type and manner of development of the urbanizable land shall be based upon each community's land use proposals and development standards that are jointly agreed upon by each city and Marion County and are consistent with the LCDC goals.
	The provision of urban services and facilities should be in an orderly economic basis according to a phased growth plan.
	The majority of the projected population increases in Marion County should be directed to the urban areas.
(Urban Growth Management Framework)	Provide transportation corridors and options that connect and improve accessibility and mobility for residents along with the movement of goods and services throughout the County.

Marion County Comprehensive Plan Element	Relevant Goals/Policies/Comments
(Transportation)	Address transportation needs appropriate to both urban and rural areas throughout the County.
	Marion County shall jointly plan with communities to meet the transportation needs in the future.
	Allow for complementary mix of land uses and transportation systems
	Encourage coordination of traffic calming methods
(Environmental)	Preserve and protect agricultural and forest lands, wetland, wildlife habitat, riparian corridors and natural areas through wise stewardship
	Promote conservation, recycling and the efficient use of energy and resources.
	To protect rural farm and forest lands, identify land use efficiency standards that should be met before a city can amend its UGB.
	Development should retain vegetation buffers along streams, lakes, and reservoirs to provide shelter, shade, food and nesting for wildlife resources.
(Economic Development)	Encourage a sustainable local and regional economy.
Transportation	Development of a transportation system for the safe, economical, reliable, and efficient movement of persons and goods to meet the present and future needs.
	Provision of a balanced approach to transportation system development, giving due consideration to all modes of travel.
	Development of a transportation system consistent with area-wide goals and policies and the land use plans.
	To ensure a minimization of interruption of traffic flow and to promote safety, the number of access points on a collector and arterial roads shall be kept to a minimum.
	Highway facilities should be developed in such a manner that valuable soil, timber, water, scenic, or cultural resources are not damaged or impaired.

Marion County Rural Transportation System Plan (1998)

The Sublimity IAMP has been found to be compliant with applicable sections of the Marion County Rural TSP as provided in the following table:

Marion County TSP Element	Relevant Goals/Policies/Comments
4.0 Goals and Objectives	
Goal 1	Improve transportation system safety
Goal 2	Provide an accessible, efficient and practical transportation system
Goal 3	Provide sufficient and uniform design standards
Goal 4	Provide sufficient transportation capacity.
Goal 5	Work in partnership with communities to address community needs and values.
Goal 6	Promote alternative modes of transportation.
Goal 7	Consider land use and transportation relationships
Goal 8	Address transportation policy issues and intergovernmental coordination
7.2.4 Roadway Design Standards	Balance between transportation and land use.
9.7.5 Development, Land Use, and Access Policies	
Policy 3	County shall consider and strive to minimize the negative impacts to surrounding land uses and communities in selection and implementation of transportation projects.
Policy 4	Development proposals and changes in land use designations shall conform to any sub-area management plans created or adopted by Marion County
Policy 8	New transportation facilities of all types should use existing rights-of-way to the extent possible to minimize disruption to existing land use.
Policy 12	To prevent exceeding the expected capacity of any component of the transportation system, the County will consider roadway functional classification, capacity, and current conditions as primary criteria for proposed changes in land use designations and proposed land use developments.
Policy 13	The County shall review land use actions, development proposals, and large transportation projects in the region for impacts to the transpiration system and facilities. If impacts are deemed significant and can not be mitigated, the action shall be denied or altered.

Marion County TSP Element	Relevant Goals/Policies/Comments
Policy 14	Number of access points on arterial and major collector roadways shall be kept to a minimum to minimize the interruption to traffic flow and to promote safety.

Marion County Zoning Ordinances (2004 - Revised)

The entire range of transportation improvements discussed in this IAMP are permitted outright in all zones in Marion County. Relevant sections are described in the following table:

Provision	Relevant Requirements
25.10 Uses Permitted in all Zones	(b) Except as provided in (d), expansion and realignment of existing right of way and easements, including improvement and construction of streets, roads and utilities in conformance with the applicable comprehensive plan and standards of the Department of Public Works. (d) In the UTF zone, in addition to existing uses and facilities, the following uses and facilities within street rights-of-way are permitted without approval: (1) climbing and passing lanes within the right-of-way existing as of July 1, 1987; (2) Reconstruction or modification of streets. Additional travel lanes, removal or displacement of buildings, or creation of new lots are not included.

City of Stayton Plans and Policies

Stayton Comprehensive Plan (1995 - Revised)

The Sublimity IAMP has been found to be compliant with applicable sections of the Stayton Comprehensive Plan as provided in the following table:

Stayton Comprehensive Plan Element	Relevant Goals/Policies/Comments
Section 2	TSP has been prepared to meet state and federal regulations that require urban areas to conduct long-range planning. The long-range planning is intended to serve as a guide for the City of Stayton in managing their existing transportation facilities and developing future transportation facilities.
2.2.1 Land Uses	Four major types: commercial, industrial, residential, and public uses

Stayton Comprehensive Plan Element	Relevant Goals/Policies/Comments
Section 4	
4.3.2 Arterials	Cascade Hwy/1st Ave is north/south arterial providing primary access to Stayton from Hwy 22 and Linn County. Conflicts with through traffic, local traffic, and pedestrians.
4.4.2 Pavement Width	Deficiencies at Golf Club Road from Mill Creek Road to Shaff Road; Fern Ridge Road from west of 10th Ave to Hwy 22; Cascade Hwy south of Hwy 22 eastbound ramps to Whitney Street. Required widths for arterials are 100 feet for right-of-way and 40 feet for pavement.
Section 7	
7.1.2 Functional Classification	Golf Club Road upgraded to minor arterial; Cascade Highway fro Hwy 22 upgraded to primary arterial.
7.1.5 Traffic Calming	Installed on a case-by-case basis.
7.1.6 Street Improvements	Highway 22 Joseph Street project ($50,000); Widen Golf Club Road between Hwy 22 and Shaff Road ($4,000,000); Signalize Golf Club Road/Hwy 22 eastbound ramps and install eastbound right-turn lane ($250,000).
7.2 Ped/Bike Improvements	Fern Ridge Road, north side, sections between 1st Ave and Hwy 22 ($72,000)

Stayton Transportation System Plan (2004 – Final Draft)

The Sublimity IAMP has been found to be compliant with applicable sections of the Stayton TSP as provided in the following table:

Stayton TSP Element	IAMP-Relevant Goals and Policies
Natural Resources	
NR-11	Vegetation along streams and rivers should be maintained in a natural state. A buffer between urban development and fish habitat a strip of riparian vegetation should be retained along the North Santiam River and Mill Creek.
NR-12	Flood plain areas along Mill Creek and the North Santiam River that remain after flood protection measures, such as dikes or fill, are used, shall be retained as areas for open space and fish and wildlife habitat.
Transportation	Plan considers ways to provide a safe, convenient, efficient, and economic system of moving people and goods in, around, and through the Stayton area.

Stayton TSP Element	IAMP-Relevant Goals and Policies
Street Improvements	Long-term improvements include more safe and convenient access to and from Highway 22; and adequate provision for increased traffic to and from industrial areas.
Highway 22	Two lanes will eventually be needed from the intersection of Highway 214 and Highway 22 to Mehama.
Financing	Additional funding is needed to do any street construction. The city relies heavily on the Marion County Road Department and the State Highway Division for construction and maintenance of major streets and bridges.
Transportation Policies	
T-2	The City of Stayton, Marion County, and the Oregon State Highway Division are the primary providers of bikeways, streets, and highways within the Stayton urban growth area and shall also maintain the streets for which they are responsible.
T-3	Future arterial streets shall have a minimum 80-foot right-of-way Existing arterials should be improved to an 80-foot right-of-way.
T-4	All designated arterials shall have a 50-foot center line setback to allow for improvements and widening.
T-12	The City of Stayton encourages the State Highway Division to include an overpass at Golf Club Road and Highway 22 in its 6-year plan.
Land Use Policies	
LU-2	Zoning shall follow property lines and include entire rights-of-way as much as practicable.
LU-8	Land for medium density residential development shall be designated on the periphery of the central business area and in each sector of the city and urban growth area.
LU-11	The central business area of Stayton shall continue to be the primary retail business area of the community.
LU-12	The development regulations shall contain specific requirements for off-street parking needed for commercial, industrial, public, and residential development.
LU-14	Strip-type commercial development along major streets (arterials and collectors) shall be discouraged.
LU-20	The development regulations shall allow utility facilities necessary for public service to all zones. Utility facilities shall include, but not be limited to, water lines, sewer lines, storm drains, streets, power lines, telephone lines, natural gas lines, and the like.
Economy	This element indicates Stayton's capability to provide for economic development.
E-3	Commercial development at Highway 22 shall be discouraged
Energy Policies	

Stayton TSP Element	IAMP-Relevant Goals and Policies
En-4	Vacant lands within the corporate city limits shall be developed rather than leap-frogging to areas outside the city.
En-7	Transportation facilities shall be developed in such a manner as to encourage the use of alternative modes.

Stayton Land Use and Development Code (2004 - Revised)

The Sublimity IAMP has been found to be compliant with applicable sections of the Stayton Code as provided in the following table:

Stayton Code Provision	Relevant Requirements
17.12.420 Plan Amendments	
5c.	The proposed amendment complies with all applicable Statewide Planning Goals and administrative rule requirements, including Goal 14 and the urban growth policies of Stayton if a change to the urban growth boundary is requested.
17.12.430 Zone Changes	
5a.	Proposed change and intended use is compatible with existing land use patterns and traffic generation and circulation.
5d.	Proposed change is compatible with applicable provisions of Stayton Comp Plan.
5e.	Proposed zone change satisfies applicable provisions of Oregon Statewide Planning Goals and Administrative Rules.
17.12.470 Site Plan Review	
6b.	Provisions for safe and efficient internal traffic circulation, including both pedestrian and motor vehicle traffic, and provision for safe access to and from the property to those public streets and roads which serve the property.
Chapter 17.16 Zoning	
17.16.630 General Requirements	
2. Minimum Street Width	All street rights-of-way shall conform to requirements in Chapter 17.20 of this code.

Stayton Code Provision	Relevant Requirements
17.16.710 Interchange Development District	
1. Purpose	To provide for the location of needed highway service commercial facilities at the intersections of controlled access highways and arterial roads. All land zoned ID shall have frontage (not necessarily access) on Highway 22 or an arterial.
8. Parking	All uses are subject to parking and loading requirements of chapter 17.20 of this title.
17.16.780 Floodplain Overlay District	
3. Floodway	Except as permitted in SMC Section 17.16.790.16, no development shall be allowed in the floodway.
Chapter 17.20 Development and Improvement Standards	
17.20.860 Off Street Parking	
6. Auto Parking	Number of spaces determined by use, i.e. Retail store is one space per 400 square feet plus one space per 2 employees.
17.20.880 Special Street and Riparian Setbacks	
1. Special Street Setbacks	Minimum building setback of 50-feet, measured at right angles from centerline for First Avenue, Golf Club Road from Highway 22 to Shaff Road.
2. Riparian Setbacks	b. Shall be 15-feet from ordinary high water mark along Salem ditch and 35-feet along Mill Creek and the North Santiam River.
Chapter 17.26 Transportation	
17.26.1020 Access Management	
1. Access Permits	a. Required for all projects requiring any type of permitting from the City that result in additional trip generation or change in use.
	c. Permits for access onto State highways shall be subject to review and approval by ODOT except when responsibility has been delegated to City or Marion County.
	g. City has authority to change accesses for all uses if it is constructing a capital improvement project along that section of the public street.
3. Location of Access	h. Access spacing standards per table 17.26.1020-3h.

Stayton Code Provision	Relevant Requirements
	i. Highway 22 - adopts the 1999 OHP for access management spacing for Highway 22 at Golf Club Road and Cascade Highway
6. Development Review Procedures	b.3. The access shall be consistent with the access management standards adopted in the TSP and contained in 17.26.1010.

City of Sublimity Plans and Policies

Sublimity Comprehensive Plan (1973)

The Sublimity IAMP has been found to be compliant with applicable sections of the Sublimity Comprehensive Plan as provided in the following table:

Sublimity Comprehensive Plan Element	Relevant Goals and Policies
Air Quality	All development within the City shall adhere to applicable federal and state air quality standards.
Noise Control	Future development activities that generate a significant amount of noise will be required to meet all noise regulations of the State of Oregon.
Open Space	The City shall encourage development plans that provide for preservation of open space. Discourage the premature, unnecessary and wasteful conversion of valuable agricultural land to city uses.
Economics	Increase local employment opportunities to meet the needs of the residents of the area. Foster commercial and/or industrial activities to meet the expressed needs of the residents. Create a favorable climate to attract new commercial uses which will benefit the community.
Land Use	Preserve the rural quality of existing residential development. Assure that commercial activities are compatible with adjacent land uses and consistent with the environmental and economic goals of the community. Designate an area appropriate for industrial development which would be retained in agricultural use during the interim period through zoning.

Sublimity Comprehensive Plan Element	Relevant Goals and Policies
Transportation	Establish a street system which is consistent with orderly growth and minimizes conflicts with adjacent land uses. Provide a circulation system which is safe and efficient for both vehicle users and pedestrians. Bike paths and sidewalks should be provided to connect schools, parks and shopping facilities with residential areas. Future streets should seek to facilitate access by residents to major transportation routes. Give priority to street improvements which are necessary to achieve safety, lower maintenance costs and increase efficiency.
Amendment, 1997	TSP replaces Transportation Element; TSP in full compliance with requirements of TPR.

Sublimity Transportation System Plan (1998 – Final Draft)

The Sublimity IAMP has been found to be compliant with applicable sections of the Sublimity TSP as provided in the following table:

Sublimity TSP Element	Relevant Goals and Policies
Overall Guidance	Provide a circulation system which is consistent with orderly growth and minimizes conflicts with adjacent land uses The City shall establish a system of transportation facilities and services adequate to meet identified local transportation needs and shall be consistent with regional and state TSP's. Bicycle and Pedestrian facilities should be developed that provide safe and convenient access within and from new subdivisions, planned developments, shopping centers and industrial arks to nearby residential areas, transit stops, and neighborhood activity centers, such as schools, parks and shopping. The City shall establish a system of transportation facilities and services adequate to meet identified local transportation needs and shall be consistent with regional and state TSP's. The City shall consider the adoption of the State Highway Compatibility Guidelines and Model Ordinance when completed by ODOT. Future streets should seek to facilitate access by residents to major transportation routes. Traffic movement on arterials shall be facilitated by controlling access wherever possible. Access control shall include restrictions on the number and location of individual encroachments and street intersections.
Street Design	Design standards for arterials, collectors, local streets.

Sublimity TSP Element	Relevant Goals and Policies
Access Management	Maintain acceptable level of service (good mobility). Minimize capital costs. Improve safety by minimizing potential conflict points Improve bicycle/pedestrian mobility.

Sublimity Land Use and Development Code (2002 - Revised)

The entire range of transportation improvements discussed in this IAMP are permitted outright in all zones in the City of Sublimity. Relevant sections are described in the following table:

Sublimity Code Provision	Relevant Requirements
2.202 Street Standards	2.202.04 General Right-of-Way and Improvement Width, Standards for new and existing streets
2.403 Uses Permitted in All Zones	2.403.01 C. Surfaced travel lanes, curbs, gutters, drainage ditches, sidewalks, bikeways, transit stops, landscaping and related structures and facilities located within rights-of-way controlled by a public agency. 2.403.01 D. Expansion of public right-of-way and widening or adding improvements within the right-of-way, provided the right-of-way is not expanded to more width than prescribed for the street in the Public Facilities segment of the Comprehensive Plan. A non-conforming use may be continued although not in conformity with the regulations for the zone in which the use is located.

Other Documents

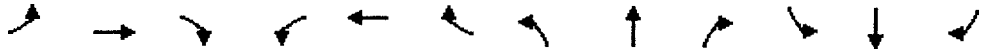
Joseph Street – North Stayton City Limits Environmental Assessment / Revised Environmental Assessment (1995)

Findings from the Joseph Street EA, relevant to the Sublimity IAMP, are described in the following table:

Element	Relevant Findings
Purpose and Need	Project consistent with OHP. OR 22 is one of 15 Access Oregon Highway (AOH) routes
	Major safety concerns in the corridor. Increasing traffic, unsatisfactory LOS, accident history, and importance of this highway are the need for the project.
Transportation	LOS D east of Golf Club Road as well as east of Cascade Highway. All private access to OR 22 would be terminated
Utilities	Northwest Natural Gas line on the east side of Sublimity Interchange. Waterline and sewer lift stations in the NW quadrant of Sublimity Interchange.
Economics	Insurance office in NW quadrant of Sublimity Interchange would lose a small amount of ROW.
Community Facilities	Small amount of ROW to be taken from golf course at Golf Club Road.
Land Use/Zoning	Sublimity Comp Plan does not specifically mention this project yet does mention the need to improve Sublimity Interchange. Stayton Plan recommends an overpass at Golf Creek Road
Natural Resources	Mill Creek to pass under new westbound lanes in Phase 2.
Wetlands	Cascade Highway option to impact 0.01 acre.
Wetland Mitigation	Land in Mill Creek floodplain as mitigation site.
Historic Properties	Century Farm (Miller property) northeast of Sublimity Interchange.
Compliance w/ Comp Plans, Statewide Planning Goals, Transportation Planning Rule	County Plan calls for widening Highway 22 from Joseph St to Mehama. Modification of Sublimity Interchange would require conditional use permits from Marion County.

APPENDIX C

Existing 2005 Turning Movement Counts



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.95		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1660	1622		1660	1668		1660	1704		1644	1684	
Flt Permitted	0.31	1.00		0.21	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	545	1622		359	1668		1660	1704		1644	1684	
Volume (vph)	120	175	160	85	160	70	130	425	85	80	505	110
Peak-hour factor, PHF	0.92	0.92	0.92	0.84	0.84	0.84	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	130	190	174	101	190	83	157	512	102	87	549	120
RTOR Reduction (vph)	0	26	0	0	13	0	0	6	0	0	6	0
Lane Group Flow (vph)	130	338	0	101	260	0	157	609	0	87	663	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	41.4	29.5		38.4	28.0		14.6	54.0		10.1	49.5	
Effective Green, g (s)	41.4	29.5		38.4	28.0		14.6	54.0		10.1	49.5	
Actuated g/C Ratio	0.34	0.25		0.32	0.23		0.12	0.45		0.08	0.41	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	299	399		228	389		202	767		138	695	
v/s Ratio Prot	c0.04	c0.21		0.04	0.16		c0.09	0.36		0.05	c0.39	
v/s Ratio Perm	0.11			0.10								
v/c Ratio	0.43	0.85		0.44	0.67		0.78	0.79		0.63	0.95	
Uniform Delay, d1	28.9	43.1		31.0	41.8		51.1	28.2		53.1	34.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	15.1		1.4	4.3		17.0	8.3		9.0	23.1	
Delay (s)	29.9	58.2		32.3	46.1		68.1	36.5		62.2	57.3	
Level of Service	C	E		C	D		E	D		E	E	
Approach Delay (s)		50.8			42.4			42.9			57.8	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM Average Control Delay	49.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

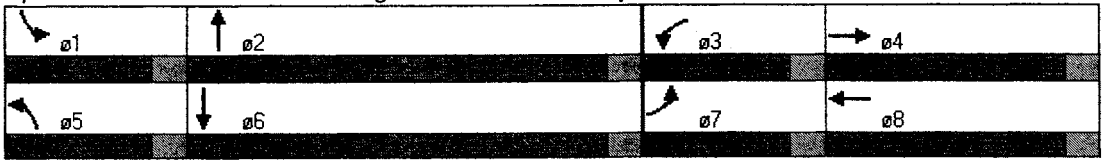
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1660	1622	0	1660	1667	0	1660	1704	0	1644	1684	0
Flt Permitted	0.300			0.154			0.950			0.950		
Satd. Flow (perm)	524	1622	0	269	1667	0	1660	1704	0	1644	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		35			17			10			11	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		816			826			887			946	
Travel Time (s)		18.5			18.8			11.0			11.7	
Volume (vph)	120	175	160	85	160	70	130	425	85	80	505	110
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.83	0.83	0.83	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	130	364	0	101	273	0	157	614	0	87	669	0
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	30.0		20.0	30.0		20.0	40.0		20.0	40.0	
Total Split (s)	20.0	30.0	0.0	20.0	30.0	0.0	20.0	50.0	0.0	20.0	50.0	0.0
Total Split (%)	16.7%	25.0%	0.0%	16.7%	25.0%	0.0%	16.7%	41.7%	0.0%	16.7%	41.7%	0.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	None	
Act Effct Green (s)	41.4	29.5		38.4	28.0		14.6	54.8		11.4	49.5	
Actuated g/C Ratio	0.34	0.25		0.32	0.23		0.12	0.46		0.10	0.41	
v/c Ratio	0.44	0.85		0.49	0.68		0.78	0.78		0.56	0.95	
Control Delay	29.0	58.4		28.9	48.4		68.9	38.2		56.4	59.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.0	58.4		28.9	48.4		68.9	38.2		56.4	59.7	
LOS	C	E		C	D		E	D		E	E	
Approach Delay		50.6			43.2			44.4			59.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		D			D			D			E	
90th %ile Green (s)	16.0	28.0		14.0	26.0		16.0	46.0		16.0	46.0	
90th %ile Term Code	Max	Max		Gap	Max		Max	Coord		Max	Coord	
70th %ile Green (s)	13.5	30.3		11.7	28.5		16.0	48.6		13.4	46.0	
70th %ile Term Code	Gap	Max		Gap	Hold		Max	Coord		Gap	Coord	
50th %ile Green (s)	11.7	31.8		10.2	30.3		16.0	50.5		11.5	46.0	
50th %ile Term Code	Gap	Max		Gap	Hold		Max	Coord		Gap	Coord	
30th %ile Green (s)	10.1	32.2		8.9	31.0		14.3	53.3		9.6	48.6	
30th %ile Term Code	Gap	Gap		Gap	Hold		Gap	Coord		Gap	Coord	
10th %ile Green (s)	8.0	25.3		7.0	24.3		10.6	75.7		0.0	61.1	
10th %ile Term Code	Gap	Gap		Gap	Hold		Gap	Coord		Skip	Coord	
Queue Length 50th (ft)	67	240		51	177		118	416		65	~547	
Queue Length 95th (ft)	114	#430		84	261		#179	#585		116	#782	
Internal Link Dist (ft)		736			746			807			866	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	341	427		282	407		221	784		219	702	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.38	0.85		0.36	0.67		0.71	0.78		0.40	0.95	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 50.2 Intersection LOS: D
Intersection Capacity Utilization 81.1% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Fern Ridge Rd & Cascade Hwy



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	15	595	20	0	695
Peak Hour Factor	0.92	0.92	0.92	0.92	0.81	0.81
Hourly flow rate (vph)	0	16	647	22	0	858
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			946			
pX, platoon unblocked	0.70	0.70			0.70	
vC, conflicting volume	1516	658			668	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1742	508			523	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	66	390			722	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	668	858
Volume Left	0	0	0
Volume Right	16	22	0
cSH	390	1700	1700
Volume to Capacity	0.04	0.39	0.50
Queue Length 95th (ft)	3	0	0
Control Delay (s)	14.6	0.0	0.0
Lane LOS	B		
Approach Delay (s)	14.6	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	75	100	555	55	175	620
Peak Hour Factor	0.93	0.93	0.81	0.81	0.91	0.91
Hourly flow rate (vph)	81	108	685	68	192	681
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			1300			
pX, platoon unblocked	0.74	0.74			0.74	
vC, conflicting volume	1785	719			753	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2060	621			667	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	70			72	
cM capacity (veh/h)	32	360			677	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	188	753	192	681
Volume Left	81	0	192	0
Volume Right	108	68	0	0
cSH	66	1700	677	1700
Volume to Capacity	2.83	0.44	0.28	0.40
Queue Length 95th (ft)	474	0	29	0
Control Delay (s)	960.9	0.0	12.4	0.0
Lane LOS	F		B	
Approach Delay (s)	960.9	0.0	2.7	
Approach LOS	F			

Intersection Summary			
Average Delay	100.9		
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	15	5	650	780	10
Peak Hour Factor	0.92	0.92	0.91	0.91	0.84	0.84
Hourly flow rate (vph)	11	16	5	714	929	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1660	935	940			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1660	935	940			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	95	99			
cM capacity (veh/h)	105	319	721			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	27	720	940
Volume Left	11	5	0
Volume Right	16	0	12
cSH	176	721	1700
Volume to Capacity	0.15	0.01	0.55
Queue Length 95th (ft)	13	1	0
Control Delay (s)	29.2	0.2	0.0
Lane LOS	D	A	
Approach Delay (s)	29.2	0.2	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	45	390	45	615	400	60
Peak Hour Factor	0.87	0.87	0.84	0.84	0.90	0.90
Hourly flow rate (vph)	52	448	54	732	444	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1317	478	511			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1317	478	511			
tC, single (s)	*7.4	*7.2	4.1			
tC, 2 stage (s)						
tF (s)	*4.5	*4.3	2.2			
p0 queue free %	50	0	95			
cM capacity (veh/h)	103	423	1044			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	500	786	511
Volume Left	52	54	0
Volume Right	448	0	67
cSH	320	1044	1700
Volume to Capacity	1.56	0.05	0.30
Queue Length 95th (ft)	724	4	0
Control Delay (s)	297.2	1.3	0.0
Lane LOS	F	A	
Approach Delay (s)	297.2	1.3	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	83.3		
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		

* User Entered Value

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	470	190	0	460
Peak Hour Factor	0.92	0.92	0.85	0.85	0.88	0.88
Hourly flow rate (vph)	0	0	553	224	0	523
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1187	665			776	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1187	665			776	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	208	460			827	

Direction, Lane #	NB 1	SB 1
Volume Total	776	523
Volume Left	0	0
Volume Right	224	0
cSH	1700	1700
Volume to Capacity	0.46	0.31
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Sign Control	Stop				Free			Free			Stop	
Grade	0%				0%			0%			0%	
Volume (veh/h)	15	25	55	35	435	0	15	395	15	10	5	45
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.94	0.94	0.94	0.77	0.77	0.77
Hourly flow rate (vph)	17	28	62	40	494	0	16	420	16	13	6	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None										None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1096	1034	428	436			494			1111	1042	494
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1096	1034	428	436			494			1111	1042	494
tC, single (s)	*8.6	*8.0	*7.7	4.1			4.1			*8.7	*8.1	*7.8
tC, 2 stage (s)												
tF (s)	*4.5	*5.0	*4.3	2.2			2.2			*4.6	*5.1	*4.4
p0 queue free %	80	78	85	96			98			81	95	84
cM capacity (veh/h)	83	129	428	1108			1054			68	123	374

Direction, Lane #	EB 1	NB 1	SB 1	NW 1
Volume Total	108	534	452	78
Volume Left	17	40	16	13
Volume Right	62	0	16	58
cSH	190	1108	1054	195
Volume to Capacity	0.57	0.04	0.02	0.40
Queue Length 95th (ft)	76	3	1	44
Control Delay (s)	46.5	1.0	0.5	35.2
Lane LOS	E	A	A	E
Approach Delay (s)	46.5	1.0	0.5	35.2
Approach LOS	E			E

Intersection Summary				
Average Delay	7.3			
Intersection Capacity Utilization	59.5%	ICU Level of Service	B	
Analysis Period (min)	15			

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	15	50	20	475	375	15
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	16	54	21	505	408	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	964	416	424			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	964	416	424			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	91	98			
cM capacity (veh/h)	276	633	1119			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	71	527	424
Volume Left	16	21	0
Volume Right	54	0	16
cSH	487	1119	1700
Volume to Capacity	0.15	0.02	0.25
Queue Length 95th (ft)	13	1	0
Control Delay (s)	13.6	0.5	0.0
Lane LOS	B	A	
Approach Delay (s)	13.6	0.5	0.0
Approach LOS	B		

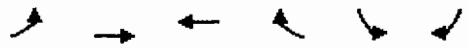
Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	465	0	0	875	0	105
Peak Hour Factor	0.92	0.92	0.92	0.92	0.87	0.87
Hourly flow rate (vph)	505	0	0	951	0	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			505		1457	505
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			505		1457	505
tC, single (s)			4.1		6.4	*8.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	*5.3
p0 queue free %			100		100	60
cM capacity (veh/h)			1059		141	305

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	505	951	121
Volume Left	0	0	0
Volume Right	0	0	121
cSH	1700	1700	305
Volume to Capacity	0.30	0.56	0.40
Queue Length 95th (ft)	0	0	46
Control Delay (s)	0.0	0.0	24.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	24.4
Approach LOS			C

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	570	645	0	0	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.85	0.85
Hourly flow rate (vph)	0	620	701	0	0	271
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	701				1321	701
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	701				1321	701
tC, single (s)	4.1				6.4	*6.7
tC, 2 stage (s)						
tF (s)	2.2				3.5	*3.8
p0 queue free %	100				100	26
cM capacity (veh/h)	896				171	364

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	620	701	271
Volume Left	0	0	0
Volume Right	0	0	271
cSH	1700	1700	364
Volume to Capacity	0.36	0.41	0.74
Queue Length 95th (ft)	0	0	145
Control Delay (s)	0.0	0.0	38.7
Lane LOS			E
Approach Delay (s)	0.0	0.0	38.7
Approach LOS			E

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

APPENDIX D

Existing 2005 Traffic Operations Worksheets

All TRAFFIC DATA SERVICES, Inc

3209 S.E. 147th PL. #97
Vancouver, WA. 98683
Ph. 503-833-2740

File Name : Cascade&FernRidge
Site Code : 00000000
Start Date : 2/3/2005
Page No : 1

Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Fern Ridge Westbound					Cascade Hwy Northbound					Fern Ridge Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	6	21	1	0	28	5	15	4	0	24	2	40	2	0	44	0	7	5	0	12	108
06:15	5	31	2	0	38	6	26	9	0	41	1	40	3	0	44	4	12	6	0	22	145
06:30	13	22	1	0	36	6	20	4	0	30	1	69	7	0	77	1	8	10	0	19	162
06:45	9	37	9	0	55	11	31	10	0	52	5	57	6	0	68	6	10	10	2	28	203
Total	33	111	13	0	157	28	92	27	0	147	9	206	18	0	233	11	37	31	2	81	618
07:00	8	46	5	0	59	14	23	10	0	47	2	54	5	0	61	4	7	13	0	24	191
07:15	11	67	6	0	84	10	26	7	0	43	3	79	10	0	92	11	15	17	0	43	262
07:30	12	81	15	0	108	17	30	23	0	70	3	87	14	0	104	9	16	17	0	42	324
07:45	16	126	19	0	161	18	49	54	0	121	10	98	19	0	127	18	57	27	0	102	511
Total	47	320	45	0	412	59	128	94	0	281	18	318	48	0	384	42	95	74	0	211	1288
08:00	15	74	15	1	105	16	43	14	0	73	9	77	32	0	118	21	32	14	0	67	363
08:15	6	41	6	0	53	14	20	5	0	39	15	46	10	0	71	18	13	14	0	45	208
08:30	12	48	7	1	68	15	17	21	0	53	9	71	8	0	88	11	17	9	0	37	246
08:45	7	52	6	0	65	8	15	12	0	35	2	59	6	0	67	8	11	5	0	24	191
Total	40	215	34	2	291	53	95	52	0	200	35	253	56	0	344	58	73	42	0	173	1008
09:00	9	56	4	0	69	7	20	9	0	36	4	53	9	0	66	5	9	9	1	24	195
09:15	7	41	6	0	54	6	20	6	0	32	7	57	9	0	73	8	10	6	0	24	183
09:30	7	43	8	0	58	12	21	4	1	38	10	65	10	0	85	14	12	12	0	38	219
09:45	17	57	4	0	78	8	11	9	0	28	10	55	11	1	77	25	14	9	0	48	231
Total	40	197	22	0	259	33	72	28	1	134	31	230	39	1	301	52	45	36	1	134	828
10:00	16	43	12	0	71	11	13	17	0	41	7	43	8	0	58	20	11	13	0	44	214
10:15	10	46	8	1	65	14	16	17	0	47	15	63	26	0	104	22	18	14	0	54	270
10:30	13	45	6	0	64	13	19	12	0	44	5	45	25	0	75	17	19	12	0	48	231
10:45	13	48	15	0	76	11	15	13	0	39	18	91	15	0	124	26	17	14	0	57	296
Total	52	182	41	1	276	49	63	59	0	171	45	242	74	0	361	85	65	53	0	203	1011
11:00	18	54	15	0	87	16	20	14	0	50	11	53	27	0	91	15	11	11	0	37	265
11:15	13	67	8	0	88	10	16	11	0	37	9	80	21	0	110	29	20	18	0	67	302
11:30	18	52	9	0	79	12	19	18	1	50	10	60	14	0	84	25	16	15	6	62	275
11:45	12	63	8	0	83	13	21	15	0	49	6	74	19	0	99	25	25	13	0	63	294
Total	61	236	40	0	337	51	76	58	1	186	36	267	81	0	384	94	72	57	6	229	1136
12:00	15	66	4	0	85	12	21	12	0	45	9	66	16	0	91	22	22	22	1	67	288
12:15	26	55	14	0	95	8	13	8	0	29	14	43	17	0	74	20	8	14	0	42	240
12:30	19	62	10	0	91	14	20	11	0	45	8	50	16	0	74	32	30	17	0	79	289
12:45	18	73	12	0	103	10	24	12	0	46	13	56	21	0	90	27	29	25	0	81	320
Total	78	256	40	0	374	44	78	43	0	165	44	215	70	0	329	101	89	78	1	269	1137
13:00	24	65	23	0	112	3	5	2	0	10	5	68	15	0	88	18	2	10	0	30	240
13:15	22	75	11	0	108	18	12	5	0	35	15	52	20	0	87	25	15	20	0	60	290
13:30	11	79	12	0	102	10	15	17	0	42	9	42	23	0	74	31	21	23	0	75	293
13:45	17	79	19	0	115	15	15	13	0	43	17	52	17	0	86	29	23	21	0	73	317
Total	74	298	65	0	437	46	47	37	0	130	46	214	75	0	335	103	61	74	0	238	1140
14:00	9	70	14	0	93	6	17	16	1	40	15	67	21	1	104	25	24	30	0	79	316
14:15	20	81	25	0	126	13	7	7	0	27	3	68	10	1	82	9	6	13	0	28	263
14:30	20	60	15	0	95	16	25	13	0	54	19	73	24	0	116	32	38	22	0	92	357
14:45	32	105	27	0	164	17	39	23	0	79	7	89	29	0	125	35	32	24	0	91	459
Total	81	316	81	0	478	52	88	59	1	200	44	297	84	2	427	101	100	89	0	290	1395

All TRAFFIC DATA SERVICES, Inc

3209 S.E. 147th PL. #97
Vancouver, WA. 98683
Ph. 503-833-2740

File Name : Cascade&FernRidge
Site Code : 00000000
Start Date : 2/3/2005
Page No : 2

Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Fern Ridge Westbound					Cascade Hwy Northbound					Fern Ridge Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	21	83	15	1	120	19	31	32	0	82	33	79	20	0	132	40	38	29	0	107	441
15:15	24	79	11	0	114	9	36	26	3	74	19	75	26	0	120	33	43	29	3	108	416
15:30	21	83	15	1	120	19	34	20	0	73	23	79	21	0	123	28	34	22	0	84	400
15:45	21	96	8	1	126	9	35	18	0	62	12	86	30	0	128	27	28	24	0	79	395
Total	87	341	49	3	480	56	136	96	3	291	87	319	97	0	503	128	143	104	3	378	1652
16:00	27	91	14	0	132	24	23	23	0	70	13	81	24	0	118	27	31	22	0	80	400
16:15	13	103	22	1	139	9	30	17	0	56	18	67	27	0	112	28	38	19	0	85	392
16:30	20	94	20	0	134	6	24	12	0	42	11	64	18	0	93	26	33	32	0	91	360
16:45	16	92	15	0	123	15	30	14	0	59	17	85	25	0	127	36	36	21	0	93	402
Total	76	380	71	1	528	54	107	66	0	227	59	297	94	0	450	117	138	94	0	349	1554
17:00	26	93	20	0	139	20	33	24	0	77	16	96	25	0	137	36	25	42	0	103	456
17:15	31	113	9	0	153	12	24	19	0	55	18	106	35	1	160	28	36	24	1	89	457
17:30	11	120	19	0	150	10	44	14	1	69	17	67	24	0	108	31	46	18	0	95	422
17:45	19	101	15	0	135	18	20	22	0	60	17	77	22	0	116	25	36	23	0	84	395
Total	87	427	63	0	577	60	121	79	1	261	68	346	106	1	521	120	143	107	1	371	1730
18:00	23	109	17	0	149	8	25	7	0	40	14	62	20	0	96	20	36	19	0	75	360
18:15	17	72	13	0	102	10	20	10	0	40	15	52	22	0	89	21	21	19	0	61	292
18:30	15	73	8	0	96	9	22	12	0	43	16	43	15	0	74	17	21	19	0	57	270
18:45	15	84	16	0	115	10	15	8	0	33	11	28	12	0	51	18	22	8	0	48	247
Total	70	338	54	0	462	37	82	37	0	156	56	185	69	0	310	76	100	65	0	241	1169
19:00	12	68	4	0	84	9	13	11	0	33	19	50	27	0	96	25	27	21	0	73	286
19:15	14	60	10	0	84	5	12	9	0	26	14	28	16	0	58	12	17	18	0	47	215
19:30	14	34	15	0	63	5	16	2	0	23	8	37	12	0	57	10	18	16	0	44	187
19:45	10	34	4	0	48	6	6	7	0	19	11	40	15	0	66	9	19	13	0	41	174
Total	50	196	33	0	279	25	47	29	0	101	52	155	70	0	277	56	81	68	0	205	862
20:00	3	30	6	0	39	3	6	2	0	11	11	42	7	0	60	8	14	15	0	37	147
20:15	7	29	7	0	43	5	8	6	0	19	8	23	4	0	35	4	18	1	0	23	120
20:30	9	33	5	0	47	5	10	7	0	22	6	19	5	0	30	13	7	6	0	26	125
20:45	4	19	4	0	27	2	13	5	0	20	4	18	5	0	27	13	12	11	0	36	110
Total	23	111	22	0	156	15	37	20	0	72	29	102	21	0	152	38	51	33	0	122	502
21:00	8	29	9	0	46	2	6	1	0	9	4	21	6	0	31	13	12	5	0	30	116
21:15	5	19	5	0	29	4	7	1	0	12	3	24	5	0	32	5	11	4	0	20	93
21:30	5	20	6	0	31	4	8	9	0	21	2	27	4	0	33	4	5	3	0	12	97
21:45	2	13	5	0	20	4	5	4	0	13	6	48	4	0	58	6	5	8	0	19	110
Total	20	81	25	0	126	14	26	15	0	55	15	120	19	0	154	28	33	20	0	81	416
Grand Total	919	4005	698	7	5629	676	1295	799	7	2777	674	3766	1021	4	5465	1210	1326	1025	14	3575	17446
Apprch %	16.3	71.1	12.4	0.1		24.3	46.6	28.8	0.3		12.3	68.9	18.7	0.1		33.8	37.1	28.7	0.4		
Total %	5.3	23	4	0	32.3	3.9	7.4	4.6	0	15.9	3.9	21.6	5.9	0	31.3	6.9	7.6	5.9	0.1	20.5	
Unshifted	871	3838	687	7	5403	661	1246	768	7	2682	650	3632	1000	4	5286	1179	1283	993	13	3468	33678
% Unshifted	94.8	95.8	98.4	100	96	97.8	96.2	96.1	100	96.6	96.4	96.4	97.9	100	96.7	97.4	96.8	96.9	92.9	97	96.5
HV	48	167	11	0	226	15	49	31	0	95	24	134	21	0	179	31	43	32	1	107	1214
% HV	5.2	4.2	1.6	0	4	2.2	3.8	3.9	0	3.4	3.6	3.6	2.1	0	3.3	2.6	3.2	3.1	7.1	3	3.5

All TRAFFIC DATA SERVICES, Inc
3209 S.E. 147th PL. #97
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File Name : Cascade&FernRidge
Site Code : 00000000
Start Date : 2/3/2005
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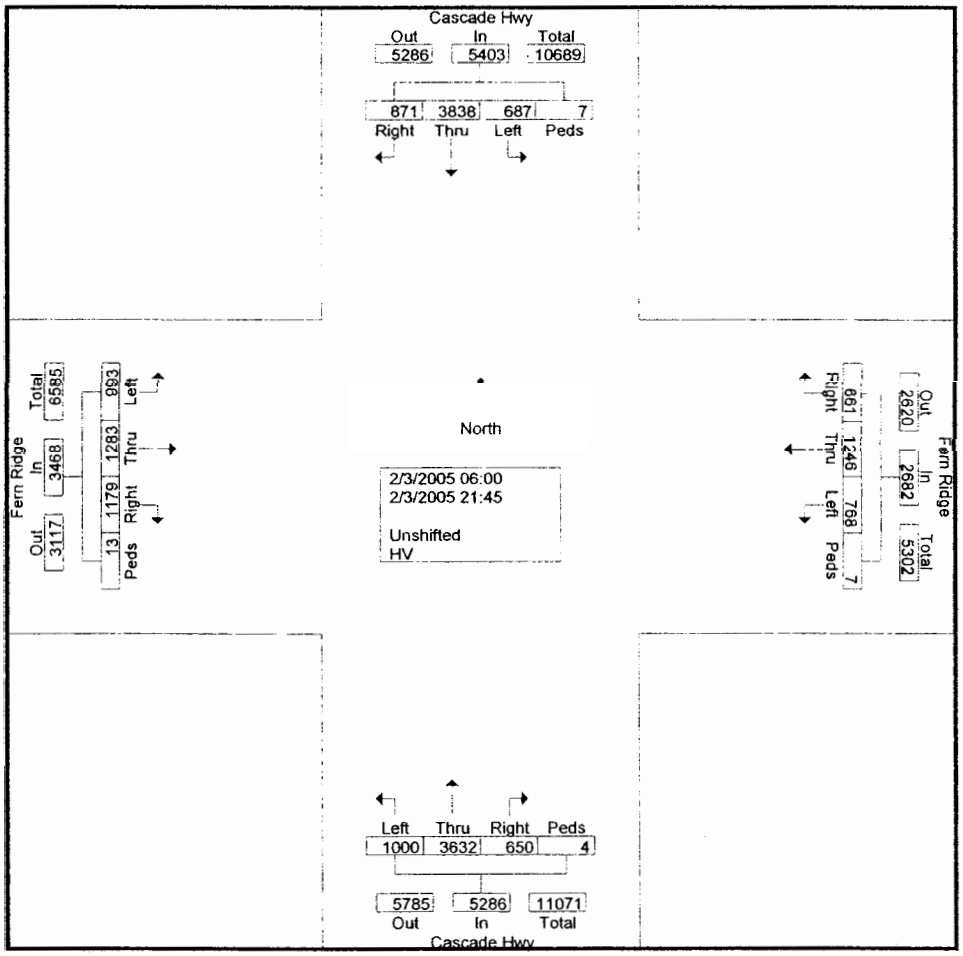

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File Name : Cascade&FernRidge
Site Code : 00000000
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	Cascade Hwy Southbound					Fern Ridge Westbound					Cascade Hwy Northbound					Fern Ridge Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:45																					
16:45	16	92	15	0	123	15	30	14	0	59	17	85	25	0	127	**36**	36	21	0	93	402
17:00	26	93	**20**	0	139	**20**	33	**24**	0	**77**	16	96	25	0	137	36	25	**42**	0	**103**	456
17:15	**31**	113	9	0	**153**	12	24	19	0	55	**18**	**106**	**35**	**1**	**160**	28	36	24	**1**	89	**457**
17:30	11	**120**	19	0	150	10	**44**	14	**1**	69	17	67	24	0	108	31	**46**	18	0	95	422
Total Volume	84	418	63	0	565	57	131	71	1	260	68	354	109	1	532	131	143	105	1	380	1737
% App. Total	14.9	74	11.2	0		21.9	50.4	27.3	0.4		12.8	66.5	20.5	0.2		34.5	37.6	27.6	0.3		
PHF	.677	.871	.788	.00 0	.923	71 3	.74 4	.74 0	.25 0	.844	.94 4	.83 5	.77 9	.25 0	.831	.91 0	.77 7	.62 5	.25 0	.922	.950

	Cascade Hwy Southbound					Fern Ridge Westbound					Cascade Hwy Northbound					Fern Ridge Eastbound					
Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	17:15					14:45					16:45					14:30					
+0 mins.	**31**	113	9	0	**153**	17	**39**	23	0	79	17	85	25	0	127	32	38	22	0	92	
+15 mins.	11	**120**	**19**	0	150	**19**	31	**32**	0	**82**	16	96	25	0	137	35	32	24	0	91	
+30 mins.	19	101	15	0	135	9	36	26	**3**	74	**18**	**106**	**35**	**1**	**160**	**40**	38	**29**	0	107	
+45 mins.	23	109	17	0	149	19	34	20	0	73	17	67	24	0	108	33	**43**	29	**3**	**108**	
Total Volume	84	443	60	0	587	64	140	101	3	308	68	354	109	1	532	140	151	104	3	398	
% App. Total	14.3	75.5	10.2	0		20.8	45.5	32.8	1		12.8	66.5	20.5	0.2		35.2	37.9	26.1			
PHF	.677	.923	.789	.00 0	.959	.842	.897	.789	.25 0	.939	.944	.835	.779	.25 0	.831	.875	.878	.897	.25 0	.921	

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File Name : Cascade&Martin
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Martin Westbound					Cascade Hwy Northbound					Martin Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	0	28	0	0	28	0	0	0	0	0	0	51	0	0	51	0	0	0	0	0	79
06:15	0	38	0	0	38	0	0	0	0	0	0	53	0	0	53	0	0	0	0	0	91
06:30	0	36	0	0	36	0	0	0	0	0	4	80	0	0	84	0	0	0	0	0	120
06:45	0	55	0	0	55	0	0	0	0	0	1	76	0	0	77	0	0	0	0	0	132
Total	0	157	0	0	157	0	0	0	0	0	5	260	0	0	265	0	0	0	0	0	422
07:00	0	59	0	0	59	0	0	0	0	0	3	77	0	0	80	0	0	0	0	0	139
07:15	0	84	0	0	84	0	0	0	0	0	1	103	0	0	104	0	0	0	0	0	188
07:30	0	108	0	0	108	0	0	0	0	0	3	118	0	0	121	0	0	0	0	0	229
07:45	0	161	0	0	161	2	0	0	0	2	4	137	0	1	142	0	0	0	0	0	305
Total	0	412	0	0	412	2	0	0	0	2	11	435	0	1	447	0	0	0	0	0	861
08:00	0	105	0	0	105	0	0	0	0	0	2	103	0	0	105	0	0	0	0	0	210
08:15	0	53	0	0	53	2	0	0	0	2	3	73	0	0	76	0	0	0	0	0	131
08:30	0	68	0	0	68	1	0	0	0	1	3	93	0	0	96	0	0	0	0	0	165
08:45	0	65	0	0	65	3	0	0	0	3	3	69	0	0	72	0	0	0	0	0	140
Total	0	291	0	0	291	6	0	0	0	6	11	338	0	0	349	0	0	0	0	0	646
09:00	0	69	0	0	69	2	0	0	0	2	2	68	0	0	70	0	0	0	0	0	141
09:15	0	54	0	0	54	2	0	0	0	2	3	68	0	0	71	0	0	0	0	0	127
09:30	0	58	0	0	58	0	0	0	0	0	7	82	0	1	90	0	0	0	0	0	148
09:45	0	78	0	0	78	3	0	0	0	3	4	67	0	0	71	0	0	0	0	0	152
Total	0	259	0	0	259	7	0	0	0	7	16	285	0	1	302	0	0	0	0	0	568
Grand Total	0	1119	0	0	1119	15	0	0	0	15	43	1318	0	2	1363	0	0	0	0	0	2497
Apprch %	0	100	0	0		100	0	0	0		3.2	96.7	0	0.1		0	0	0	0		
Total %	0	44.8	0	0	44.8	0.6	0	0	0	0.6	1.7	52.8	0	0.1	54.6	0	0	0	0	0	
Unshifted	0	1072	0	0	1072	15	0	0	0	15	**43**	**1255**	0	2	1300	0	0	0	0	0	4774
% Unshifted	0	95.8	0	0	95.8	100	0	0	0	100	100	95.2	0	100	95.4	0	0	0	0	0	95.6
HV	0	47	0	0	47	0	0	0	0	0	0	63	0	0	63	0	0	0	0	0	220
% HV	0	4.2	0	0	4.2	0	0	0	0	0	0	4.8	0	0	4.6	0	0	0	0	0	4.4

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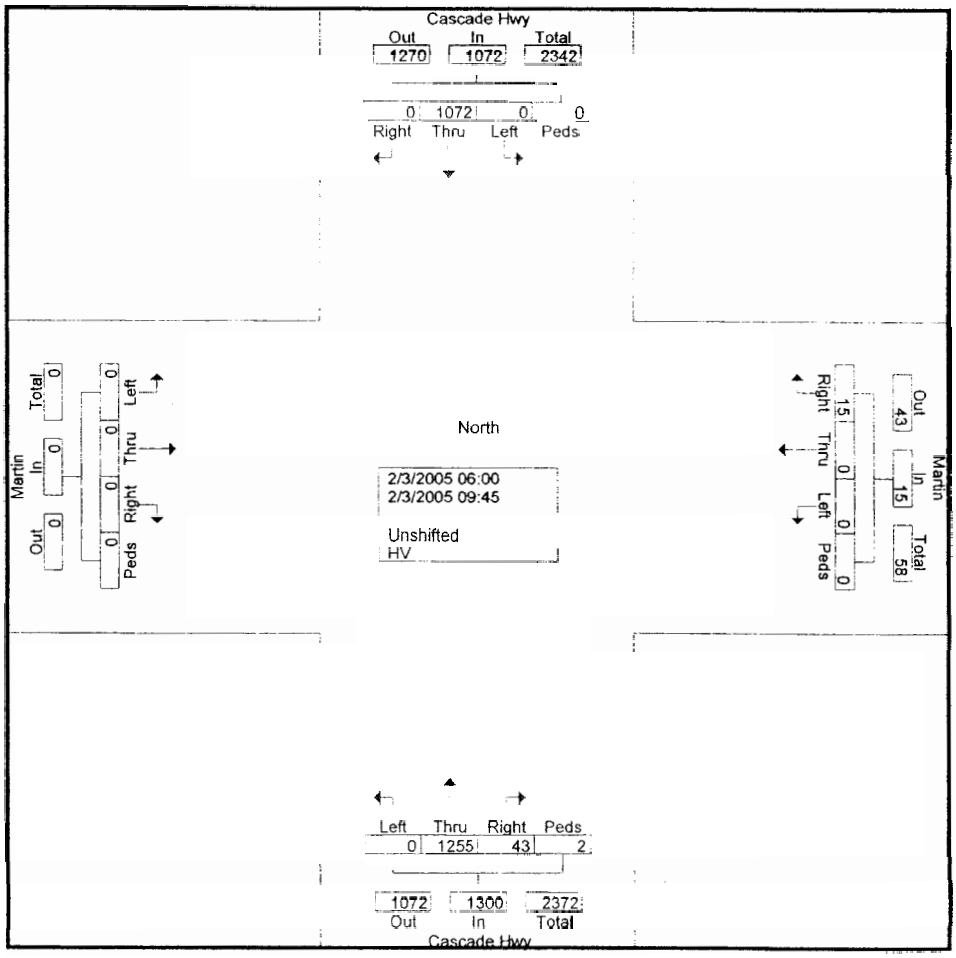

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File Name : Cascade&Martin
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	Cascade Hwy Southbound					Martin Westbound					Cascade Hwy Northbound					Martin Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15																					
07:15	0	84	0	0	84	0	0	0	0	0	1	103	0	0	104	0	0	0	0	0	188
07:30	0	108	0	0	108	0	0	0	0	0	3	118	0	0	121	0	0	0	0	0	229
07:45	0	**161**	0	0	**161**	**2**	0	0	0	**2**	**4**	**137**	0	**1**	**142**	0	0	0	0	0	**305**
08:00	0	105	0	0	105	0	0	0	0	0	2	103	0	0	105	0	0	0	0	0	210
Total Volume	0	458	0	0	458	2	0	0	0	2	10	461	0	1	472	0	0	0	0	0	932
% App. Total	0	100	0	0		100	0	0	0		2.1	97.7	0	0.2		0	0	0	0		
PHF	.00	.71	.00	.00	.711	.25	.00	.00	.00	.250	.62	.84	.00	.25	.831	.00	.00	.00	.00	.000	.764
	0	1	0	0		0	0	0	0		5	1	0	0		0	0	0	0		

Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of **1**
Peak Hour for Each Approach Begins at:

	07:15					08:15					07:15					06:00				
+0 mins.	0	84	0	0	84	2	0	0	0	2	1	103	0	0	104	0	0	0	0	0
+15 mins.	0	108	0	0	108	1	0	0	0	1	3	118	0	0	121	0	0	0	0	0
+30 mins.	0	**161**	0	0	**161**	**3**	0	0	0	**3**	**4**	**137**	0	**1**	**142**	0	0	0	0	0
+45 mins.	0	105	0	0	105	2	0	0	0	2	2	103	0	0	105	0	0	0	0	0
Total Volume	0	458	0	0	458	8	0	0	0	8	10	461	0	1	472	0	0	0	0	0
% App. Total	0	100	0	0		100	0	0	0		2.1	97.7	0	0.2		0	0	0	0	
PHF	.00	.71	.00	.00	.711	.66	.00	.00	.00	.667	.62	.84	.00	.25	.831	.00	.00	.00	.00	.000
	0	1	0	0		7	0	0	0		5	1	0	0		0	0	0	0	

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File Name : Cascade&Whitney
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Whitney Westbound					Cascade Hwy Northbound					Whitney Eastbound					
Start Time	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App Total	Int Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	0	28	5	0	33	16	0	0	0	16	11	40	0	0	51	0	0	0	0	0	100
06:15	0	32	7	0	39	20	0	6	0	26	8	45	0	0	53	0	0	0	0	0	118
06:30	0	30	13	0	43	20	0	6	0	26	5	75	0	0	80	0	0	0	0	0	149
06:45	0	52	7	0	59	17	0	3	0	20	9	67	0	0	76	0	0	0	0	0	155
Total	0	142	32	0	174	73	0	15	0	88	33	227	0	0	260	0	0	0	0	0	522
07:00	0	57	9	0	66	19	0	2	0	21	4	73	0	0	77	0	0	0	0	0	164
07:15	0	78	12	0	90	36	0	6	0	42	4	99	0	0	103	0	0	0	0	0	235
07:30	0	104	9	0	113	28	0	4	0	32	9	109	0	0	118	0	0	0	0	0	263
07:45	0	154	25	0	179	13	0	7	0	20	7	132	0	0	139	0	0	0	0	0	338
Total	0	393	55	0	448	96	0	19	0	115	24	413	0	0	437	0	0	0	0	0	1000
08:00	0	100	14	0	114	6	0	5	0	11	6	97	0	0	103	0	0	0	0	0	228
08:15	0	48	9	0	57	14	0	5	0	19	6	69	0	0	75	0	0	0	0	0	151
08:30	0	61	5	0	66	9	0	7	0	16	10	84	0	0	94	0	0	0	0	0	176
08:45	0	59	15	0	74	7	0	6	0	13	4	68	0	0	72	0	0	0	0	0	159
Total	0	268	43	0	311	36	0	23	0	59	26	318	0	0	344	0	0	0	0	0	714
09:00	0	57	13	0	70	15	0	12	1	28	13	57	0	0	70	0	0	0	0	0	168
09:15	0	48	11	0	59	16	0	6	0	22	6	64	0	0	70	0	0	0	0	0	151
09:30	0	52	10	0	62	16	0	6	0	22	6	76	0	0	82	0	0	0	0	0	166
09:45	0	73	13	0	86	8	0	5	0	13	6	64	0	0	70	0	0	0	0	0	169
Total	0	230	47	0	277	55	0	29	1	85	31	261	0	0	292	0	0	0	0	0	654
10:00	0	61	13	0	74	20	0	9	0	29	3	64	0	0	67	0	0	0	0	0	170
10:15	0	58	9	0	67	15	0	6	0	21	10	82	0	0	92	0	0	0	0	0	180
10:30	0	58	21	0	79	17	0	7	0	24	6	65	0	0	71	0	0	0	0	0	174
10:45	0	64	15	0	79	14	0	12	0	26	20	95	0	0	115	0	0	0	0	0	220
Total	0	241	58	0	299	66	0	34	0	100	39	306	0	0	345	0	0	0	0	0	744
11:00	0	76	19	0	95	23	0	11	0	34	11	81	0	1	93	0	0	0	0	0	222
11:15	0	67	20	0	87	15	0	19	0	34	15	95	0	0	110	0	0	0	0	0	231
11:30	0	67	15	0	82	24	0	13	0	37	12	72	0	0	84	0	0	0	0	0	203
11:45	0	66	19	0	85	18	0	16	3	37	18	81	0	0	99	0	0	0	0	0	221
Total	0	276	73	0	349	80	0	59	3	142	56	329	0	1	386	0	0	0	0	0	877
12:00	0	72	19	0	91	27	0	10	0	37	11	90	0	0	101	0	0	0	0	0	229
12:15	0	82	19	0	101	22	0	12	0	34	15	49	0	0	64	0	0	0	0	0	199
12:30	0	77	18	0	95	26	0	13	0	39	14	68	0	0	82	0	0	0	0	0	216
12:45	0	91	22	0	113	17	0	14	0	31	16	75	0	0	91	0	0	0	0	0	235
Total	0	322	78	0	400	92	0	49	0	141	56	282	0	0	338	0	0	0	0	0	879
13:00	0	98	23	0	121	16	0	16	0	32	14	69	0	0	83	0	0	0	0	0	236
13:15	0	91	17	0	108	26	0	16	0	42	18	69	0	0	87	0	0	0	0	0	237
13:30	0	88	17	0	105	17	0	11	0	28	10	66	0	0	76	0	0	0	0	0	209
13:45	0	94	18	0	112	14	0	22	2	38	9	78	0	0	87	0	0	0	0	0	237
Total	0	371	75	0	446	73	0	65	2	140	51	282	0	0	333	0	0	0	0	0	919
14:00	0	84	20	0	104	23	0	8	1	32	5	94	0	0	99	0	0	0	0	0	235
14:15	0	110	19	0	129	18	0	17	0	35	11	87	0	0	98	0	0	0	0	0	262
14:30	0	83	25	0	108	21	0	10	0	31	13	97	0	0	110	0	0	0	0	0	249
14:45	0	144	23	0	167	23	0	21	0	44	20	108	0	0	128	0	0	0	0	0	339
Total	0	421	87	0	508	85	0	56	1	142	49	386	0	0	435	0	0	0	0	0	1085

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File Name : Cascade&Whitney
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Whitney Westbound					Cascade Hwy Northbound					Whitney Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	0	107	20	0	127	17	0	11	0	28	13	114	0	0	127	0	0	0	0	0	282
15:15	0	114	23	0	137	24	0	10	1	35	19	94	0	0	113	0	0	0	0	0	285
15:30	0	100	33	0	133	27	0	20	0	47	13	109	0	0	122	0	0	0	0	0	302
15:45	0	108	28	0	136	20	0	17	0	37	21	97	0	0	118	0	0	0	0	0	291
Total	0	429	104	0	533	88	0	58	1	147	66	414	0	0	480	0	0	0	0	0	1160
16:00	0	112	33	0	145	20	0	18	0	38	15	113	0	0	128	0	0	0	0	0	311
16:15	0	127	22	0	149	24	0	11	1	36	11	83	0	0	94	0	0	0	0	0	279
16:30	0	116	35	0	151	26	0	16	0	42	13	90	0	0	103	0	0	0	0	0	296
16:45	0	115	32	0	147	16	0	10	0	26	20	100	0	0	120	0	0	0	0	0	293
Total	0	470	122	0	592	86	0	55	1	142	59	386	0	0	445	0	0	0	0	0	1179
17:00	0	124	34	0	158	15	0	15	0	30	13	145	0	0	158	0	0	0	0	0	346
17:15	0	134	43	0	177	17	0	19	0	36	12	130	0	0	142	0	0	0	0	0	355
17:30	0	140	42	0	182	24	0	13	0	37	12	83	0	0	95	0	0	0	0	0	314
17:45	0	122	26	0	148	20	0	14	1	35	12	106	0	0	118	0	0	0	0	0	301
Total	0	520	145	0	665	76	0	61	1	138	49	464	0	0	513	0	0	0	0	0	1316
18:00	0	132	43	0	175	28	0	16	0	44	12	79	0	0	91	0	0	0	0	0	310
18:15	0	88	23	0	111	17	0	13	0	30	16	65	0	0	81	0	0	0	0	0	222
18:30	0	84	22	0	106	23	0	14	0	37	18	52	0	0	70	0	0	0	0	0	213
18:45	0	99	19	0	118	11	0	15	0	26	10	36	0	0	46	0	0	0	0	0	190
Total	0	403	107	0	510	79	0	58	0	137	56	232	0	0	288	0	0	0	0	0	935
19:00	0	71	27	0	98	15	0	11	0	26	9	71	0	0	80	0	0	0	0	0	204
19:15	0	69	19	0	88	17	0	14	0	31	9	41	0	1	51	0	0	0	0	0	170
19:30	0	49	7	0	56	9	0	15	0	24	10	49	0	0	59	0	0	0	0	0	139
19:45	0	42	12	0	54	17	0	6	0	23	11	48	0	0	59	0	0	0	0	0	136
Total	0	231	65	0	296	58	0	46	0	104	39	209	0	1	249	0	0	0	0	0	649
20:00	0	33	11	0	44	14	0	5	0	19	6	54	0	0	60	0	0	0	0	0	123
20:15	0	40	12	0	52	9	0	4	0	13	7	22	0	0	29	0	0	0	0	0	94
20:30	0	34	10	0	44	8	0	13	0	21	4	26	0	0	30	0	0	0	0	0	95
20:45	0	22	9	0	31	9	0	5	0	14	5	27	0	0	32	0	0	0	0	0	77
Total	0	129	42	0	171	40	0	27	0	67	22	129	0	0	151	0	0	0	0	0	389
21:00	0	39	11	0	50	5	0	7	0	12	5	23	0	0	28	0	0	0	0	0	90
21:15	0	23	7	0	30	11	0	4	0	15	6	25	0	0	31	0	0	0	0	0	76
21:30	0	27	9	0	36	9	0	5	1	15	4	30	0	0	34	0	0	0	0	0	85
21:45	0	19	5	0	24	7	0	1	0	8	8	52	0	0	60	0	0	0	0	0	92
Total	0	108	32	0	140	32	0	17	1	50	23	130	0	0	153	0	0	0	0	0	343
Grand Total	0	4954	1165	0	6119	1115	0	671	11	1797	679	4768	0	2	5449	0	0	0	0	0	13365
Apprch %	0	81	19	0		62	0	37.3	0.6		12.5	87.5	0	0		0	0	0	0		
Total %	0	37.1	8.7	0	45.8	8.3	0	5	0.1	13.4	5.1	35.7	0	0	40.8	0	0	0	0	0	
Unshifted	0	4749	1142	0	5891	1078	0	654	9	1741	675	4592	0	2	5269	0	0	0	0	0	25802
% Unshifted	0	95.9	98	0	96.3	96.7	0	97.5	81.8	96.9	99.4	96.3	0	100	96.7	0	0	0	0	0	96.5
HV	0	205	23	0	228	37	0	17	2	56	4	176	0	0	180	0	0	0	0	0	928
% HV	0	4.1	2	0	3.7	3.3	0	2.5	18.2	3.1	0.6	3.7	0	0	3.3	0	0	0	0	0	3.5

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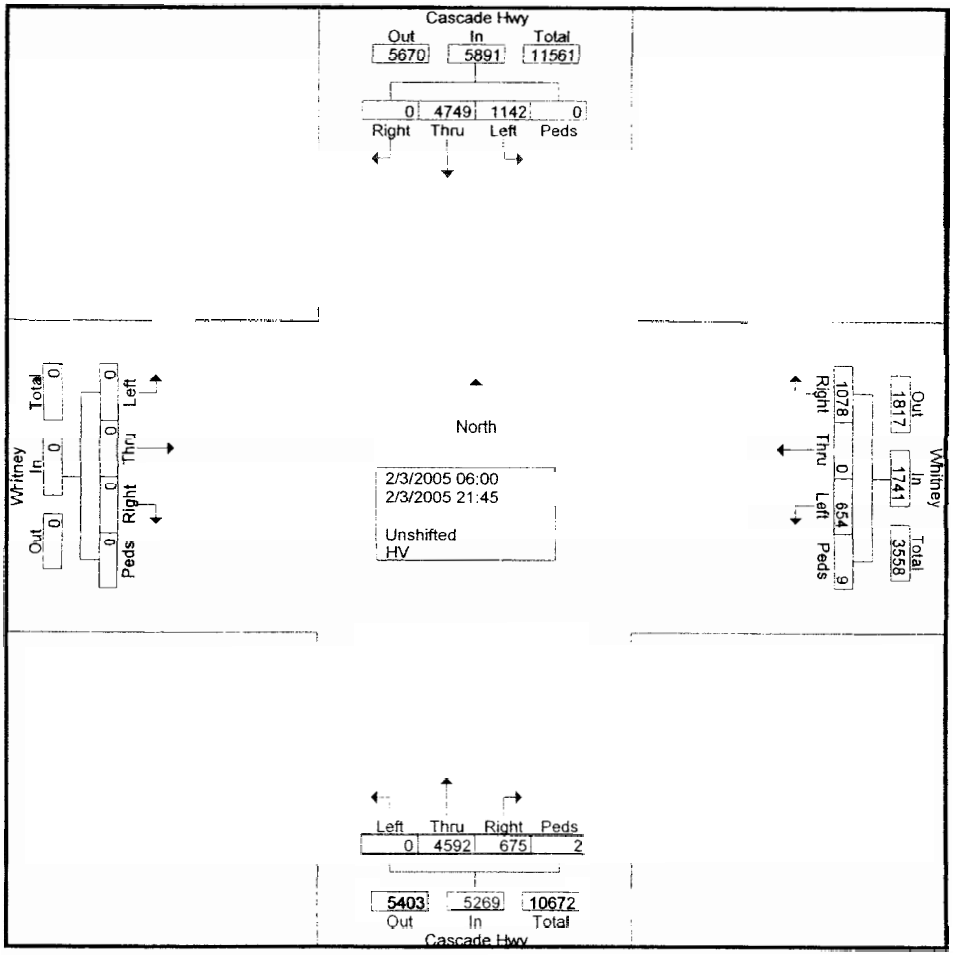

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File Name : Cascade&Whitney
Site Code : 00000000
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	Cascade Hwy Southbound					Whitney Westbound					Cascade Hwy Northbound					Whitney Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	0	124	34	0	158	15	0	15	0	30	**13**	**145**	0	0	**158**	0	0	0	0	0	346
17:15	0	134	**43**	0	177	17	0	**19**	0	36	12	130	0	0	142	0	0	0	0	0	**355**
17:30	0	**140**	42	0	**182**	**24**	0	13	0	**37**	12	83	0	0	95	0	0	0	0	0	314
17:45	0	122	26	0	148	20	0	14	**1**	35	12	106	0	0	118	0	0	0	0	0	301
Total Volume	0	520	145	0	665	76	0	61	1	138	49	464	0	0	513	0	0	0	0	0	1316
% App. Total	0	78.2	21.8	0		55.1	0	44.2	0.7		9.6	90.4	0	0		0	0	0	0		
PHF	.00	.92	.84	.00	.913	.79	.00	.80	.25	.932	.94	.80	.00	.00	.812	.00	.00	.00	.00	.000	.927
	0	9	3	0		2	0	3	0		2	0	0	0		0	0	0	0		

Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	17:15					15:30					16:30					06:00					
+0 mins.	0	134	**43**	0	177	**27**	0	**20**	0	**47**	13	90	0	0	103	0	0	0	0	0	0
+15 mins.	0	**140**	42	0	**182**	20	0	17	0	37	**20**	100	0	0	120	0	0	0	0	0	0
+30 mins.	0	122	26	0	148	20	0	18	0	38	13	**145**	0	0	**158**	0	0	0	0	0	0
+45 mins.	0	132	43	0	175	24	0	11	1	36	12	130	0	0	142	0	0	0	0	0	0
Total Volume	0	528	154	0	682	91	0	66	1	158	58	465	0	0	523	0	0	0	0	0	0
% App. Total	0	77.4	22.6	0		57.6	0	41.8	0.6		11.1	88.9	0	0		0	0	0	0		
PHF	.00	.94	.89	.00	.937	.84	.00	.82	.25	.840	.72	.80	.00	.00	.828	.00	.00	.00	.00	.000	
	0	3	5	0		3	0	5	0		5	2	0	0		0	0	0	0		

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File Name : Cascade&GolfLane
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Golf Lane Westbound					Cascade Hwy Northbound					Golf Lane Eastbound					
Start Time	Right	Thru	Left	Peds	App. Tota	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Tota	Right	Thru	Left	Peds	App. Tota	t. To a
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	0	32	0	0	32	0	0	0	0	0	0	57	0	0	57	1	0	0	0	1	90
06:15	1	37	0	0	38	0	0	0	0	0	0	65	0	0	65	0	0	0	0	0	103
06:30	1	47	0	0	48	0	0	0	0	0	0	94	0	0	94	0	0	0	0	0	142
06:45	2	61	0	0	63	0	0	0	0	0	0	86	0	0	86	1	0	0	0	1	150
Total	4	177	0	0	181	0	0	0	0	0	0	302	0	0	302	2	0	0	0	2	485
07:00	2	73	0	0	75	0	0	0	0	0	0	93	0	0	93	1	0	0	0	1	169
07:15	4	97	0	0	101	0	0	0	0	0	0	135	0	0	135	2	0	0	0	2	238
07:30	3	113	0	0	116	0	0	0	0	0	0	136	1	0	137	0	0	0	0	0	253
07:45	3	169	0	0	172	0	0	0	0	0	0	146	0	0	146	1	0	3	0	4	322
Total	12	452	0	0	464	0	0	0	0	0	0	510	1	0	511	4	0	3	0	7	982
08:00	1	82	0	0	83	0	0	0	0	0	0	103	1	0	104	0	0	0	0	0	187
08:15	2	59	0	0	61	0	0	0	0	0	0	83	0	0	83	0	0	1	0	1	145
08:30	1	63	0	0	64	0	0	0	0	0	0	98	0	0	98	0	0	0	0	0	162
08:45	1	73	0	0	74	0	0	0	0	0	0	70	0	0	70	0	0	0	0	0	144
Total	5	277	0	0	282	0	0	0	0	0	0	354	1	0	355	0	0	1	0	1	638
09:00	3	77	0	0	80	0	0	0	0	0	0	73	0	0	73	0	0	1	0	1	154
09:15	0	59	0	0	59	0	0	0	0	0	0	74	0	0	74	0	0	0	0	0	133
09:30	1	64	0	0	65	0	0	0	0	0	0	91	1	0	92	0	0	0	0	0	157
09:45	1	98	0	0	99	0	0	0	0	0	0	73	0	0	73	0	0	0	0	0	172
Total	5	298	0	0	303	0	0	0	0	0	0	311	1	0	312	0	0	1	0	1	616
Grand Total	26	1204	0	0	1230	0	0	0	0	0	0	1477	3	0	1480	6	0	5	0	11	2721
Apprch %	2.1	97.9	0	0		0	0	0	0		0	99.8	0.2	0		54.5	0	45.5	0		
Total %	1	44.2	0	0	45.2	0	0	0	0	0	0	54.3	0.1	0	54.4	0.2	0	0.2	0	0.4	
Unshifted	26	1150	0	0	1176	0	0	0	0	0	0	1409	3	0	1412	6	0	5	0	11	5198
% Unshifted	100	95.5	0	0	95.6	0	0	0	0	0	0	95.4	100	0	95.4	100	0	100	0	100	95.5
HV	0	54	0	0	54	0	0	0	0	0	0	68	0	0	68	0	0	0	0	0	244
% HV	0	4.5	0	0	4.4	0	0	0	0	0	0	4.6	0	0	4.6	0	0	0	0	0	4.5

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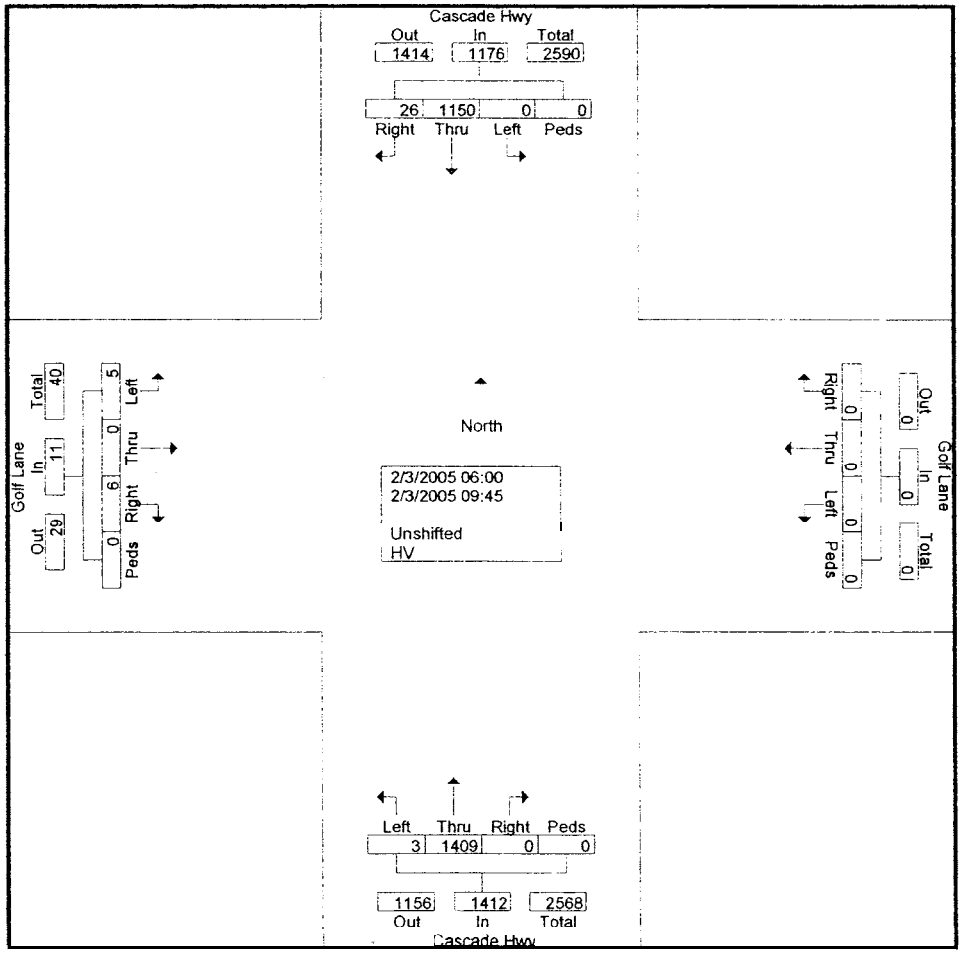

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File Name : Cascade&GolfLane
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	Cascade Hwy Southbound					Golf Lane Westbound					Cascade Hwy Northbound					Golf Lane Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15																					
07:15	**4**	97	0	0	101	0	0	0	0	0	0	135	0	0	135	**2**	0	0	0	2	238
07:30	3	113	0	0	116	0	0	0	0	0	0	136	**1**	0	137	0	0	0	0	0	253
07:45	3	**169**	0	0	**172**	0	0	0	0	0	0	**146**	0	0	**146**	1	0	**3**	0	**4**	**322**
08:00	1	82	0	0	83	0	0	0	0	0	0	103	1	0	104	0	0	0	0	0	187
Total Volume	11	461	0	0	472	0	0	0	0	0	0	520	2	0	522	3	0	3	0	6	1000
% App. Total	2.3	97.7	0	0		0	0	0	0		0	99.6	0.4	0		50	0	50	0		
PHF	.68	.68	.00	.00	.686	.00	.00	.00	.00	.000	.00	.89	.50	.00	.894	.37	00	.25	.00	.375	.776
	8	2	0	0		0	0	0	0		0	0	0	0		5	0	0	0		

Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15					06:00					07:15					07:00					
+0 mins.	**4**	97	0	0	101	0	0	0	0	0	0	135	0	0	135	1	0	0	0	1	
+15 mins.	3	113	0	0	116	0	0	0	0	0	0	136	**1**	0	137	**2**	0	0	0	2	
+30 mins.	3	**169**	0	0	**172**	0	0	0	0	0	0	**146**	0	0	**146**	0	0	0	0	0	
+45 mins.	1	82	0	0	83	0	0	0	0	0	0	103	1	0	104	1	0	**3**	0	**4**	
Total Volume	11	461	0	0	472	0	0	0	0	0	0	520	2	0	522	4	0	3	0	7	
% App. Total	2.3	97.7	0	0		0	0	0	0		0	99.6	0.4	0		57.1	0	42.9	0		
PHF	68	.68	.00	.00	.686	.00	.00	.00	.00	.000	.00	.89	.50	.00	.894	.50	.00	.25	.00	.438	
	8	2	0	0		0	0	0	0		0	0	0	0		0	0	0	0		

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File Name : Cascade&EBRamp
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					EB Ramp Westbound					Cascade Hwy Northbound					EB Ramp Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	0	24	0	0	24	0	0	0	0	0	0	54	2	0	56	0	0	0	0	0	80
06:15	4	23	0	0	27	0	0	0	0	0	0	62	3	0	65	12	0	2	0	14	106
06:30	6	33	0	0	39	0	0	0	0	0	0	96	2	0	98	14	0	0	0	14	151
06:45	8	39	0	0	47	0	0	0	0	0	0	86	3	0	89	20	0	5	0	25	161
Total	18	119	0	0	137	0	0	0	0	0	0	298	10	0	308	46	0	7	0	53	498
07:00	3	41	0	0	44	0	0	0	0	0	0	96	3	0	99	32	0	4	1	37	180
07:15	5	50	0	0	55	0	0	0	0	0	0	121	5	0	126	43	0	5	0	48	229
07:30	3	75	0	0	78	0	0	0	0	0	0	129	6	0	135	40	0	3	1	44	257
07:45	6	140	0	0	146	0	0	0	0	0	0	121	4	0	125	37	0	19	0	56	327
Total	17	306	0	0	323	0	0	0	0	0	0	467	18	0	485	152	0	31	2	185	993
08:00	3	69	0	0	72	0	0	0	0	0	0	118	4	0	122	26	0	9	0	35	229
08:15	12	35	0	0	47	0	0	0	0	0	0	82	3	0	85	25	0	11	0	36	168
08:30	4	43	0	0	47	0	0	0	0	0	0	97	4	0	101	24	0	10	1	35	183
08:45	3	51	0	0	54	0	0	0	0	0	0	77	2	0	79	28	0	13	0	41	174
Total	22	198	0	0	220	0	0	0	0	0	0	374	13	0	387	103	0	43	1	147	754
09:00	3	43	0	0	46	0	0	0	0	0	0	66	4	0	70	39	0	13	0	52	168
09:15	4	44	0	0	48	0	0	0	0	0	0	75	4	0	79	19	0	4	0	23	150
09:30	4	34	0	0	38	0	0	0	0	0	0	75	4	0	79	30	0	8	0	38	155
09:45	5	61	0	0	66	0	0	0	0	0	0	69	5	0	74	36	0	6	0	42	182
Total	16	182	0	0	198	0	0	0	0	0	0	285	17	0	302	124	0	31	0	155	655
10:00	13	47	0	0	60	0	0	0	0	0	0	84	1	0	85	23	0	7	0	30	175
10:15	4	46	0	0	50	0	0	0	0	0	0	94	2	0	96	22	0	3	0	25	171
10:30	7	41	0	0	48	0	0	0	0	0	0	79	2	0	81	34	0	6	0	40	169
10:45	5	50	0	0	55	0	0	0	0	0	0	106	2	0	108	26	0	10	0	36	199
Total	29	184	0	0	213	0	0	0	0	0	0	363	7	0	370	105	0	26	0	131	714
11:00	3	70	0	0	73	0	0	0	0	0	0	101	3	0	104	32	0	10	0	42	219
11:15	7	55	0	0	62	0	0	0	0	0	0	110	3	0	113	37	0	4	0	41	216
11:30	7	48	0	0	55	0	0	0	0	0	0	91	5	0	96	32	0	4	0	36	187
11:45	9	42	0	0	51	0	0	0	0	0	0	92	6	0	98	43	0	8	0	51	200
Total	26	215	0	0	241	0	0	0	0	0	0	394	17	0	411	144	0	26	0	170	822
12:00	7	65	0	0	72	0	0	0	0	0	0	113	4	0	117	28	0	2	0	30	219
12:15	5	61	0	0	66	0	0	0	0	0	0	66	4	0	70	41	0	19	0	60	196
12:30	5	59	0	0	64	0	0	0	0	0	0	91	3	0	94	30	0	7	0	37	195
12:45	3	69	0	0	72	0	0	0	0	0	0	89	2	0	91	39	0	6	0	45	208
Total	20	254	0	0	274	0	0	0	0	0	0	359	13	0	372	138	0	34	0	172	818
13:00	4	76	0	0	80	0	0	0	0	0	0	77	6	0	83	48	0	13	4	65	228
13:15	7	72	0	0	79	0	0	0	0	0	0	85	10	0	95	34	0	13	0	47	221
13:30	9	68	0	0	77	0	0	0	0	0	0	78	5	0	83	37	0	9	0	46	206
13:45	0	61	0	0	61	0	0	0	0	0	0	88	3	0	91	45	0	15	0	60	212
Total	20	277	0	0	297	0	0	0	0	0	0	328	24	0	352	164	0	50	4	218	867
14:00	7	61	0	0	68	0	0	0	0	0	0	109	8	0	117	41	0	9	0	50	235
14:15	7	85	0	0	92	0	0	0	0	0	0	101	5	0	106	53	0	9	0	62	260
14:30	5	70	0	0	75	0	0	0	0	0	0	111	5	0	116	44	0	9	0	53	244
14:45	6	99	0	0	105	0	0	0	0	0	0	125	7	0	132	62	0	9	0	71	308
Total	25	315	0	0	340	0	0	0	0	0	0	446	25	0	471	200	0	36	0	236	1047

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File Name : Cascade&EBRamp
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					EB Ramp Westbound					Cascade Hwy Northbound					EB Ramp Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App Total	In Tota
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	10	83	0	0	93	0	0	0	0	0	0	126	2	0	128	43	0	11	0	54	275
15:15	8	86	0	0	94	0	0	0	0	0	0	114	5	0	119	55	0	9	0	64	277
15:30	8	83	0	0	91	0	0	0	0	0	0	129	5	0	134	49	0	14	0	63	288
15:45	11	84	0	0	95	0	0	0	0	0	0	111	6	0	117	51	0	18	0	69	281
Total	37	336	0	0	373	0	0	0	0	0	0	480	18	0	498	198	0	52	0	250	1121
16:00	6	75	0	0	81	0	0	0	0	0	0	126	8	0	134	69	0	7	0	76	291
16:15	7	70	0	0	77	0	0	0	0	0	0	105	2	0	107	84	0	10	0	94	278
16:30	10	77	0	0	87	0	0	0	0	0	0	102	12	0	114	67	0	13	0	80	281
16:45	8	80	0	0	88	0	0	0	0	0	0	108	7	0	115	71	0	7	0	78	281
Total	31	302	0	0	333	0	0	0	0	0	0	441	29	0	470	291	0	37	0	328	1131
17:00	9	93	0	0	102	0	0	0	0	0	0	154	5	0	159	72	0	11	0	83	344
17:15	11	86	0	0	97	0	0	0	0	0	0	139	6	0	145	96	0	13	0	109	351
17:30	6	81	0	0	87	0	0	0	0	0	0	97	9	0	106	97	0	8	0	105	298
17:45	8	73	0	0	81	0	0	0	0	0	0	123	3	0	126	71	0	12	0	83	290
Total	34	333	0	0	367	0	0	0	0	0	0	513	23	0	536	336	0	44	0	380	1283
18:00	4	109	0	0	113	0	0	0	0	0	0	98	7	0	105	59	0	7	1	67	285
18:15	7	64	0	0	71	0	0	0	0	0	0	76	7	0	83	48	0	5	0	53	207
18:30	7	50	0	0	57	0	0	0	0	0	0	71	8	0	79	50	0	3	0	53	189
18:45	5	63	0	0	68	0	0	0	0	0	0	46	1	0	47	51	0	7	0	58	173
Total	23	286	0	0	309	0	0	0	0	0	0	291	23	0	314	208	0	22	1	231	854
19:00	2	51	0	0	53	0	0	0	0	0	0	84	1	0	85	44	0	4	0	48	186
19:15	1	36	0	0	37	0	0	0	0	0	0	53	5	0	58	43	0	8	2	53	148
19:30	1	32	0	0	33	0	0	0	0	0	0	55	2	0	57	26	0	1	0	27	117
19:45	1	30	0	0	31	0	0	0	0	0	0	60	3	0	63	17	0	4	0	21	115
Total	5	149	0	0	154	0	0	0	0	0	0	252	11	0	263	130	0	17	2	149	566
20:00	2	22	0	0	24	0	0	0	0	0	0	65	5	0	70	21	0	2	0	23	117
20:15	2	17	0	0	19	0	0	0	0	0	0	44	1	0	45	35	0	11	0	46	110
20:30	3	18	0	0	21	0	0	0	0	0	0	32	2	0	34	20	0	6	0	26	81
20:45	2	21	0	0	23	0	0	0	0	0	0	44	0	0	44	16	0	1	0	17	84
Total	9	78	0	0	87	0	0	0	0	0	0	185	8	0	193	92	0	20	0	112	392
21:00	1	22	0	0	23	0	0	0	0	0	0	26	2	0	28	26	0	0	0	26	77
21:15	3	14	0	0	17	0	0	0	0	0	0	32	4	0	36	17	0	5	0	22	75
21:30	3	12	0	0	15	0	0	0	0	0	0	28	1	0	29	22	0	6	0	28	72
21:45	3	12	0	0	15	0	0	0	0	0	0	57	2	0	59	15	0	6	0	21	95
Total	10	60	0	0	70	0	0	0	0	0	0	143	9	0	152	80	0	17	0	97	319
Grand Total	342	3594	0	0	3936	0	0	0	0	0	0	5619	265	0	5884	2511	0	493	10	3014	12834
Apprch %	8.7	91.3	0	0		0	0	0	0		0	95.5	4.5	0		83.3	0	16.4	0.3		
Total %	2.7	28	0	0	30.7	0	0	0	0	0	0	43.8	2.1	0	45.8	19.6	0	3.8	0.1	23.5	
Unshifted	290	3451	0	0	3741	0	0	0	0	0	0	5413	261	0	5674	2431	0	465	10	2906	24642
% Unshifted	84.8	96	0	0	95	0	0	0	0	0	0	96.3	98.5	0	96.4	96.8	0	94.3	100	96.4	96
HV	52	143	0	0	195	0	0	0	0	0	0	206	4	0	210	80	0	28	0	108	1026
% HV	15.2	4	0	0	5	0	0	0	0	0	0	3.7	1.5	0	3.6	3.2	0	5.7	0	3.6	4

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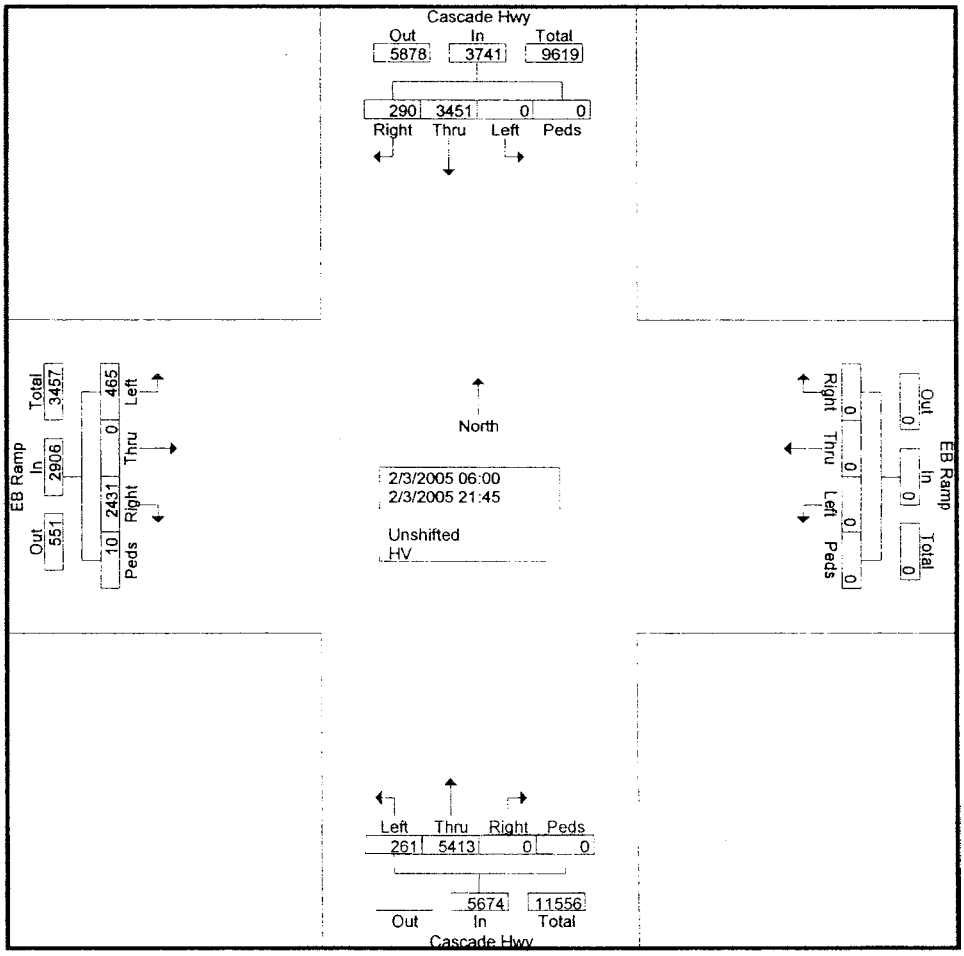

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	Cascade Hwy Southbound					EB Ramp Westbound					Cascade Hwy Northbound					EB Ramp Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	9	**93**	0	0	**102**	0	0	0	0	0	0	**154**	5	0	**159**	72	0	11	0	83	344
17:15	**11**	86	0	0	97	0	0	0	0	0	0	139	6	0	145	96	0	**13**	0	**109**	**351**
17:30	6	81	0	0	87	0	0	0	0	0	0	97	**9**	0	106	**97**	0	8	0	105	298
17:45	8	73	0	0	81	0	0	0	0	0	0	123	3	0	126	71	0	12	0	83	290
Total Volume	34	333	0	0	367	0	0	0	0	0	0	513	23	0	536	336	0	44	0	380	1283
% App. Total	9.3	90.7	0	0		0	0	0	0		0	95.7	4.3	0		88.4	0	11.6	0		
PHF	.773	.895	.00 0	.00 0	.900	.00 0	.00 0	.00 0	.00 0	.000	.00 0	.833	.639	.00 0	.843	.866	.00 0	.846	.00 0	.872	.914

Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at

	14:45					06:00					17:00					17:00					
+0 mins.	6	**99**	0	0	**105**	0	0	0	0	0	0	**154**	5	0	**159**	72	0	11	0	83	
+15 mins.	**10**	83	0	0	93	0	0	0	0	0	0	139	6	0	145	96	0	**13**	0	**109**	
+30 mins.	8	86	0	0	94	0	0	0	0	0	0	97	**9**	0	106	**97**	0	8	0	105	
+45 mins.	8	83	0	0	91	0	0	0	0	0	0	123	3	0	126	71	0	12	0	83	
Total Volume	32	351	0	0	383	0	0	0	0	0	0	513	23	0	536	336	0	44	0	380	
% App. Total	8.4	91.6	0	0		0	0	0	0		0	95.7	4.3	0		88.4	0	11.6	0		
PHF	.800	.886	.00 0	.00 0	.912	.00 0	.00 0	.00 0	.00 0	.000	.00 0	.833	.639	.00 0	.843	.866	.00 0	.846	.00 0	.872	

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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					WB Ramp Westbound					Cascade Hwy Northbound					WB Ramp Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	0	23	0	0	23	0	0	2	0	2	38	16	0	0	54	0	0	0	0	0	79
06:15	0	26	0	0	26	0	0	1	0	1	42	22	0	0	64	0	0	0	0	0	91
06:30	0	37	0	0	37	0	0	2	0	2	73	23	0	0	96	0	0	0	0	0	135
06:45	0	44	0	0	44	0	0	2	0	2	46	45	0	0	91	0	0	0	0	0	137
Total	0	130	0	0	130	0	0	7	0	7	199	106	0	0	305	0	0	0	0	0	442
07:00	0	44	0	0	44	0	0	0	0	0	56	44	0	0	100	0	0	0	0	0	144
07:15	0	51	0	0	51	0	0	4	0	4	71	55	0	0	126	0	0	0	0	0	181
07:30	0	75	0	0	75	0	0	3	0	3	87	45	0	0	132	0	0	0	0	0	210
07:45	0	145	0	0	145	0	0	1	0	1	50	90	0	0	140	0	0	0	0	0	286
Total	0	315	0	0	315	0	0	8	0	8	264	234	0	0	498	0	0	0	0	0	821
08:00	0	70	0	0	70	0	0	2	0	2	53	74	0	0	127	0	0	0	0	0	199
08:15	0	44	0	0	44	0	0	3	0	3	42	51	0	0	93	0	0	0	0	0	140
08:30	0	44	0	0	44	1	0	3	0	4	51	56	0	0	107	0	0	0	0	0	155
08:45	0	52	0	0	52	0	0	2	0	2	33	57	0	0	90	0	0	0	0	0	144
Total	0	210	0	0	210	1	0	10	0	11	179	238	0	0	417	0	0	0	0	0	638
09:00	0	42	0	0	42	0	0	4	0	4	32	48	0	0	80	0	0	0	0	0	126
09:15	0	44	0	0	44	0	0	4	0	4	40	39	0	0	79	0	0	0	0	0	127
09:30	0	34	1	0	35	0	0	4	0	4	38	45	0	0	83	0	0	0	0	0	122
09:45	0	66	0	0	66	1	0	0	0	1	31	44	0	0	75	0	0	0	0	0	142
Total	0	186	1	0	187	1	0	12	0	13	141	176	0	0	317	0	0	0	0	0	517
10:00	0	60	0	0	60	0	0	1	0	1	43	46	0	0	89	0	0	0	0	0	150
10:15	0	48	0	0	48	0	0	2	0	2	46	49	0	0	95	0	0	0	0	0	145
10:30	0	45	0	0	45	2	0	3	0	5	30	54	0	0	84	0	0	0	0	0	134
10:45	0	54	0	0	54	1	0	2	0	3	43	71	0	0	114	0	0	0	0	0	171
Total	0	207	0	0	207	3	0	8	0	11	162	220	0	0	382	0	0	0	0	0	600
11:00	0	68	0	0	68	0	0	3	0	3	50	60	0	0	110	0	0	0	0	0	181
11:15	0	59	0	0	59	0	0	3	0	3	44	65	0	0	109	0	0	0	0	0	171
11:30	0	55	0	0	55	0	0	1	0	1	33	61	0	0	94	0	0	0	0	0	150
11:45	0	51	0	0	51	0	0	1	0	1	34	66	0	0	100	0	0	0	0	0	152
Total	0	233	0	0	233	0	0	8	0	8	161	252	0	0	413	0	0	0	0	0	654
12:00	0	72	0	0	72	1	0	1	0	2	46	69	0	0	115	0	0	0	0	0	189
12:15	0	64	0	0	64	0	0	1	0	1	25	60	0	0	85	0	0	0	0	0	150
12:30	0	63	0	0	63	0	0	2	0	2	39	59	0	0	98	0	0	0	0	0	163
12:45	0	67	0	0	67	0	0	4	0	4	27	69	0	0	96	0	0	0	0	0	167
Total	0	266	0	0	266	1	0	8	0	9	137	257	0	0	394	0	0	0	0	0	669
13:00	0	82	0	0	82	0	0	0	0	0	28	63	0	2	93	0	0	0	0	0	175
13:15	0	74	0	0	74	0	0	5	0	5	27	71	0	0	98	0	0	0	0	0	177
13:30	0	74	0	0	74	1	0	1	0	2	24	62	0	0	86	0	0	0	0	0	162
13:45	0	62	0	0	62	0	0	0	0	0	36	68	0	0	104	0	0	0	0	0	166
Total	0	292	0	0	292	1	0	6	0	7	115	264	0	2	381	0	0	0	0	0	680
14:00	0	65	0	0	65	0	0	3	0	3	32	87	0	0	119	0	0	0	0	0	187
14:15	0	89	1	0	90	0	0	2	0	2	32	78	0	0	110	0	0	0	0	0	202
14:30	0	75	0	0	75	0	0	1	0	1	33	86	0	0	119	0	0	0	0	0	195
14:45	0	105	1	0	106	0	0	0	0	0	48	84	0	0	132	0	0	0	0	0	238
Total	0	334	2	0	336	0	0	6	0	6	145	335	0	0	480	0	0	0	0	0	822

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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					WB Ramp Westbound					Cascade Hwy Northbound					WB Ramp Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	0	91	0	0	91	1	0	2	0	3	41	95	0	0	136	0	0	0	0	0	230
15:15	0	97	1	0	98	0	0	3	0	3	22	91	0	0	113	0	0	0	0	0	214
15:30	0	85	0	0	85	0	0	3	0	3	47	97	0	0	144	0	0	0	0	0	232
15:45	0	88	1	0	89	0	0	5	0	5	36	93	0	0	129	0	0	0	0	0	223
Total	0	361	2	0	363	1	0	13	0	14	146	376	0	0	522	0	0	0	0	0	899
16:00	0	75	1	0	76	0	0	3	0	3	49	85	0	0	134	0	0	0	0	0	213
16:15	0	79	0	0	79	1	0	1	0	2	43	72	1	0	116	0	0	0	0	0	197
16:30	0	90	0	0	90	0	0	0	0	0	21	94	0	0	115	0	0	0	0	0	205
16:45	0	85	0	0	85	0	0	0	0	0	42	73	0	0	115	0	0	0	0	0	200
Total	0	329	1	0	330	1	0	4	0	5	155	324	1	0	480	0	0	0	0	0	815
17:00	0	103	0	0	103	0	0	0	0	0	56	109	0	0	165	0	0	0	0	0	268
17:15	0	94	0	0	94	2	0	1	0	3	49	103	0	0	152	0	0	0	0	0	249
17:30	0	85	0	0	85	0	0	1	0	1	18	87	0	0	105	0	0	0	0	0	191
17:45	0	80	0	0	80	0	0	2	0	2	45	92	0	0	137	0	0	0	0	0	219
Total	0	362	0	0	362	2	0	4	0	6	168	391	0	0	559	0	0	0	0	0	927
18:00	0	110	1	0	111	0	0	2	0	2	36	70	0	0	106	0	0	0	0	0	219
18:15	0	69	0	0	69	1	0	2	0	3	26	55	0	0	81	0	0	0	0	0	153
18:30	0	58	0	0	58	0	0	0	0	0	30	44	0	1	75	0	0	0	0	0	133
18:45	0	67	0	0	67	0	0	1	0	1	12	44	0	0	56	0	0	0	0	0	124
Total	0	304	1	0	305	1	0	5	0	6	104	213	0	1	318	0	0	0	0	0	629
19:00	0	44	0	0	44	0	0	0	0	0	25	65	0	0	90	0	0	0	0	0	134
19:15	0	43	0	0	43	2	0	0	0	2	22	40	0	0	62	0	0	0	0	0	107
19:30	0	35	0	0	35	0	0	1	0	1	15	42	0	0	57	0	0	0	0	0	93
19:45	0	30	0	0	30	0	0	1	0	1	22	42	0	0	64	0	0	0	0	0	95
Total	0	152	0	0	152	2	0	2	0	4	84	189	0	0	273	0	0	0	0	0	429
20:00	0	23	0	0	23	0	0	0	0	0	18	50	0	0	68	0	0	0	0	0	91
20:15	0	19	0	0	19	0	0	0	0	0	12	43	0	0	55	0	0	0	0	0	74
20:30	0	20	0	0	20	0	0	1	0	1	10	30	0	0	40	0	0	0	0	0	61
20:45	0	22	0	0	22	1	0	1	0	2	9	36	0	0	45	0	0	0	0	0	69
Total	0	84	0	0	84	1	0	2	0	3	49	159	0	0	208	0	0	0	0	0	295
21:00	0	24	0	0	24	0	0	0	0	0	7	21	0	0	28	0	0	0	0	0	52
21:15	0	16	0	0	16	0	0	0	0	0	9	28	0	0	37	0	0	0	0	0	53
21:30	0	15	0	0	15	0	0	1	0	1	12	22	0	0	34	0	0	0	0	0	50
21:45	0	15	0	0	15	0	0	0	0	0	33	31	0	0	64	0	0	0	0	0	79
Total	0	70	0	0	70	0	0	1	0	1	61	102	0	0	163	0	0	0	0	0	234
Grand Total	0	3835	7	0	3842	15	0	104	0	119	2270	3836	1	3	6110	0	0	0	0	0	10071
Apprch %	0	99.8	0.2	0		12.6	0	87.4	0		37.2	62.8	0	0		0	0	0	0		
Total %	0	38.1	0.1	0	38.1	0.1	0	1	0	1.2	22.5	38.1	0	0	60.7	0	0	0	0	0	
Unshifted	0	3643	7	0	3650	14	0	102	0	116	2210	3663	0	3	5876	0	0	0	0	0	19284
% Unshifted	0	95	100	0	95	93.3	0	98.1	0	97.5	97.4	95.5	0	100	96.2	0	0	0	0	0	95.7
HV	0	192	0	0	192	1	0	2	0	3	60	173	1	0	234	0	0	0	0	0	858
% HV	0	5	0	0	5	6.7	0	1.9	0	2.5	2.6	4.5	100	0	3.8	0	0	0	0	0	4.3

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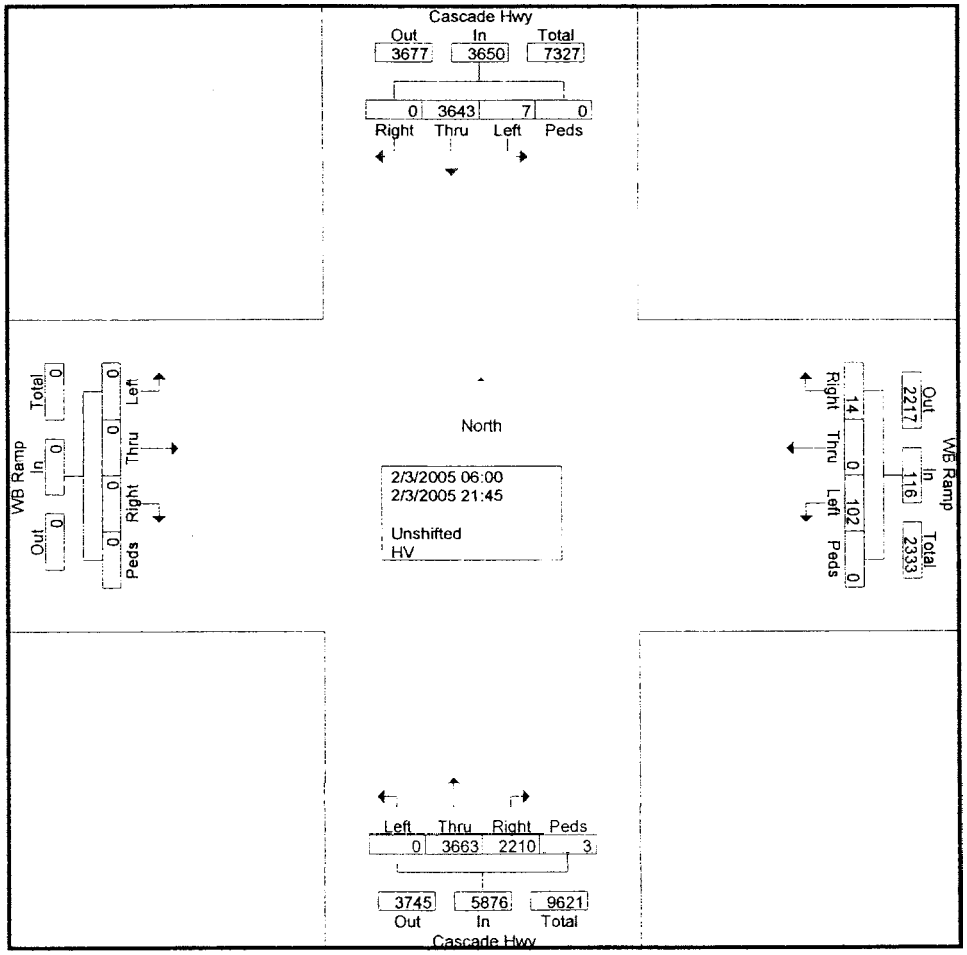

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	Cascade Hwy Southbound					WB Ramp Westbound					Cascade Hwy Northbound					WB Ramp Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Tota
Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:00																					
17:00	0	**103**	0	0	**103**	0	0	0	0	0	**56**	**109**	0	0	**165**	0	0	0	0	0	**268**
17:15	0	94	0	0	94	**2**	0	1	0	**3**	49	103	0	0	152	0	0	0	0	0	249
17:30	0	85	0	0	85	0	0	1	0	1	18	87	0	0	105	0	0	0	0	0	191
17:45	0	80	0	0	80	0	0	**2**	0	2	45	92	0	0	137	0	0	0	0	0	219
Total Volume	0	362	0	0	362	2	0	4	0	6	168	391	0	0	559	0	0	0	0	0	927
% App. Total	0	100	0	0		**33.3**	**0**	**66.7**	**0**		**30.1**	**69.9**	**0**	**0**		**0**	**0**	**0**	**0**		
PHF	.00	.87	.00	.00	.879	.25	.00	.50	.00	.500	.75	.89	.00	.00	.847	.00	.00	.00	.00	.000	.865
	0	9	0	0		0	0	0	0		0	7	0	0		0	0	0	0		

Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at

	14:45					08:30					17:00					06:00					
+0 mins.	0	**105**	**1**	0	**106**	**1**	0	3	0	**4**	**56**	**109**	0	0	**165**	0	0	0	0	0	
+15 mins.	0	91	0	0	91	0	0	2	0	2	49	103	0	0	152	0	0	0	0	0	
+30 mins.	**0**	**97**	**1**	**0**	**98**	**0**	**0**	**4**	**0**	**4**	18	87	0	0	105	0	0	0	0	0	
+45 mins.	0	85	0	0	85	0	0	4	0	4	45	92	0	0	137	0	0	0	0	0	
Total Volume	0	378	2	0	380	1	0	13	0	14	168	391	0	0	559	0	0	0	0	0	
% App. Total	0	99.5	0.5	0		7.1	0	92.9	0		30.1	69.9	0	0		0	0	0	0		
PHF	.00	.90	.50	.00	.896	.25	.00	.81	.00	.875	.75	.89	.00	.00	.847	.00	.00	.00	.00	.000	
	0	0	0	0		0	0	3	0		0	7	0	0		0	0	0	0		

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3209 S.E. 147th PL. #97
Vancouver, WA. 98683
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File Name : Cascade&Sublimity
Site Code : 00000000
Start Date : 2/3/2005
Page No : 1

Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Sublimity Westbound					Cascade Hwy Northbound					Sublimity Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	1	22	2	0	25	6	0	0	0	6	0	12	0	0	12	0	0	0	0	0	43
06:15	0	23	2	0	25	4	0	0	0	4	0	20	1	0	21	4	0	0	0	4	54
06:30	1	37	9	0	47	4	0	0	0	4	0	21	2	0	23	1	0	0	0	1	75
06:45	1	44	4	0	49	4	0	0	0	4	0	39	3	0	42	1	0	2	0	3	98
Total	3	126	17	0	146	18	0	0	0	18	0	92	6	0	98	6	0	2	0	8	270
07:00	2	42	7	0	51	4	0	0	0	4	0	38	4	0	42	3	0	0	0	3	100
07:15	2	51	3	0	56	5	0	0	0	5	1	44	8	0	53	2	1	0	0	3	117
07:30	1	69	6	0	76	7	2	0	0	9	0	42	1	0	43	1	1	0	0	2	130
07:45	1	133	5	0	139	11	1	0	0	12	0	77	10	0	87	1	0	0	0	1	239
Total	6	295	21	0	322	27	3	0	0	30	1	201	23	0	225	7	2	0	0	9	586
08:00	2	69	5	0	76	4	0	1	0	5	0	63	10	0	73	7	0	1	0	8	162
08:15	3	46	4	0	53	4	0	0	0	4	0	41	6	0	47	3	1	0	0	4	108
08:30	2	43	5	0	50	6	1	0	0	7	0	44	9	0	53	5	0	0	0	5	115
08:45	1	49	4	0	54	7	2	0	0	9	0	47	10	0	57	6	2	0	0	8	128
Total	8	207	18	0	233	21	3	1	0	25	0	195	35	0	230	21	3	1	0	25	513
09:00	2	37	3	0	42	2	0	1	0	3	0	39	5	0	44	2	1	3	0	6	95
09:15	1	45	4	0	50	7	0	0	0	7	2	34	1	0	37	4	1	0	0	5	99
09:30	2	34	2	0	38	3	2	1	0	6	0	38	3	0	41	2	0	2	0	4	89
09:45	0	50	5	0	55	4	0	0	0	4	0	39	6	0	45	3	1	0	0	4	108
Total	5	166	14	0	185	16	2	2	0	20	2	150	15	0	167	11	3	5	0	19	391
10:00	0	54	7	0	61	2	0	0	0	2	0	40	4	0	44	3	1	0	0	4	111
10:15	0	46	2	0	48	1	0	0	0	1	0	46	3	0	49	3	0	1	0	4	102
10:30	3	38	3	0	44	1	1	0	0	2	1	52	6	0	59	5	3	2	0	10	115
10:45	3	42	2	0	47	4	1	1	0	6	0	62	9	0	71	11	2	0	0	13	137
Total	6	180	14	0	200	8	2	1	0	11	1	200	22	0	223	22	6	3	0	31	465
11:00	1	60	2	0	63	3	0	0	0	3	0	52	6	0	58	5	1	5	0	11	135
11:15	3	54	2	0	59	4	0	0	0	4	0	61	6	0	67	4	1	0	0	5	135
11:30	3	37	3	0	43	4	1	0	0	5	0	55	8	0	63	12	0	0	0	12	123
11:45	0	41	4	0	45	8	1	0	0	9	0	45	17	0	62	8	4	4	0	16	132
Total	7	192	11	0	210	19	2	0	0	21	0	213	37	0	250	29	6	9	0	44	525
12:00	1	52	3	0	56	3	1	1	0	5	0	61	8	0	69	17	2	5	0	24	154
12:15	3	66	3	0	72	1	0	0	0	1	1	47	12	0	60	0	4	1	0	5	138
12:30	3	53	8	0	64	4	0	0	0	4	1	45	8	0	54	9	1	7	0	17	139
12:45	5	59	2	0	66	4	1	0	0	5	0	60	8	0	68	8	0	1	0	9	148
Total	12	230	16	0	258	12	2	1	0	15	2	213	36	0	251	34	7	14	0	55	579
13:00	1	79	10	0	90	3	1	0	0	4	3	52	13	0	68	1	0	1	0	2	164
13:15	1	61	3	0	65	4	0	0	0	4	0	68	10	0	78	11	2	0	0	13	160
13:30	1	66	6	0	73	2	0	0	0	2	0	55	5	0	60	8	4	0	0	12	147
13:45	6	63	3	0	72	7	0	0	0	7	0	58	11	0	69	9	4	2	0	15	163
Total	9	269	22	0	300	16	1	0	0	17	3	233	39	0	275	29	10	3	0	42	634
14:00	2	55	7	0	64	5	0	0	0	5	0	78	12	0	90	8	3	1	0	12	171
14:15	2	83	5	0	90	8	0	0	0	8	0	71	10	0	81	10	1	2	0	13	192
14:30	2	81	2	0	85	9	3	0	0	12	0	79	8	0	87	2	2	2	0	6	190
14:45	1	101	3	0	105	6	1	0	0	7	0	75	9	0	84	5	3	1	0	9	205
Total	7	320	17	0	344	28	4	0	0	32	0	303	39	0	342	25	9	6	0	40	758

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File Name : Cascade&Sublimity
Site Code : 00000000
Start Date : 2/3/2005

Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					Sublimity Westbound					Cascade Hwy Northbound					Sublimity Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
15:00	3	79	4	0	86	9	1	0	0	10	0	86	13	0	99	10	2	4	0	16	211
15:15	2	77	3	0	82	9	0	1	0	10	0	91	7	0	98	21	3	0	0	24	214
15:30	5	75	4	0	84	8	0	0	0	8	0	89	9	0	98	5	2	1	0	8	198
15:45	3	82	3	0	88	6	0	0	0	6	0	80	13	0	93	10	3	1	1	15	202
Total	13	313	14	0	340	32	1	1	0	34	0	346	42	0	388	46	10	6	1	63	825
16:00	3	62	2	0	67	16	2	0	0	18	0	77	8	0	85	11	3	2	0	16	186
16:15	4	69	6	0	79	5	0	0	0	5	0	72	3	0	75	10	2	4	0	16	175
16:30	6	75	5	0	86	6	0	0	0	6	0	88	11	0	99	11	6	4	0	21	212
16:45	4	76	2	0	82	14	0	0	0	14	0	74	3	0	77	9	3	2	0	14	187
Total	17	282	15	0	314	41	2	0	0	43	0	311	25	0	336	41	14	12	0	67	760
17:00	2	89	2	0	93	8	0	1	0	9	0	106	8	0	114	10	5	6	0	21	237
17:15	3	85	6	0	94	10	1	0	0	11	0	102	8	0	110	10	7	1	0	18	233
17:30	0	79	0	0	79	6	0	0	0	6	0	81	6	0	87	4	5	1	0	10	182
17:45	0	74	0	0	74	5	2	0	0	7	1	83	5	0	89	6	1	0	0	7	177
Total	5	327	8	0	340	29	3	1	0	33	1	372	27	0	400	30	18	8	0	56	829
18:00	0	119	3	0	122	7	1	0	0	8	11	53	3	0	67	11	2	1	0	14	211
18:15	0	65	1	1	67	3	0	0	0	3	5	48	4	0	57	4	4	0	0	8	135
18:30	0	56	4	0	60	3	0	0	0	3	4	41	4	0	49	2	1	0	0	3	115
18:45	0	63	3	0	66	6	2	0	0	8	1	37	3	0	41	4	0	1	0	5	120
Total	0	303	11	1	315	19	3	0	0	22	21	179	14	0	214	21	7	2	0	30	581
19:00	1	43	1	0	45	2	0	0	0	2	0	65	2	0	67	1	1	2	0	4	118
19:15	0	43	4	0	47	2	0	0	0	2	0	37	4	0	41	1	0	0	0	1	91
19:30	0	35	0	0	35	2	0	0	0	2	1	34	2	0	37	1	0	0	0	1	75
19:45	0	28	1	0	29	3	0	0	0	3	1	38	1	0	40	2	1	0	0	3	75
Total	1	149	6	0	156	9	0	0	0	9	2	174	9	0	185	5	2	2	0	9	359
20:00	0	17	2	0	19	0	0	0	0	0	0	48	2	0	50	5	0	0	0	5	74
20:15	0	19	1	0	20	5	0	0	0	5	0	42	1	0	43	0	0	0	0	0	68
20:30	1	17	0	0	18	3	0	0	0	3	5	31	2	0	38	2	0	0	0	2	61
20:45	0	20	2	0	22	1	0	0	0	1	0	32	3	0	35	2	0	0	0	2	60
Total	1	73	5	0	79	9	0	0	0	9	5	153	8	0	166	9	0	0	0	9	263
21:00	0	22	2	0	24	1	1	1	0	3	4	15	1	0	20	1	0	0	0	1	48
21:15	0	14	0	0	14	0	0	0	0	0	0	25	2	0	27	1	0	0	0	1	42
21:30	0	13	2	0	15	1	0	0	0	1	0	22	2	0	24	0	0	0	0	0	40
21:45	0	15	0	0	15	0	0	0	0	0	0	29	1	0	30	0	0	0	0	0	45
Total	0	64	4	0	68	2	1	1	0	4	4	91	6	0	101	2	0	0	0	2	175
Grand Total	100	3496	213	1	3810	306	29	8	0	343	42	3426	383	0	3851	338	97	73	1	509	8513
Apprch %	2.6	91.8	5.6	0		89.2	8.5	2.3	0		1.1	89	9.9	0		66.4	19.1	14.3	0.2		
Total %	1.2	41.1	2.5	0	44.8	3.6	0.3	0.1	0	4	0.5	40.2	4.5	0	45.2	4	1.1	0.9	0	6	
Unshifted	97	3322	202	1	3622	267	26	8	0	301	41	3269	367	0	3677	320	90	72	1	483	16166
% Unshifted	97	95	94.8	100	95.1	87.3	89.7	100	0	87.8	97.6	95.4	95.8	0	95.5	94.7	92.8	98.6	100	94.9	94.9
HV	3	174	11	0	188	39	3	0	0	42	1	157	16	0	174	18	7	1	0	26	860
% HV	3	5	5.2	0	4.9	12.7	10.3	0	0	12.2	2.4	4.6	4.2	0	4.5	5.3	7.2	1.4	0	5.1	5.1

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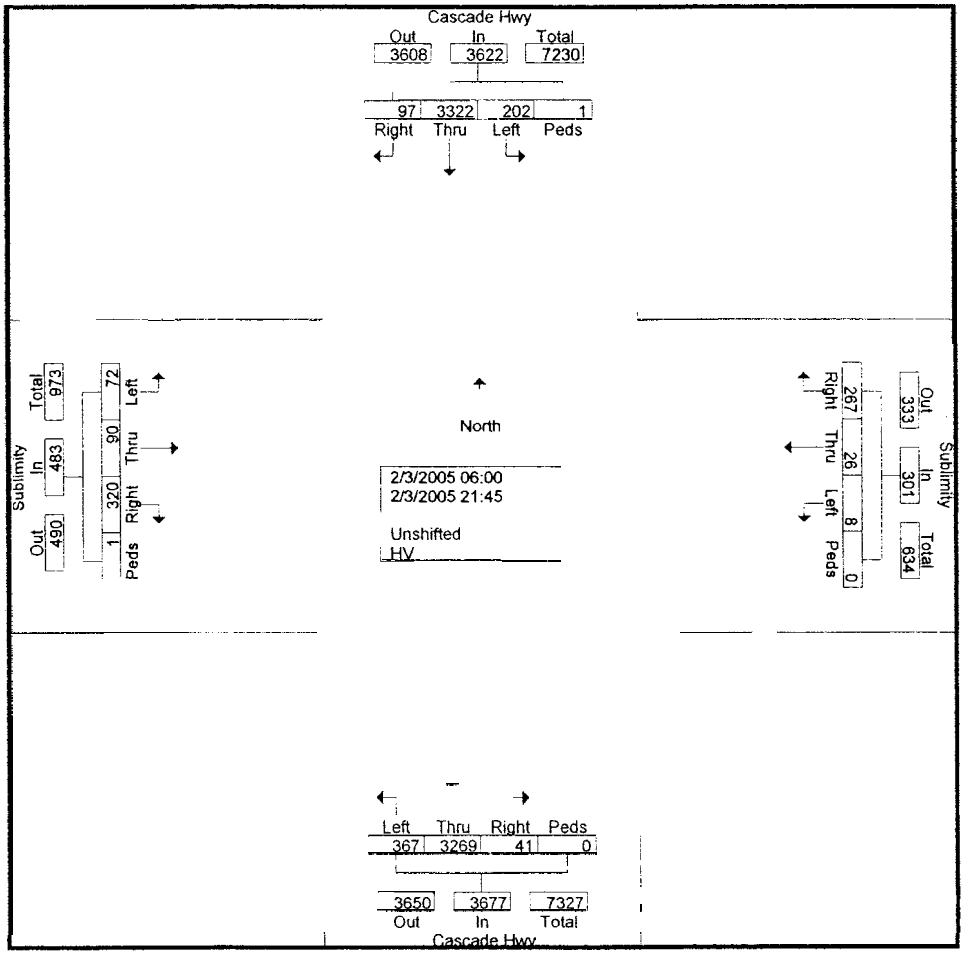

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	Cascade Hwy Southbound					Sublimity Westbound					Cascade Hwy Northbound					Sublimity Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 21:45 - Peak 1 of 1																					
Peak Hour for Each Approach Begins at																					
	17:15					16:00					16:30					16:30					
+0 mins.	3	85	6	0	94	16	2	0	0	18	0	88	11	0	99	11	6	4	0	21	
+15 mins.	0	79	0	0	79	5	0	0	0	5	0	74	3	0	77	9	3	2	0	14	
+30 mins.	0	74	0	0	74	6	0	0	0	6	0	106	8	0	114	10	5	6	0	21	
+45 mins.	0	119	3	0	122	14	0	0	0	14	0	102	8	0	110	10	7	1	0	18	
Total Volume	3	357	9	0	369	41	2	0	0	43	0	370	30	0	400	40	21	13	0	74	
% App. Total	0.8	96.7	2.4	0		95.3	4.7	0	0		0	92.5	7.5	0		54.1	28.4	17.6	-		
PHF	.250	.750	.375	.000	.756	.641	.250	.000	.000	.597	.000	.873	.682	.000	.877	.909	.750	.542	.000	.881	

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File Name : Cascade&9th
Site Code : 00000000
Start Date : 2/3/2005
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Groups Printed- Unshifted - HV

	Cascade Hwy Southbound					9th Westbound					Cascade Hwy Northbound					9th Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:00	1	2	0	0	3	0	0	0	0	0	0	19	0	0	19	2	0	0	0	2	24
06:15	0	21	0	0	21	0	0	0	0	0	0	23	2	0	25	4	0	2	0	6	52
06:30	0	34	0	0	34	0	0	0	0	0	0	24	1	0	25	13	0	2	0	15	74
06:45	0	38	0	0	38	0	0	0	0	0	0	42	5	0	47	11	0	3	0	14	99
Total	1	95	0	0	96	0	0	0	0	0	0	108	8	0	116	30	0	7	0	37	249
07:00	0	45	0	0	45	0	0	0	0	0	0	41	3	0	44	6	0	2	0	8	97
07:15	0	51	0	0	51	0	0	0	0	0	0	49	3	0	52	5	0	1	0	6	109
07:30	4	67	0	0	71	0	0	0	0	0	0	49	1	0	50	9	0	5	0	14	135
07:45	5	126	0	0	131	0	0	0	0	0	0	89	1	0	90	13	0	3	0	16	237
Total	9	289	0	0	298	0	0	0	0	0	0	228	8	0	236	33	0	11	0	44	578
08:00	4	66	0	0	70	0	0	0	0	0	0	64	4	0	68	10	0	4	0	14	152
08:15	2	49	0	0	51	0	0	0	0	0	0	47	0	0	47	4	0	2	0	6	104
08:30	0	47	0	0	47	0	0	0	0	0	0	50	2	0	52	3	0	4	0	7	106
08:45	1	48	0	0	49	0	0	0	0	0	0	52	1	0	53	6	0	2	0	8	110
Total	7	210	0	0	217	0	0	0	0	0	0	213	7	0	220	23	0	12	0	35	472
09:00	0	42	0	0	42	0	0	0	0	0	0	45	2	0	47	0	0	4	0	4	93
09:15	4	46	0	0	50	0	0	0	0	0	0	39	2	0	41	4	0	3	0	7	98
09:30	0	44	0	0	44	0	0	0	0	0	0	45	1	0	46	3	0	1	0	4	94
09:45	4	53	0	0	57	0	0	0	0	0	0	40	3	0	43	6	0	0	0	6	106
Total	8	185	0	0	193	0	0	0	0	0	0	169	8	0	177	13	0	8	0	21	391
Grand Total	25	779	0	0	804	0	0	0	0	0	0	718	31	0	749	99	0	38	0	137	1690
Apprch %	3.1	96.9	0	0		0	0	0	0		0	95.9	4.1	0		72.3	0	27.7	0		
Total %	1.5	46.1	0	0	47.6	0	0	0	0	0	0	42.5	1.8	0	44.3	5.9	0	2.2	0	8.1	
Unshifted	22	741	0	0	763	0	0	0	0	0	0	655	30	0	685	95	0	36	0	131	3158
% Unshifted	88	95.1	0	0	94.9	0	0	0	0	0	0	91.2	96.8	0	91.5	96	0	94.7	0	95.6	93.4
HV	3	38	0	0	41	0	0	0	0	0	0	63	1	0	64	4	0	2	0	6	222
% HV	12	4.9	0	0	5.1	0	0	0	0	0	0	8.8	3.2	0	8.5	4	0	5.3	0	4.4	6.6

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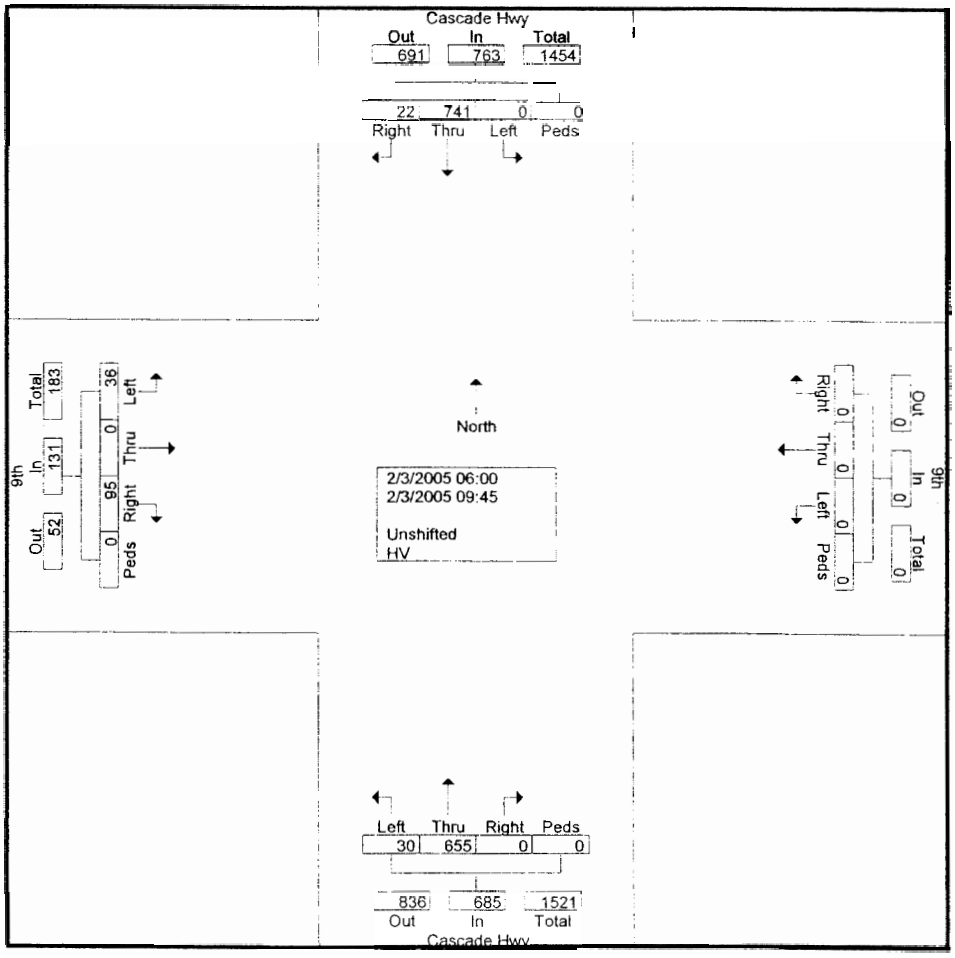

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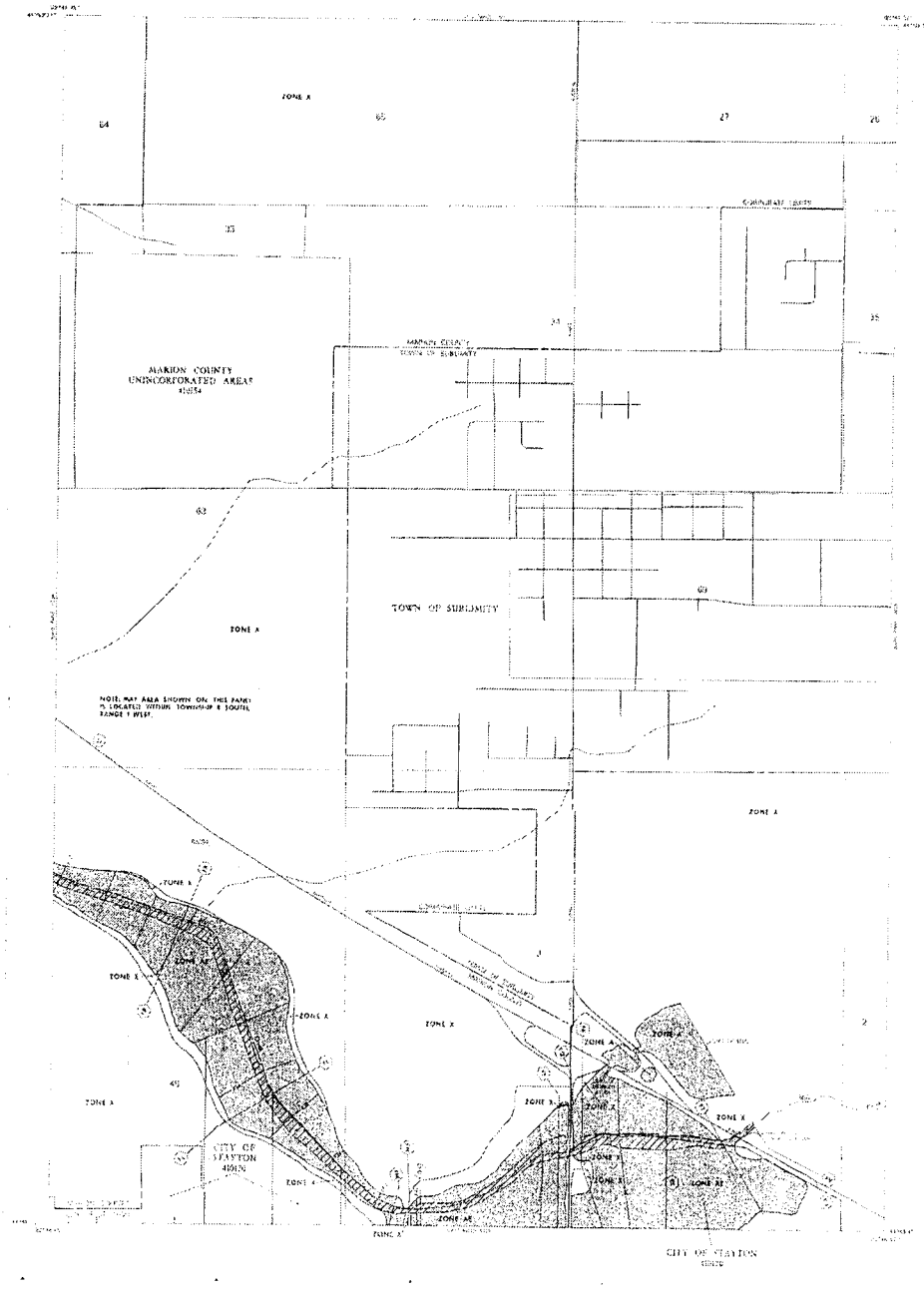
	Cascade Hwy Southbound					9th Westbound					Cascade Hwy Northbound					9th Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15																					
07:15	0	51	0	0	51	0	0	0	0	0	0	49	3	0	52	5	0	1	0	6	109
07:30	4	67	0	0	71	0	0	0	0	0	0	49	1	0	50	9	0	**5**	0	14	135
07:45	**5**	**126**	0	0	**131**	0	0	0	0	0	0	**89**	1	0	**90**	**13**	0	3	0	**16**	**237**
08:00	4	66	0	0	70	0	0	0	0	0	0	64	**4**	0	68	10	0	4	0	14	152
Total Volume	13	310	0	0	323	0	0	0	0	0	0	251	9	0	260	37	0	13	0	50	633
% App. Total	4	96	0	0		0	0	0	0		0	96.5	3.5	0		74	0	26	0		
PHF	.65	.61	.00	.00	.616	.00	.00	.00	.00	.000	.00	.70	.56	.00	.722	.71	.00	.65	.00	.781	.668
	0	5	0	0		0	0	0	0		0	5	3	0		2	0	0	0		

Peak Hour Analysis From 06:00 to 09:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15					06:00					07:15					07:15				
+0 mins.	0	51	0	0	51	0	0	0	0	0	0	49	3	0	52	5	0	1	0	6
+15 mins.	4	67	0	0	71	0	0	0	0	0	0	49	1	0	50	9	0	**5**	0	14
+30 mins.	**5**	**126**	0	0	**131**	0	0	0	0	0	0	**89**	1	0	**90**	**13**	0	3	0	**16**
+45 mins.	4	66	0	0	70	0	0	0	0	0	0	64	**4**	0	68	10	0	4	0	14
Total Volume	13	310	0	0	323	0	0	0	0	0	0	251	9	0	260	37	0	13	0	50
% App. Total	4	96	0	0		0	0	0	0		0	96.5	3.5	0		74	0	26	0	
PHF	.65	.61	.00	.00	.616	.00	.00	.00	.00	.000	.00	.70	.56	.00	.722	.71	.00	.65	.00	.781
	0	5	0	0		0	0	0	0		0	5	3	0		2	0	0	0	

APPENDIX E

FEMA Flood Insurance Rate Map



LEGEND

NOTES

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARION COUNTY, OREGON AND INCORPORATED AREAS

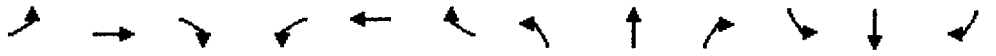
PANEL 208 OF 1150

MAP NUMBER
41047C0208 G

EFFECTIVE DATE
JANUARY 19, 2010

APPENDIX F

No Build 2025 Traffic Operations Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1660	1624		1660	1667		1660	1704		1644	1684	
Flt Permitted	0.17	1.00		0.12	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	293	1624		203	1667		1660	1704		1644	1684	
Volume (vph)	165	240	215	115	215	95	175	575	115	110	680	150
Peak-hour factor, PHF	0.92	0.92	0.92	0.84	0.84	0.84	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	179	261	234	137	256	113	211	693	139	120	739	163
RTOR Reduction (vph)	0	22	0	0	11	0	0	5	0	0	6	0
Lane Group Flow (vph)	179	473	0	137	358	0	211	827	0	120	896	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	50.7	36.1		47.3	34.4		16.0	59.0		16.0	59.0	
Effective Green, g (s)	50.7	36.1		47.3	34.4		16.0	59.0		16.0	59.0	
Actuated g/C Ratio	0.36	0.26		0.34	0.25		0.11	0.42		0.11	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	249	419		203	410		190	718		188	710	
v/s Ratio Prot	c0.08	c0.29		0.06	0.21		c0.13	0.49		0.07	c0.53	
v/s Ratio Perm	0.19			0.17								
v/c Ratio	0.72	1.13		0.67	0.87		1.11	1.15		0.64	1.26	
Uniform Delay, d1	34.7	52.0		37.6	50.7		62.0	40.5		59.2	40.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.94	0.89	
Incremental Delay, d2	9.5	83.8		8.6	18.1		98.0	83.7		5.7	127.3	
Delay (s)	44.2	135.7		46.1	68.8		160.0	124.2		61.5	163.4	
Level of Service	D	F		D	E		F	F		E	F	
Approach Delay (s)		111.4			62.6			131.5			151.4	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	122.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Queues

1: Fern Ridge Rd & Cascade Hwy 07/07/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1660	1623	0	1660	1667	0	1660	1704	0	1644	1684	0
Flt Permitted	0.154			0.121			0.950			0.950		
Satd. Flow (perm)	269	1623	0	211	1667	0	1660	1704	0	1644	1684	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30			15			9			10	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		816			826			887			946	
Travel Time (s)		18.5			18.8			11.0			11.7	
Volume (vph)	165	240	215	115	215	95	175	575	115	110	680	150
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.83	0.83	0.83	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	179	495	0	137	369	0	211	832	0	120	902	0
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	30.0		20.0	30.0		20.0	40.0		20.0	40.0	
Total Split (s)	20.0	37.0	0.0	20.0	37.0	0.0	20.0	63.0	0.0	20.0	63.0	0.0
Total Split (%)	14.3%	26.4%	0.0%	14.3%	26.4%	0.0%	14.3%	45.0%	0.0%	14.3%	45.0%	0.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	None	
Act Effct Green (s)	50.6	36.1		47.4	34.4		16.0	59.0		16.0	59.0	
Actuated g/C Ratio	0.36	0.26		0.34	0.25		0.11	0.42		0.11	0.42	
v/c Ratio	0.74	1.12		0.67	0.88		1.11	1.15		0.64	1.26	
Control Delay	46.1	125.4		40.8	71.0		153.1	120.3		69.4	159.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	46.1	125.4		40.8	71.0		153.1	120.3		69.4	159.2	
LOS	D	F		D	E		F	F		E	F	
Approach Delay		104.3			62.8			126.9			148.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		F			E			F			F	
90th %ile Green (s)	16.0	33.0		16.0	33.0		16.0	59.0		16.0	59.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Coord		Max	Coord	
70th %ile Green (s)	16.0	33.8		15.2	33.0		16.0	59.0		16.0	59.0	
70th %ile Term Code	Max	Max		Gap	Max		Max	Coord		Max	Coord	
50th %ile Green (s)	16.0	35.7		13.3	33.0		16.0	59.0		16.0	59.0	
50th %ile Term Code	Max	Max		Gap	Max		Max	Coord		Hold	Coord	
30th %ile Green (s)	14.0	37.6		11.4	35.0		16.0	59.0		16.0	59.0	
30th %ile Term Code	Gap	Max		Gap	Hold		Max	Coord		Hold	Coord	
10th %ile Green (s)	10.8	40.2		8.8	38.2		16.0	59.0		16.0	59.0	
10th %ile Term Code	Gap	Max		Gap	Hold		Max	Coord		Hold	Coord	
Queue Length 50th (ft)	113	~503		84	318		~220	~887		107	~1030	
Queue Length 95th (ft)	#194	#759		128	#447		#342	#1000		m168	#1278	
Internal Link Dist (ft)		736			746			807			866	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	258	440		241	421		190	723		188	715	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.69	1.13		0.57	0.88		1.11	1.15		0.64	1.26	

Intersection Summary

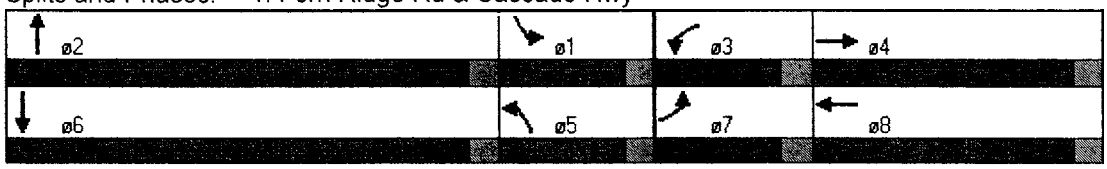
Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 4 (3%), Referenced to phase 2:NBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 119.1 Intersection LOS: F
Intersection Capacity Utilization 104.9% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Fern Ridge Rd & Cascade Hwy



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	20	805	30	0	940
Peak Hour Factor	0.92	0.92	0.92	0.92	0.81	0.81
Hourly flow rate (vph)	0	22	875	33	0	1160
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			946			354
pX, platoon unblocked	0.68	0.53			0.53	
vC, conflicting volume	2052	891			908	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1870	796			826	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	54	204			426	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	908	1160
Volume Left	0	0	0
Volume Right	22	33	0
cSH	204	1700	1700
Volume to Capacity	0.11	0.53	0.68
Queue Length 95th (ft)	9	0	0
Control Delay (s)	24.7	0.0	0.0
Lane LOS	C		
Approach Delay (s)	24.7	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1500		1660	1485		1660	1723		1644	1726	
Flt Permitted	0.33	1.00		0.74	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	583	1500		1298	1485		1660	1723		1644	1726	
Volume (vph)	15	0	20	105	0	140	10	740	75	240	815	15
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.81	0.81	0.91	0.91	0.92
Adj. Flow (vph)	16	0	22	113	0	151	11	914	93	264	896	16
RTOR Reduction (vph)	0	20	0	0	135	0	0	3	0	0	0	0
Lane Group Flow (vph)	16	2	0	113	16	0	11	1004	0	264	912	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	14.9	14.9		14.9	14.9		1.6	86.5		26.6	111.5	
Effective Green, g (s)	14.9	14.9		14.9	14.9		1.6	86.5		26.6	111.5	
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.01	0.62		0.19	0.80	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	160		138	158		19	1065		312	1375	
v/s Ratio Prot		0.00			0.01		0.01	c0.58		c0.16	0.53	
v/s Ratio Perm	0.03			c0.09								
v/c Ratio	0.26	0.01		0.82	0.10		0.58	0.94		0.85	0.66	
Uniform Delay, d1	57.5	56.0		61.2	56.5		68.9	24.5		54.7	6.1	
Progression Factor	1.00	1.00		1.00	1.00		0.96	0.32		1.00	1.00	
Incremental Delay, d2	2.2	0.0		30.0	0.3		17.1	8.9		18.6	2.5	
Delay (s)	59.7	56.0		91.2	56.8		83.0	16.8		73.3	8.7	
Level of Service	E	E		F	E		F	B		E	A	
Approach Delay (s)		57.6			71.5			17.5			23.2	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

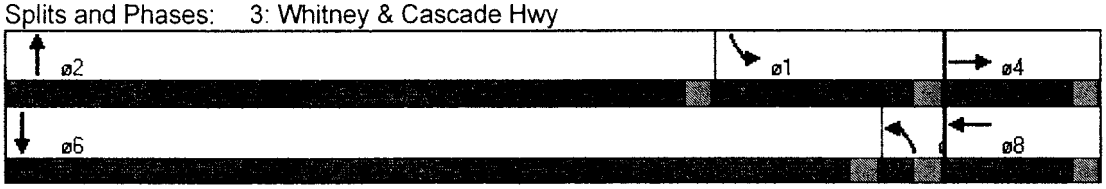
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	300		0	300		0	300		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1676	1500	0	1660	1485	0	1660	1723	0	1644	1726	0
Flt Permitted	0.357			0.743			0.950			0.950		
Satd. Flow (perm)	630	1500	0	1298	1485	0	1660	1723	0	1644	1726	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		271			339			7			2	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		1105			636			354			541	
Travel Time (s)		25.1			14.5			4.4			6.7	
Volume (vph)	15	0	20	105	0	140	10	740	75	240	815	15
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.81	0.81	0.91	0.91	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	16	22	0	113	151	0	11	1007	0	264	912	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	8.0	91.0	0.0	29.0	112.0	0.0
Total Split (%)	14.3%	14.3%	0.0%	14.3%	14.3%	0.0%	5.7%	65.0%	0.0%	20.7%	80.0%	0.0%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag							Lag	Lead		Lag	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	14.9	14.9		14.9	14.9		5.1	88.9		24.2	113.9	
Actuated g/C Ratio	0.11	0.11		0.11	0.11		0.04	0.64		0.17	0.81	
v/c Ratio	0.24	0.05		0.82	0.33		0.18	0.92		0.93	0.65	
Control Delay	64.7	0.2		91.5	1.8		66.6	15.6		88.6	8.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	64.7	0.2		91.5	1.8		66.6	15.6		88.6	8.6	
LOS	E	A		F	A		E	B		F	A	
Approach Delay		27.4			40.2			16.1			26.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			D			B			C	
90th %ile Green (s)	16.0	16.0		16.0	16.0		4.0	87.0		25.0	108.0	
90th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		Max	Coord	
70th %ile Green (s)	16.0	16.0		16.0	16.0		4.0	87.0		25.0	108.0	
70th %ile Term Code	Hold	Hold		Max	Max		Max	Coord		Max	Coord	
50th %ile Green (s)	16.0	16.0		16.0	16.0		0.0	87.0		25.0	116.0	
50th %ile Term Code	Hold	Hold		Max	Max		Skip	Coord		Max	Coord	
30th %ile Green (s)	15.4	15.4		15.4	15.4		0.0	87.6		25.0	116.6	
30th %ile Term Code	Hold	Hold		Gap	Gap		Skip	Coord		Max	Coord	
10th %ile Green (s)	11.0	11.0		11.0	11.0		0.0	96.0		21.0	121.0	
10th %ile Term Code	Hold	Hold		Gap	Gap		Skip	Coord		Gap	Coord	
Queue Length 50th (ft)	14	0		101	0		10	314		238	242	
Queue Length 95th (ft)	39	0		#204	0		m13	m266		#403	482	
Internal Link Dist (ft)		1025			556			274			461	
Turn Bay Length (ft)	300			300			300					
Base Capacity (vph)	72	411		148	470		60	1097		294	1405	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.22	0.05		0.76	0.32		0.18	0.92		0.90	0.65	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 132 (94%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 23.8 Intersection LOS: C
Intersection Capacity Utilization 83.1% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Whitney & Cascade Hwy



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	65	530	65	830	540	85
Peak Hour Factor	0.87	0.87	0.84	0.84	0.90	0.90
Hourly flow rate (vph)	75	609	77	988	600	94
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				954		
pX, platoon unblocked	0.44					
vC, conflicting volume	1790	647	694			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2815	647	694			
tC, single (s)	*7.4	*7.2	4.1			
tC, 2 stage (s)						
tF (s)	*4.5	*4.3	2.2			
p0 queue free %	0	0	91			
cM capacity (veh/h)	4	329	892			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	684	1065	694
Volume Left	75	77	0
Volume Right	609	0	94
cSH	30	892	1700
Volume to Capacity	22.94	0.09	0.41
Queue Length 95th (ft)	Err	7	0
Control Delay (s)	Err	2.5	0.0
Lane LOS	F	A	
Approach Delay (s)	Err	2.5	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	2799.3		
Intersection Capacity Utilization	133.7%	ICU Level of Service	H
Analysis Period (min)	15		

* User Entered Value

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↳			↑
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	635	260	0	625
Peak Hour Factor	0.92	0.92	0.85	0.85	0.88	0.88
Hourly flow rate (vph)	0	0	747	306	0	710
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1610	900			1053	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1610	900			1053	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	115	337			650	

Direction, Lane #	NB 1	SB 1
Volume Total	1053	710
Volume Left	0	0
Volume Right	306	0
cSH	1700	1700
Volume to Capacity	0.62	0.42
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Sign Control	Stop				Free			Free			Stop	
Grade	0%				0%			0%			0%	
Volume (veh/h)	20	35	75	50	585	0	20	535	20	15	10	65
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.94	0.94	0.94	0.77	0.77	0.77
Hourly flow rate (vph)	23	40	85	57	665	0	21	569	21	19	13	84
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None										None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1492	1401	580	590			665			1506	1411	665
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1492	1401	580	590			665			1506	1411	665
tC, single (s)	*8.6	*8.0	*7.7	4.1			4.1			*8.7	*8.1	*7.8
tC, 2 stage (s)												
tF (s)	*4.5	*5.0	*4.3	2.2			2.2			*4.6	*5.1	*4.4
p0 queue free %	18	40	75	94			98			0	79	70
cM capacity (veh/h)	28	67	336	970			910			17	63	283

Direction, Lane #	EB 1	NB 1	SB 1	NW 1
Volume Total	148	722	612	117
Volume Left	23	57	21	19
Volume Right	85	0	21	84
cSH	89	970	910	71
Volume to Capacity	1.67	0.06	0.02	1.64
Queue Length 95th (ft)	300	5	2	251
Control Delay (s)	426.2	1.5	0.6	439.2
Lane LOS	F	A	A	F
Approach Delay (s)	426.2	1.5	0.6	439.2
Approach LOS	F			F

Intersection Summary			
Average Delay	72.5		
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	20	70	30	640	505	20
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	22	76	32	681	549	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1304	560	571			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1304	560	571			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	85	97			
cM capacity (veh/h)	169	524	987			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	98	713	571
Volume Left	22	32	0
Volume Right	76	0	22
cSH	358	987	1700
Volume to Capacity	0.27	0.03	0.34
Queue Length 95th (ft)	27	3	0
Control Delay (s)	18.8	0.8	0.0
Lane LOS	C	A	
Approach Delay (s)	18.8	0.8	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	620	0	0	1175	0	150
Peak Hour Factor	0.92	0.92	0.92	0.92	0.87	0.87
Hourly flow rate (vph)	674	0	0	1277	0	172
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			674		1951	674
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			674		1951	674
tC, single (s)			4.1		6.4	*8.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	*5.3
p0 queue free %			100		100	25
cM capacity (veh/h)			917		70	231

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	674	1277	172
Volume Left	0	0	0
Volume Right	0	0	172
cSH	1700	1700	231
Volume to Capacity	0.40	0.75	0.75
Queue Length 95th (ft)	0	0	130
Control Delay (s)	0.0	0.0	55.8
Lane LOS			F
Approach Delay (s)	0.0	0.0	55.8
Approach LOS			F

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↗
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	770	860	0	0	315
Peak Hour Factor	0.92	0.92	0.92	0.92	0.85	0.85
Hourly flow rate (vph)	0	837	935	0	0	371
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	935				1772	935
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	935				1772	935
tC, single (s)	4.1				6.4	*6.7
tC, 2 stage (s)						
tF (s)	2.2				3.5	*3.8
p0 queue free %	100				100	0
cM capacity (veh/h)	732				90	262

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	837	935	371
Volume Left	0	0	0
Volume Right	0	0	371
cSH	1700	1700	262
Volume to Capacity	0.49	0.55	1.42
Queue Length 95th (ft)	0	0	511
Control Delay (s)	0.0	0.0	244.9
Lane LOS			F
Approach Delay (s)	0.0	0.0	244.9
Approach LOS			F

Intersection Summary			
Average Delay	42.4		
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

APPENDIX G

Build 2025 Traffic Operations Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.95		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1660	1624		1660	1667		1660	3237		1644	3199	
Flt Permitted	0.22	1.00		0.14	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	377	1624		240	1667		1660	3237		1644	3199	
Volume (vph)	165	240	215	115	215	95	175	575	115	110	680	150
Peak-hour factor, PHF	0.92	0.92	0.92	0.84	0.84	0.84	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	179	261	234	137	256	113	211	693	139	120	739	163
RTOR Reduction (vph)	0	27	0	0	14	0	0	15	0	0	17	0
Lane Group Flow (vph)	179	468	0	137	355	0	211	817	0	120	885	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	43.6	30.7		40.4	29.1		18.5	39.3		12.7	33.5	
Effective Green, g (s)	43.6	30.7		40.4	29.1		18.5	39.3		12.7	33.5	
Actuated g/C Ratio	0.40	0.28		0.37	0.26		0.17	0.36		0.12	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	300	453		234	441		279	1156		190	974	
v/s Ratio Prot	c0.07	c0.29		0.06	0.21		0.13	c0.25		0.07	c0.28	
v/s Ratio Perm	0.17			0.15								
v/c Ratio	0.60	1.03		0.59	0.81		0.76	0.71		0.63	0.91	
Uniform Delay, d1	24.4	39.6		27.0	37.8		43.6	30.4		46.4	36.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	50.8		3.7	10.3		11.1	3.7		6.7	11.9	
Delay (s)	27.5	90.5		30.7	48.1		54.7	34.1		53.1	48.7	
Level of Service	C	F		C	D		D	C		D	D	
Approach Delay (s)		73.8			43.4			38.2			49.2	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM Average Control Delay	49.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

1: Fern Ridge Rd & Cascade Hwy 07/08/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	200		0	200		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1660	1623	0	1660	1667	0	1660	3237	0	1644	3200	0
Flt Permitted	0.174			0.154			0.950			0.950		
Satd. Flow (perm)	304	1623	0	269	1667	0	1660	3237	0	1644	3200	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38			19			23			25	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		816			826			887			946	
Travel Time (s)		18.5			18.8			11.0			11.7	
Volume (vph)	165	240	215	115	215	95	175	575	115	110	680	150
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.83	0.83	0.83	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	179	495	0	137	369	0	211	832	0	120	902	0
Turn Type	pm+pt			pm+pt			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	30.0		20.0	30.0		20.0	40.0		20.0	40.0	
Total Split (s)	20.0	30.0	0.0	20.0	30.0	0.0	20.0	40.0	0.0	20.0	40.0	0.0
Total Split (%)	18.2%	27.3%	0.0%	18.2%	27.3%	0.0%	18.2%	36.4%	0.0%	18.2%	36.4%	0.0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Max		None	None	
Act Effct Green (s)	43.5	30.7		40.5	29.1		18.5	39.3		12.7	33.5	
Actuated g/C Ratio	0.40	0.28		0.37	0.26		0.17	0.36		0.12	0.30	
v/c Ratio	0.64	1.03		0.57	0.81		0.76	0.71		0.63	0.91	
Control Delay	28.5	86.8		25.5	52.0		63.2	34.2		53.3	44.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.5	86.8		25.5	52.0		63.2	34.2		53.3	44.1	
LOS	C	F		C	D		E	C		D	D	
Approach Delay		71.3			44.9			40.1			45.2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		E			D			D			D	
90th %ile Green (s)	16.0	26.4		15.6	26.0		16.0	36.0		16.0	36.0	
90th %ile Term Code	Max	Max		Gap	Max		Max	Coord		Max	Coord	
70th %ile Green (s)	15.2	29.2		12.8	26.8		16.0	36.6		15.4	36.0	
70th %ile Term Code	Gap	Max		Gap	Max		Max	Coord		Gap	Coord	
50th %ile Green (s)	13.2	30.8		11.2	28.8		16.0	39.0		13.0	36.0	
50th %ile Term Code	Gap	Max		Gap	Max		Max	Coord		Gap	Coord	
30th %ile Green (s)	11.3	32.4		9.6	30.7		19.7	41.0		11.0	32.3	
30th %ile Term Code	Gap	Max		Gap	Hold		Hold	Coord		Gap	Coord	
10th %ile Green (s)	8.7	34.5		7.5	33.3		24.7	44.0		8.0	27.3	
10th %ile Term Code	Gap	Max		Gap	Hold		Hold	Coord		Gap	Coord	
Queue Length 50th (ft)	81	~354		60	234		148	257		82	303	
Queue Length 95th (ft)	134	#610		95	#370		#248	308		140	#389	
Internal Link Dist (ft)		736			746			807			866	
Turn Bay Length (ft)	200			200			200			200		
Base Capacity (vph)	322	480		311	455		279	1172		239	1064	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.56	1.03		0.44	0.81		0.76	0.71		0.50	0.85	

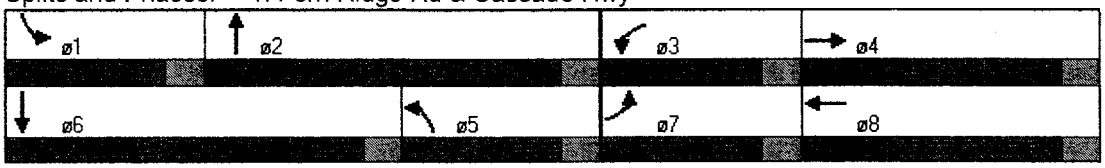
Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 48.9 Intersection LOS: D
Intersection Capacity Utilization 82.4% ICU Level of Service E
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Fern Ridge Rd & Cascade Hwy



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	20	805	30	0	940
Peak Hour Factor	0.92	0.92	0.92	0.92	0.81	0.81
Hourly flow rate (vph)	0	22	875	33	0	1160
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			946			354
pX, platoon unblocked	0.90	0.83			0.83	
vC, conflicting volume	1472	454			908	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	964	139			685	
tC, single (s)	6.9	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	224	729			746	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	22	583	324	580	580
Volume Left	0	0	0	0	0
Volume Right	22	0	33	0	0
cSH	729	1700	1700	1700	1700
Volume to Capacity	0.03	0.34	0.19	0.34	0.34
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.1	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1500		1660	1485		1676	3274		1644	3281	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1676	1500		1660	1485		1676	3274		1644	3281	
Volume (vph)	15	0	20	105	0	140	10	740	75	240	815	15
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.81	0.81	0.91	0.91	0.92
Adj. Flow (vph)	16	0	22	113	0	151	11	914	93	264	896	16
RTOR Reduction (vph)	0	21	0	0	132	0	0	6	0	0	1	0
Lane Group Flow (vph)	16	1	0	113	19	0	11	1001	0	264	911	0
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	3%	3%	4%	4%	2%
Turn Type	Split			Split			Prot			Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	4.2	4.2		11.2	11.2		1.0	41.4		17.2	57.6	
Effective Green, g (s)	4.2	4.2		11.2	11.2		1.0	41.4		17.2	57.6	
Actuated g/C Ratio	0.05	0.05		0.12	0.12		0.01	0.46		0.19	0.64	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	78	70		207	185		19	1506		314	2100	
v/s Ratio Prot	c0.01	0.00		c0.07	0.01		0.01	c0.31		c0.16	0.28	
v/s Ratio Perm												
v/c Ratio	0.21	0.01		0.55	0.10		0.58	0.66		0.84	0.43	
Uniform Delay, d1	41.3	40.9		37.0	34.9		44.3	18.9		35.1	8.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.1		2.9	0.2		36.3	2.3		18.0	0.7	
Delay (s)	42.6	41.0		39.9	35.2		80.6	21.2		53.1	8.7	
Level of Service	D	D		D	D		F	C		D	A	
Approach Delay (s)		41.7			37.2			21.9			18.7	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	300		300	300		0	300		0	300		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1676	1500	0	1660	1485	0	1676	3274	0	1644	3280	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1676	1500	0	1660	1485	0	1676	3274	0	1644	3280	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		264			501			12			2	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		941			636			354			579	
Travel Time (s)		21.4			14.5			4.4			7.2	
Volume (vph)	15	0	20	105	0	140	10	740	75	240	815	15
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.81	0.81	0.91	0.91	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	3%	3%	4%	4%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	16	22	0	113	151	0	11	1007	0	264	912	0
Turn Type	Split			Split			Prot			Prot		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Detector Phases	4	4		8	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	8.0	32.0	0.0	18.0	42.0	0.0
Total Split (%)	22.2%	22.2%	0.0%	22.2%	22.2%	0.0%	8.9%	35.6%	0.0%	20.0%	46.7%	0.0%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag							Lag	Lead		Lag	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	6.4	6.4		11.2	11.2		5.6	46.2		14.0	62.4	
Actuated g/C Ratio	0.07	0.07		0.12	0.12		0.06	0.51		0.16	0.69	
v/c Ratio	0.14	0.06		0.55	0.24		0.11	0.60		1.03	0.40	
Control Delay	39.3	0.2		39.9	0.8		42.5	18.9		104.3	8.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.3	0.2		39.9	0.8		42.5	18.9		104.3	8.6	
LOS	D	A		D	A		D	B		F	A	
Approach Delay		16.6			17.5			19.2			30.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			C	
90th %ile Green (s)	7.8	7.8		15.9	15.9		4.9	36.3		14.0	45.4	
90th %ile Term Code	Gap	Gap		Gap	Gap		Max	Coord		Max	Coord	
70th %ile Green (s)	6.9	6.9		12.9	12.9		0.0	40.2		14.0	58.2	
70th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Coord		Max	Coord	
50th %ile Green (s)	6.2	6.2		11.2	11.2		0.0	42.6		14.0	60.6	
50th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Coord		Max	Coord	
30th %ile Green (s)	0.0	0.0		9.4	9.4		0.0	54.6		14.0	72.6	
30th %ile Term Code	Skip	Skip		Gap	Gap		Skip	Coord		Max	Coord	
10th %ile Green (s)	0.0	0.0		6.8	6.8		0.0	57.2		14.0	75.2	
10th %ile Term Code	Skip	Skip		Gap	Gap		Skip	Coord		Max	Coord	
Queue Length 50th (ft)	9	0		61	0		6	217		~163	107	
Queue Length 95th (ft)	28	0		109	0		23	278		#313	234	
Internal Link Dist (ft)		861			556			274			499	
Turn Bay Length (ft)	300			300			300			300		
Base Capacity (vph)	298	484		295	676		103	1686		256	2275	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.05		0.38	0.22		0.11	0.60		1.03	0.40	

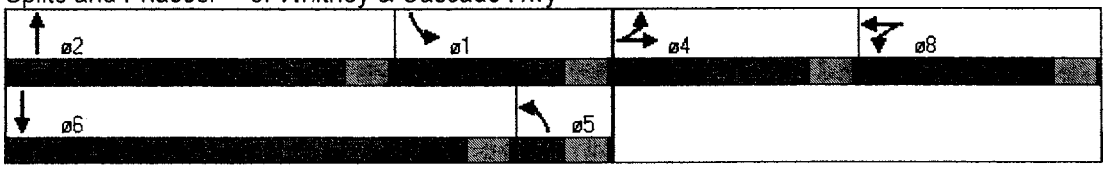
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 24.1 Intersection LOS: C
Intersection Capacity Utilization 61.3% ICU Level of Service B
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Whitney & Cascade Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0					4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00					0.95		1.00	0.95	
Frt		1.00	0.85					0.99		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1644	1471					3253		1629	3257	
Flt Permitted		0.95	1.00					1.00		0.19	1.00	
Satd. Flow (perm)		1644	1471					3253		321	3257	
Volume (vph)	65	0	530	0	0	0	0	830	65	85	540	0
Peak-hour factor, PHF	0.87	0.87	0.87	0.92	0.92	0.92	0.84	0.84	0.84	0.90	0.90	0.90
Adj. Flow (vph)	75	0	609	0	0	0	0	988	77	94	600	0
RTOR Reduction (vph)	0	0	131	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	75	478	0	0	0	0	1056	0	94	600	0
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	4%	4%	4%	5%	5%	5%
Turn Type	Split		Prot							Perm		
Protected Phases	4	4	4					2			6	
Permitted Phases										6		
Actuated Green, G (s)		21.4	21.4					30.6		30.6	30.6	
Effective Green, g (s)		21.4	21.4					30.6		30.6	30.6	
Actuated g/C Ratio		0.36	0.36					0.51		0.51	0.51	
Clearance Time (s)		4.0	4.0					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		586	525					1659		164	1661	
v/s Ratio Prot		0.05	c0.33					c0.32			0.18	
v/s Ratio Perm										0.29		
v/c Ratio		0.13	0.91					0.64		0.57	0.36	
Uniform Delay, d1		13.0	18.4					10.7		10.2	8.8	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		0.1	20.1					1.9		13.8	0.6	
Delay (s)		13.1	38.5					12.5		23.9	9.4	
Level of Service		B	D					B		C	A	
Approach Delay (s)		35.7			0.0			12.5			11.4	
Approach LOS		D			A			B			B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

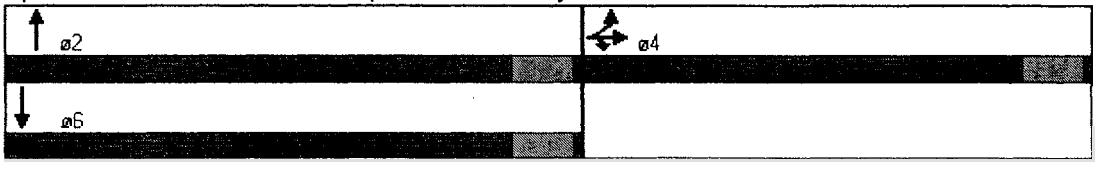
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		300	0		0	0		0	150		0
Storage Lanes	0		1	0		0	0		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50					50		50	50	
Trailing Detector (ft)	0	0	0					0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	0	1644	1471	0	0	0	0	3252	0	1629	3257	0
Flt Permitted		0.950								0.168		
Satd. Flow (perm)	0	1644	1471	0	0	0	0	3252	0	288	3257	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			203					18				
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		437			770			375			562	
Travel Time (s)		9.9			17.5			4.6			7.0	
Volume (vph)	65	0	530	0	0	0	0	830	65	85	540	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.84	0.84	0.84	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	4%	4%	4%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	75	609	0	0	0	0	1065	0	94	600	0
Turn Type	Split		Prot							Perm		
Protected Phases	4	4	4					2			6	
Permitted Phases										6		
Detector Phases	4	4	4					2		6	6	
Minimum Initial (s)	4.0	4.0	4.0					4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0					20.0		20.0	20.0	
Total Split (s)	28.0	28.0	28.0	0.0	0.0	0.0	0.0	32.0	0.0	32.0	32.0	0.0
Total Split (%)	46.7%	46.7%	46.7%	0.0%	0.0%	0.0%	0.0%	53.3%	0.0%	53.3%	53.3%	0.0%
Yellow Time (s)	3.5	3.5	3.5					3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5					0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None					C-Min		C-Min	C-Min	
Act Effct Green (s)		21.4	21.4					30.6		30.6	30.6	
Actuated g/C Ratio		0.36	0.36					0.51		0.51	0.51	
v/c Ratio		0.13	0.93					0.64		0.64	0.36	
Control Delay		12.2	26.4					13.5		39.3	10.4	
Queue Delay		0.0	0.0					0.0		0.0	0.0	
Total Delay		12.2	26.4					13.5		39.3	10.4	
LOS		B	C					B		D	B	
Approach Delay		24.9						13.5			14.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C						B			B	
90th %ile Green (s)	24.0	24.0	24.0					28.0		28.0	28.0	
90th %ile Term Code	Max	Max	Max					Coord		Coord	Coord	
70th %ile Green (s)	24.0	24.0	24.0					28.0		28.0	28.0	
70th %ile Term Code	Max	Max	Max					Coord		Coord	Coord	
50th %ile Green (s)	24.0	24.0	24.0					28.0		28.0	28.0	
50th %ile Term Code	Max	Max	Max					Coord		Coord	Coord	
30th %ile Green (s)	20.7	20.7	20.7					31.3		31.3	31.3	
30th %ile Term Code	Gap	Gap	Gap					Coord		Coord	Coord	
10th %ile Green (s)	14.4	14.4	14.4					37.6		37.6	37.6	
10th %ile Term Code	Gap	Gap	Gap					Coord		Coord	Coord	
Queue Length 50th (ft)		16	130					147		25	70	
Queue Length 95th (ft)		37	#300					188		#100	104	
Internal Link Dist (ft)		357			690			295			482	
Turn Bay Length (ft)			300							150		
Base Capacity (vph)		658	710					1666		146	1660	
Starvation Cap Reductn		0	0					0		0	0	
Spillback Cap Reductn		0	0					0		0	0	
Storage Cap Reductn		0	0					0		0	0	
Reduced v/c Ratio		0.11	0.86					0.64		0.64	0.36	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 57.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: EB Ramp & Cascade Hwy



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑↱			↑↑
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	635	260	0	625
Peak Hour Factor	0.92	0.92	0.85	0.85	0.88	0.88
Hourly flow rate (vph)	0	0	747	306	0	710
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			562			250
pX, platoon unblocked	0.82	0.78			0.78	
vC, conflicting volume	1255	526			1053	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	791	115			789	
tC, single (s)	6.8	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	269	715			631	

Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	498	555	355	355
Volume Left	0	0	0	0
Volume Right	0	306	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.29	0.33	0.21	0.21
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.87		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1629	1539		1527	1398		1629	3257		1629	3240	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1629	1539		1527	1398		1629	3257		1629	3240	
Volume (vph)	20	35	75	15	10	65	50	585	0	20	535	20
Peak-hour factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	23	40	85	19	13	84	57	665	0	21	569	21
RTOR Reduction (vph)	0	78	0	0	77	0	0	0	0	0	2	0
Lane Group Flow (vph)	23	47	0	19	20	0	57	665	0	21	588	0
Heavy Vehicles (%)	5%	5%	5%	12%	12%	12%	5%	5%	5%	5%	5%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.2	7.0		3.0	6.8		7.0	50.9		3.1	47.0	
Effective Green, g (s)	3.2	7.0		3.0	6.8		7.0	50.9		3.1	47.0	
Actuated g/C Ratio	0.04	0.09		0.04	0.08		0.09	0.64		0.04	0.59	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	65	135		57	119		143	2072		63	1904	
v/s Ratio Prot	c0.01	c0.03		0.01	0.01		0.04	c0.20		0.01	c0.18	
v/s Ratio Perm												
v/c Ratio	0.35	0.35		0.33	0.17		0.40	0.32		0.33	0.31	
Uniform Delay, d1	37.4	34.4		37.5	34.0		34.5	6.7		37.4	8.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	1.6		3.4	0.7		1.8	0.4		3.1	0.4	
Delay (s)	40.7	35.9		41.0	34.7		36.3	7.1		40.6	8.7	
Level of Service	D	D		D	C		D	A		D	A	
Approach Delay (s)		36.7			35.7			9.4			9.8	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

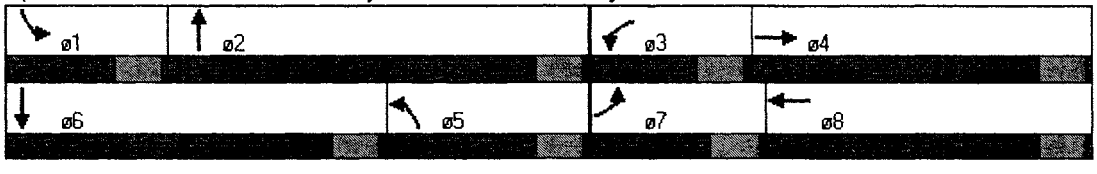
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		0	200		0	100		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1629	1539	0	1527	1398	0	1629	3257	0	1629	3241	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1629	1539	0	1527	1398	0	1629	3257	0	1629	3241	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			84						5	
Link Speed (mph)		30			30			55			55	
Link Distance (ft)		1097			355			250			730	
Travel Time (s)		24.9			8.1			3.1			9.0	
Volume (vph)	20	35	75	15	10	65	50	585	0	20	535	20
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.88	0.88	0.88	0.77	0.77	0.77	0.88	0.88	0.88	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	12%	12%	12%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	23	125	0	19	97	0	57	665	0	21	590	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	13.0	25.0	0.0	12.0	24.0	0.0	15.0	31.0	0.0	12.0	28.0	0.0
Total Split (%)	16.3%	31.3%	0.0%	15.0%	30.0%	0.0%	18.8%	38.8%	0.0%	15.0%	35.0%	0.0%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	6.6	8.0		6.4	7.9		8.5	57.4		6.5	53.5	
Actuated g/C Ratio	0.08	0.10		0.08	0.10		0.11	0.72		0.08	0.67	
v/c Ratio	0.17	0.54		0.15	0.46		0.33	0.28		0.16	0.27	
Control Delay	35.2	14.7		35.6	11.8		35.0	8.4		35.4	10.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	35.2	14.7		35.6	11.8		35.0	8.4		35.4	10.1	
LOS	D	B		D	B		D	A		D	B	
Approach Delay		17.8			15.7			10.5			10.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		**B**			**B**			**B**			**B**	
90th %ile Green (s)	8.5	12.3		8.0	11.8		11.0	35.4		8.3	32.7	
90th %ile Term Code	**Gap**	**Gap**		**Max**	**Hold**		**Max**	**Coord**		**Gap**	**Coord**	
70th %ile Green (s)	7.3	9.3		7.1	9.1		10.4	40.4		7.2	37.2	
70th %ile Term Code	**Gap**	**Gap**		**Gap**	**Hold**		**Hold**	**Coord**		**Gap**	**Coord**	
50th %ile Green (s)	0.0	7.4		0.0	7.4		9.6	64.6		0.0	51.0	
50th %ile Term Code	**Skip**	**Gap**		**Skip**	**Hold**		**Hold**	**Coord**		**Skip**	**Coord**	
30th %ile Green (s)	0.0	5.5		0.0	5.5		0.0	66.5		0.0	66.5	
30th %ile Term Code	**Skip**	**Gap**		**Skip**	**Gap**		**Skip**	**Coord**		**Skip**	**Coord**	
10th %ile Green (s)	0.0	0.0		0.0	0.0		0.0	76.0		0.0	76.0	
10th %ile Term Code	**Skip**	**Skip**		**Skip**	**Skip**		**Skip**	**Coord**		**Skip**	**Coord**	
Queue Length 50th (ft)	11	19		9	6		26	28		10	60	
Queue Length 95th (ft)	**32**	**62**		**25**	**34**		**58**	**158**		**31**	**152**	
Internal Link Dist (ft)		1017			275			170			650	
Turn Bay Length (ft)	**200**			**200**			**100**			**200**		
Base Capacity (vph)	183	467		153	413		224	2336		164	2168	
Starvation Cap Reductn	**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**	
Reduced v/c Ratio	0.13	0.27		0.12	0.23		0.25	0.28		0.13	0.27	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 14 (18%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 11.7 **Intersection LOS: B**
Intersection Capacity Utilization 38.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Sublimity Blvd & Cascade Hwy



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	20	70	30	640	505	20
Peak Hour Factor	0.92	0.92	0.94	0.94	0.92	0.92
Hourly flow rate (vph)	22	76	32	681	549	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1304	560	571			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1304	560	571			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	85	97			
cM capacity (veh/h)	169	524	987			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	98	713	571
Volume Left	22	32	0
Volume Right	76	0	22
cSH	358	987	1700
Volume to Capacity	0.27	0.03	0.34
Queue Length 95th (ft)	27	3	0
Control Delay (s)	18.8	0.8	0.0
Lane LOS	C	A	
Approach Delay (s)	18.8	0.8	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

HCS2000: Ramps and Ramp Junctions Release 4.1d

CH2M HILL
CH2M HILL

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	TY
Agency/Co.:	
Date performed:	4-14-05
Analysis time period:	30th Highest Hour
Freeway/Dir of Travel:	ORE 22 EB
Junction:	Cascade Hwy EB On-Ramp
Jurisdiction:	
Analysis Year:	2025 Build Scenario
Description:	Stayton Sublimity IAMP/ ORE22

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	620	vph

On Ramp Data

ide of freeway	Right	
umber of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	150	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	620	150		vph
Peak-hour factor, PHF	0.87	0.87		
Peak 15-min volume, v15	178	43		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
creational vehicle PCE ER	1.2	1.2		

Heavy vehicle adjustment, fHV	1.000	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	713	172	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 713 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	885	4600	No
v_{R12}	885	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 9.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.302	
Space mean speed in ramp influence area,	S_R = 54.6	mph
Space mean speed in outer lanes,	S_O = N/A	mph
Space mean speed for all vehicles,	S = 54.6	mph

HCS2000: Ramps and Ramp Junctions Release 4.1d

CH2M HILL
CH2M HILL

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	TY
Agency/Co.:	
Date performed:	4-14-05
Analysis time period:	30th Highest Hour
Freeway/Dir of Travel:	ORE 22 WB
Junction:	Cascade Hwy WB On-Ramp
Jurisdiction:	
Analysis Year:	2025 Build Scenario
Description:	Stayton Sublimity IAMP/ ORE22

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	60.0	mph
Volume on freeway	860	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	315	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	860	315		vph
Peak-hour factor, PHF	0.90	0.90		
Peak 15-min volume, v15	239	88		v
Trucks and buses	0	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	1.000	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	956	350	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 956 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1306	4600	No
v_{R12}	1306	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 13.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.307

Space mean speed in ramp influence area, S_R = 54.5 mph

Space mean speed in outer lanes, S_O = N/A mph

Space mean speed for all vehicles, S = 54.5 mph

APPENDIX H

Access Road Intersection Sight Distance Memo

TO: Project Team

FROM: Jerry Rosenblad PE

DATE: July 6, 2005

SUBJECT: OR22 At Sublimity Interchange (Ph1) Sec. Kn # 13658.
Sight distance findings, Cascade Highway, North of Project.

Myself and Monte Richards (District 3 Permit Specialist) met on site Tuesday July 5, 2005 to determine various points of minimal intersection sight distance in the area near the crest of the hill, of Cascade Highway, just north of the Intersection of Highway 22 and Cascade Highway. We determined areas acceptable to having an access and areas where intersection sight distance would prevent an access to exist with adequate site distance.

This section of roadway is posted at 45 mph, which means that we should consider a design speed of 55 mph.

The 2003 Highway Design Manual (HDM) Section 5.2.3 Intersection Sight Distance states, "Intersection sight distance is determined by using a 3.5 foot eye height and 3.5 foot height of object." The HDM refers to "Pages 665-669 of the 2001 AASHTO'S *"A Policy on Geometric Design of Highways and Streets – 2001"* indicate intersection sight distance requirements for traffic turning left, crossing, or turning right onto a major highway."

Exhibit 9-55 of AASHTO, indicates for a design speed of 55mph, the Intersection Sight Distance should be 610 feet. This distance is what was used to identify allowable locations of an access.

Refer to the attached map below.

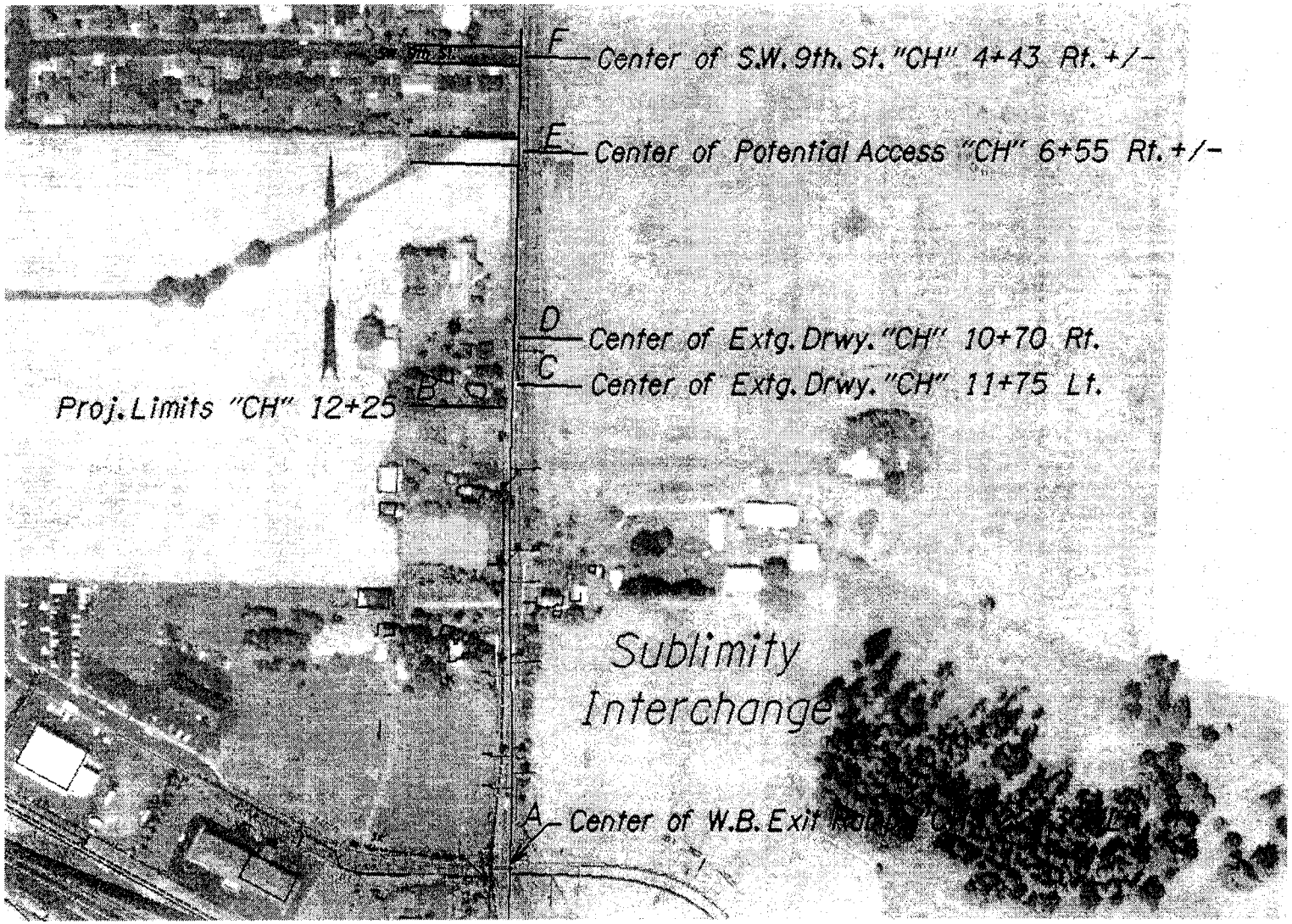
Point C denotes the point of an existing access on the East side of Cascade highway. We analyzed the existing conditions, and the design conditions of lowering the southerly crest (Near "CH" 16+50) slightly as part of the project, and determined that the Driveway could move as much as 105 feet to the North and opposite an existing driveway on the west side of the highway (point D). Locating an access any further North of point D or any further south of Point C would reduce the actual sight distance to below required standards, and not be acceptable. On the west side of the highway in this location is a house that would likely prevent others from using this same access.

If an access were to be considered further north to gain additional distance from the proposed ramp termini (point A) then the earliest acceptable position to allow an access due to limited intersection sight distance, would be at Point E. This access would have to be placed along the Northerly property line of the large open field. However, as the picture indicates, this point would be approximately 212 feet from SW 9th St. (point F).

The driveway at point C is at the very crest of the Hill. It is conceivable that the crest could be lowered to improve Sight Distance to the North and possibly allow point E to move south. This crest would need to be lowered at least 3 to 5 feet, as a minimum for this to occur. The roadway currently follows the surrounding terrain and lowering the roadway that amount may be adverse to the frontage of the adjacent homes. This crest location is currently beyond the limits of the proposed project (See point B), and would add considerable cost to an already strained budget if it were to be considered at this time.

There is one remaining access on the East side of Cascade Hwy. just south of point C that could be disconnected from the highway and routed north to connect with the access, at point C.

The remaining 2 or 3 accesses on the West side of Cascade Hwy. just south of point D, could be served by a backage road or alley, that would connect south to Sublimity Blvd. The access at point D could then remain in place.


F
Center of S.W. 9th. St. "CH" 4+43 Rt. +/-
E
Center of Potential Access "CH" 6+55 Rt. +/-
D
Center of Extg. Drwy. "CH" 10+70 Rt.
C
Center of Extg. Drwy. "CH" 11+75 Lt.
Proj. Limits "CH" 12+25
B
Sublimity
Interchange
A
Center of W.B. Exit

APPENDIX I

City of Sublimity Development Code Language Changes

Proposed City of Sublimity Development Code Language Changes

Changes and additions to existing City of sublimity Development Code language are underlined.

2.103.05 Development Standards

All developments in the Commercial District shall comply with the applicable provisions of Section 2.400 of this Ordinance. In addition, the following specific standards shall apply:

A. Off-Street Parking. Off-street parking shall be as specified in Section 2.203. Due to the required ten (10) feet front yard setback businesses are strongly encouraged to provide parking areas behind the commercial structures.

B. Signs. Signs in the Commercial District shall be subject to the provisions of Section 2.206

C. Subdivisions and Partitions. All subdivisions and partitions shall be reviewed in accordance with the provisions of Section 3.107.

D. Design Review. All new development and expansion of an existing structure or use in the Commercial District shall be subject to the Site Development Review procedures of Section 2.103.6 and 3.105.

E. Outdoor Display. There shall be no outdoor display or storage of materials or merchandise within a designated alleyway, roadway or sidewalk that would impede pedestrian or vehicular traffic except during community retail sales events. Safety precautions shall be observed at all times.

F. Minimum Landscaped Area. Landscaping in the Commercial District shall be subject to Section 2.207

G. Access. All driveways and points of access shall be subject to the provisions of Section 2.202.03(N).

2.106 INTERCHANGE MANAGEMENT AREA OVERLAY DISTRICT (IA)

2.106.01 Purpose

To objective of this overlay zone is to protect and preserve the safe and efficient functional operation of the local street network in the vicinity of the Sublimity Interchange for all users. A goal of the City's Transportation System Plan (TSP) is to *"ensure that the objectives of mobility and safety are preserved for Center Street [Cascade Highway], the city's only arterial."* The establishment of this overlay zone acknowledges that an increase of vehicular traffic directly onto Center Street will have a deleterious effect on both the safety and mobility functions of that roadway.

Implementation of the overlay zone objective is achieved through the utilization of access management measures, as called for in the TSP.

2.106.02 Regulations

A. Inside the IA Overlay Zone, access permits are required for all projects requiring any type of development permitting from the city of Sublimity that result in additional trip generation or change of use. "Change in use" is defined as a change in land use, an expansion of an existing land use, or a remodel of an existing use that results in increased traffic.

1) Marion County Roadway Access Permits

Permits for access onto Marion County roadways shall be subject to review and approval by Marion County, except where the county has delegated this responsibility to the City of Sublimity, in which case the City of Sublimity shall determine whether access is granted based on adopted based on adopted City of Sublimity standards.

B. Inside the IA Overlay Zone, development involving additional significant trip generation or change of use shall not be permitted to access onto Center Street.

C. Inside the IA Overlay Zone, the location of access placement for a development involving a change of use must be provided from the lowest functional classification roadway.

2.202.03 General Provisions

N. Driveways and Points of Access: Approaches shall be constructed according to City standards and shall meet the minimum separations of five (5) feet between residential driveways, twenty-two (22) feet between commercial and industrial driveways, twenty (20) feet from intersections for residential streets, fifty (50) feet for collectors, and one hundred (100) feet for arterials. The separation shall be measured between the nearest outside edges of each access lane and the edge of the radius of the street.

Construction of driveways and points of access inside the Interchange Area Overlay Zone (IA) shall be subject to the special access provisions of that zone (2.106).

The construction of a duplex on a corner shall provide one driveway per unit per street frontage unless the Planning commission allows a combined access on one street frontage based upon a conflict created by the topography of the lot, the location of a public utility, significant vegetation, or different street classifications.

Adjoining properties are encouraged to combine accesses. For public safety purposes, and wherever possible, driveways shall align with the access points to properties across the street and other street intersections. Where impractical due to lot configuration, driveways shall be as approved by the City's Public Works Director.

APPENDIX J

MOU: City of Stayton and Marion County (Regarding Golf Lane Realignment)

MEMORANDUM OF UNDERSTANDING
May 19, 2003

This Memorandum of Understanding is between Marion County, a political subdivision of the State of Oregon ("COUNTY") and the City of Stayton, a municipal corporation ("CITY").

The COUNTY and CITY previously entered into an agreement for improvements to Cascade Highway between Santiam Highway (State Route 22) and Shaff/Fern Ridge Road. These improvements included a bridge replacement, pavement upgrades, a traffic signal at Shaff/Fern Ridge Road and median placement. The CITY, in consultation with their traffic engineer, believes that the installation of medians, as initially called for by the construction plans, along Cascade Highway restricting turns in at the Whitney intersection are not as desirable as the installation of a traffic signal.

The COUNTY has concerns regarding the change to a traffic signal at this intersection and the potential future traffic impacts it will create. To address the potential future traffic impacts, this Memorandum of Understanding has been entered into by both parties and pertains to potential future improvements to Cascade Highway, a COUNTY-maintained road, between Santiam Highway (State Route 22) and the intersection with Shaff/Fern Ridge Road (Fern Ridge is a CITY-maintained street and Shaff Road is a COUNTY-maintained road). This section of Cascade Highway includes intersections with Whitney Street and Martin Drive, both CITY-maintained streets. It is mutually understood that the parties agree as follows:

The COUNTY understands that the CITY caused the Kittelson & Associates Whitney/Cascade Highway operational study to be completed in August 2001. In addition, the CITY will complete and update their Transportation Plan by December 2004. These two documents shall serve as a basis for future decisions regarding transportation issues on Cascade Highway between the CITY's northern boundary and Shaff/Fern Ridge Road.

The CITY will cause the realignment of the east end of Golf Lane as designed in Kittelson & Associates recommended lane configuration and traffic control map (attachment "A" Figure 10, dated August 2001), to intersect Cascade Highway at such time Golf Lane warrants signalization or Golf Lane fails to meet COUNTY standards for safety and/or operations and as funds become available. Golf Lane may remain in its existing location at the time a signal is installed at Whitney Street provided that vehicle queues from the signal do not interfere with turning movements at Golf Lane and Golf Lane meets COUNTY standards for safety and operations. If one or more of the above conditions requiring realignment of Golf Lane are met, and funding for the realignment is not available, then the CITY will prohibit any further development on Golf Lane until the east end realignment is funded and completed.

The CITY will cause the installation of a traffic signal at the Whitney/Cascade Highway intersection. However, the CITY will not cause the installation of the traffic signal at the Whitney/Cascade Highway intersection until the intersection meets at least two traffic signal warrants. Once the intersection meets the required warrants, the intersection improvements shall be made as funds become available, but no later than December 31, 2008. Intersection improvements shall be constructed as designed in Kittelson & Associates's recommended lane configuration and traffic control map (attachment "A" Figure 10, dated August 2001) and approved by Marion County Public Works.

The CITY acknowledges that installing the signal and realigning Golf Lane may result in traffic flow on one or more of the intersecting roadways failing to meet COUNTY standards for progression speed, signal cycle time, level of service, and volume/capacity ratio. CITY understands that failure to meet any of these standards will cause drivers to experience congestion and possible delays at certain times of day.

The CITY will cause the installation of a median on Whitney Street between Cascade Highway and Martin Street as proposed in the attached Kittelson & Associates recommended Lane Configuration and Traffic Control map (attachment "A" Figure 10, dated August 2001). This work shall be completed either when the Whitney/Cascade Highway traffic signal is constructed, or when property identified on the Marion County Assessors Map 91W03DB Tax Lot #500 (attachment "B") is developed, but no later than October 31, 2008. In addition to the signal, tax lots 500 & 400 on Marion County Assessors Map 91W03DB shall access Whitney Street via a shared driveway as proposed in the Kittelson & Associates recommended Lane Configuration & Traffic Control Map (attachment "A" Figure 10, dated August 2001).

The COUNTY will cause installation of the median on Cascade Highway to limit Martin Drive to right turns in and out as designed in Kittelson & Associates's recommended lane configuration and traffic control map (attachment "A", Figure 10, dated August 2001). This median will be installed at such time Martin Drive fails to meet COUNTY standards for safety and/or operations but not later than completion of the signal at Whitney Street.

The COUNTY, upon completion of the Whitney Street signal, shall program, operate and maintain the signal with the CITY paying for the cost of power.

The CITY will secure all necessary right-of-way, provide all engineering, and financing for all improvements covered under this Memorandum as funds become available.

The CITY understands that COUNTY does not commit or intend to expend any additional funds over and above the contributions made to date towards any of the improvements at this time. All future capacity improvements (ie. additional travel lanes, turning lanes, median, signals, etc.) shall be funded by development or corresponding System Development Charges. Routine maintenance, such as overlays, signing, striping, drainage, and pavement markings, will remain the responsibility of the COUNTY.

This Memorandum of Understanding is entered into this 19th day of May, 2003

IN WITNESS WHEREOF, the undersigned parties have agreed to the terms and provisions stated in this agreement.

APPROVED AS TO LEGAL SUFFICIENCY

By _____
County Counsel

APPROVAL RECOMMENDED

By _____
Director, Public Works

APPROVED AS TO LEGAL SUFFICIENCY

By _____
City Attorney

APPROVAL RECOMMENDED

By _____
Director of Public Works

Approved as to form

_____
County Contracts Coordinator

MARION COUNTY
BOARD OF COMMISSIONERS

By _____
Chair

By _____
Commissioner

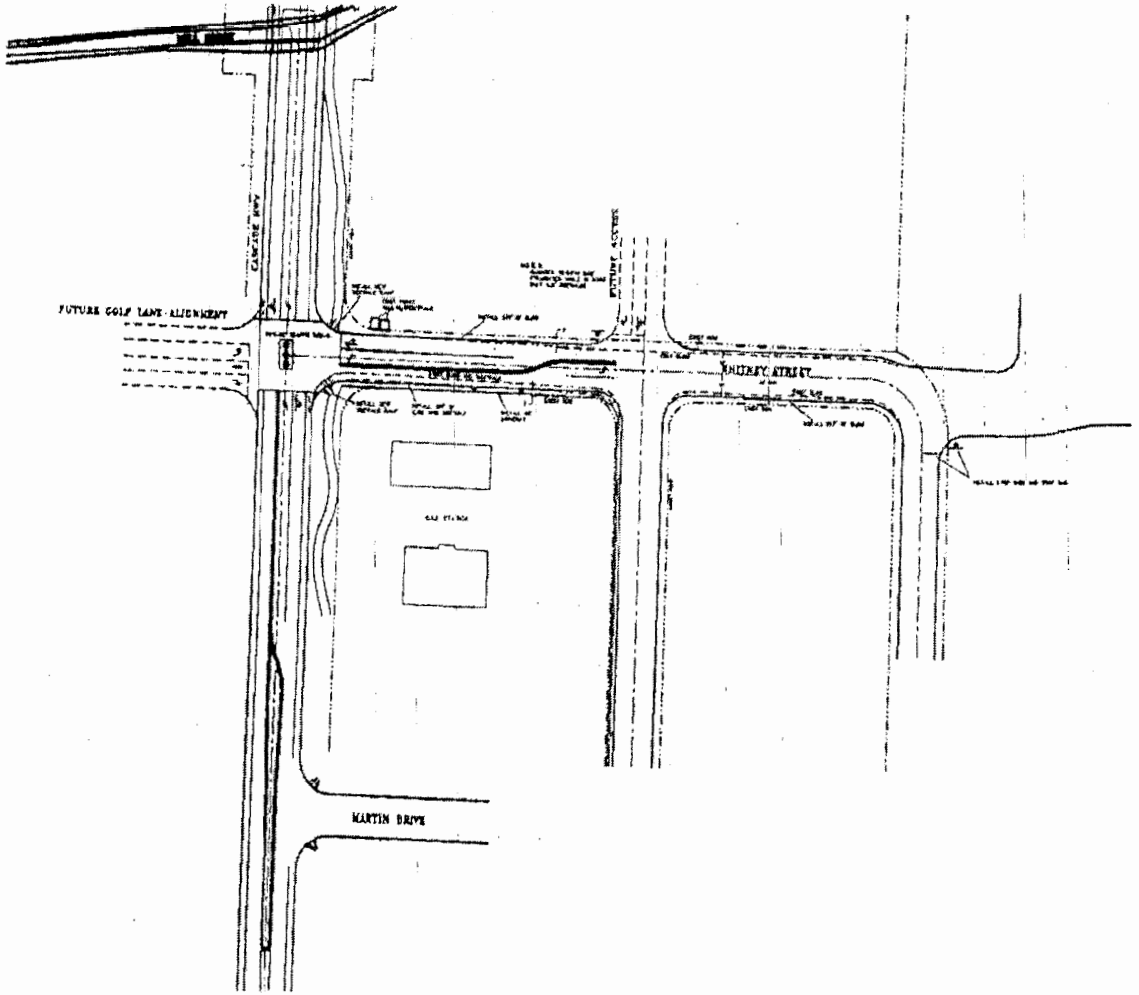
By _____
Commissioner

Date 1/21/03

CITY OF STAYTON

By _____
City Administrator

Attest _____
City Recorder



RECOMMENDED LANE CONFIGURATIONS AND TRAFFIC CONTROL

CASCADE HWY/WHITNEY ST ANALYSIS
STAYTON, OREGON
AUGUST 2001

FIGURE 10

OL

APPENDIX K

City of Sublimity IAMP Adoption Ordinance

BEFORE THE BOARD OF COMMISSIONERS

OF MARION COUNTY, OREGON

An ordinance amending the Marion County)
Transportation System Plan, an element of the)
Marion County Comprehensive Plan, to include)
the Sublimity Interchange Area Management Plan,)
(IAMP) enabling the modernization of the existing)
interchange and bridge structure and associated)
local transportation system improvements.)

ORDINANCE No. XXXX

SECTION 1 **Title.**

This ordinance shall be known as the Sublimity Interchange Area Management Plan Ordinance and shall be so cited and pleaded.

SECTION 2 **Purpose.**

Pursuant to the authority of OAR 734.051.055(5), the Board of Commissioners adopts this ordinance in order to accomplish the following objectives for the Sublimity Interchange area:

- Protect the state and local investment in the Sublimity Interchange
- Protect the function of interchanges by maximizing the capacity of the interchange for safe movement from the mainline highway facility
- Balance the need for efficient interstate and state travel with local use
- Preserve and improve the safety of the existing interchanges
- Provide the safe and efficient operation between connecting roadways
- Adequately protect the Sublimity Interchange from unintended and unexpected development while accommodating planned community development
- Manage existing Sublimity Interchange capacity and new capacity provided through interchange improvements
- Establish how future land use and transportation decisions will be coordinated in the Sublimity Interchange area between ODOT and the local governments
- Minimize impacts to farm and forest lands and other resource lands around the Sublimity Interchange in accordance with adopted Statewide Planning Goals
- Time development with appropriate improvements to the local system after Sublimity Interchange improvements are in place

SECTION 3 **Definitions.**

(1) "Interchange" means a system of interconnecting roadways in conjunction with one or more grade separations that provide for the movement of traffic between two or more roadways or highways on different levels.**

(2) "Interchange Area Management Plan" means a plan similar to an Access Management Plan or an Access Management Plan for an Interchange developed to plan for and manage grade-separated interchange areas to ensure sage and efficient operation between connecting roadways and to protect the functional integrity, operations, and safety of an interchange. Interchange Area Management Plans typically include analysis of the relationships between existing local land uses, zoning and long range plans and the state and local roadway network within a designated study area around an existing or planned interchange, and identify necessary improvements to approach roads and the local street network to support the long-term safety and efficiency of the interchange. An Interchange Management Plan is a document that may be developed independent of or in conjunction with a specific roadway project. A plan document is not a roadway project in and of itself.**

(3) "Sublimity Interchange" means the interchange located in Marion County at which Oregon State Highway 22 and Cascade Highway intersect

(4) "Sublimity Interchange Management Area" is the area surrounding the Sublimity Interchange, inside which IAMP analysis was performed and physical improvements and access management recommendations were make. The Sublimity Interchange Management Area can be seen on Figure 1-1 of the IAMP, attached hereto as Exhibit A.

* Definition excerpted from OAR 734.051.0040(33)

** Definition excerpted from OAR 734.051.0040(34)

SECTION 4 **Recitals**

(1) WHEREAS, Marion County is acting pursuant to the authority of OAR 734.051.055(5); and

(1) WHEREAS, the existing interchange that carries OR 22 over Cascade Highway is functionally obsolete; and

(2) WHEREAS, the Oregon Transportation Commission (OTC) approved funding to reconstruct the existing interchange; and

(3) WHEREAS, as a condition of funding construction for the project, the OTC required that an Interchange Area Management Plan (IAMP) be prepared in association with the design of the interchange and adopted by Marion County, the City of Sublimity, and the City of Stayton; and

(4) WHEREAS, in the Autumn of 2004 ODOT contracted with the firm CH2M HILL to manage a project consultant team to develop the Sublimity IAMP; and

(5) WHEREAS, County-appointed staff and elected officials worked closely with the Oregon Department of Transportation (ODOT) and project consultant team in planning for future improvements to the interchange, through participation on the Project Management Team (PMT) for the Sublimity IAMP project and the development of the IAMP; and

(6) WHEREAS, small group meetings with affected property owners were held throughout the course of the project and were instrumental in guiding the development of the Sublimity IAMP; and

(7) WHEREAS, the Sublimity IAMP documents the land use planning, transportation planning, access management and public involvement work that resulted in the Preferred Alternative; and

(8) WHEREAS, the County has held public hearing on the Sublimity IAMP on [insert date] and [insert date]; and

(9) WHEREAS, the City of Sublimity has held public hearing on the Sublimity IAMP on [insert date] and [insert date]; and

(10) WHEREAS, the City of Stayton has held public hearing on the Sublimity IAMP on [insert date] and [insert date]; and

NOW, THEREFORE, MARION COUNTY ORDAINS AS FOLLOWS:

(1) The City Council of the City of Sublimity hereby adopts and incorporates by reference the Sublimity IAMP, attached hereto as Exhibit A.

(2) The Marion County Board of Commissioners, based upon the Findings of Fact, does hereby amend the Marion County Transportation System Plan to include the Sublimity IAMP.

(3) Transportation improvements detailed in Section 5 of the Sublimity IAMP are hereby amended into the Rural Improvements Project List of the Marion County Rural Transportation System Plan, the Facility Improvements Tables of the City of Sublimity Transportation System Plan, and the Street Plan Capital Improvements List of the City of Stayton Transportation System Plan, respectively.

(4) The Sublimity Interchange Area Management Plan is adopted as a supporting document to the Marion County Transportation System Plan.

(5) EFFECTIVE DATE: This ordinance shall take effect on the xx day after its enactment.

Signed and finalized at Salem, Marion County, Oregon, this XXth day of XXXX 200X.

MARION COUNTY BOARD OF COMMISSIONERS

ATTACHMENT: "EXHIBIT A: SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN"

ATTACHMENT: "EXHIBIT A: SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN"

APPENDIX L

City of Sublimity Code Section 2.103.05 Amendment Ordinance

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE CITY OF SUBLIMITY DEVELOPMENT CODE CHAPTER 2.103.05 TO IMPLEMENT THE RECOMMENDATIONS OF THE SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN

WHEREAS, the City of Sublimity has adopted the Sublimity Interchange Area Management Plan (IAMP), attached hereto as Exhibit A, for the purposes of preserving the long-term function of the Sublimity Interchange in accordance with OAR 734-051-0155(5); and

WHEREAS, the Sublimity IAMP obligates the City to enact language changes to its Development Code to implement the recommendations of the IAMP; and

WHEREAS, this Ordinance amends City of Sublimity Development Code Chapter 2.103.05; and

NOW, THEREFORE, THE CITY OF SUBLIMITY ORDAINS AS FOLLOWS:

SECTION 1. City of Sublimity Development Code Chapter 2.103.05 is amended to read as follows, with the new text underlined:

2.103.05 Development Standards

All developments in the Commercial District shall comply with the applicable provisions of Section 2.400 of this Ordinance. In addition, the following specific standards shall apply:

A. Off-Street Parking. Off-street parking shall be as specified in Section 2.203. Due to the required ten (10) feet front yard setback businesses are strongly encouraged to provide parking areas behind the commercial structures.

B. Signs. Signs in the Commercial District shall be subject to the provisions of Section 2.206.

C. Subdivisions and Partitions. All subdivisions and partitions shall be reviewed in accordance with the provisions of Section 3.107.

D. Design Review. All new development and expansion of an existing structure or use in the Commercial District shall be subject to the Site Development Review procedures of Section 2.103.6 and 3.105.

E. Outdoor Display. There shall be no outdoor display or storage of materials or merchandise within a designated alleyway, roadway or sidewalk that would impede pedestrian or vehicular traffic except during community retail sales events. Safety precautions shall be observed at all times.

F. Minimum Landscaped Area. Landscaping in the Commercial District shall be subject to Section 2.207

G. Access. All driveways and points of access shall be subject to the provisions of Section 2.202.03(N).

Passed by the City Council this [insert] day of [insert month], 200x, by the following vote:

First Reading Ayes: ____ Nays: _____
Second Reading Ayes: ____ Nays: _____

APPROVED BY THE MAYOR, this _____ day of _____, 200x.

_____
Raymond Heuberger, Mayor

ATTESTED BY:

_____
Sue Bernt, City Recorder

Filed in the office of the City Recorder this _____ day of _____, 200x.

ATTACHMENT: "EXHIBIT A: SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN"

APPENDIX M

City of Sublimity Code Section 2.106 Amendment Ordinance

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE CITY OF SUBLIMITY DEVELOPMENT CODE CHAPTER 2 TO CREATE AN INTERCHANGE OVERLAY ZONING DISTRICT, SO AS TO IMPLEMENT THE RECOMMENDATIONS OF THE SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN

WHEREAS, the City of Sublimity has adopted the Sublimity Interchange Area Management Plan(IAMP) for the purposes of preserving the long-term function of the Sublimity Interchange in accordance with OAR 734-051-0155(5); and

WHEREAS, the Sublimity IAMP calls for the City to create an Interchange Overlay Zoning District to implement the recommendations of the IAMP; and

WHEREAS, this Ordinance amends City of Sublimity Development Code Chapter 2

NOW, THEREFORE, THE CITY OF SUBLIMITY ORDAINS AS FOLLOWS:

City of Sublimity Development Code Chapter 2 is amended to include an additional section, 2.106, to read as follows, with the new text underlined:

2.106 INTERCHANGE MANAGEMENT AREA OVERLAY DISTRICT (IA)

2.106.01 Purpose

To objective of this overlay zone is to protect and preserve the safe and efficient functional operation of the local street network in the vicinity of the Sublimity Interchange for all users. A goal of the City's Transportation System Plan (TSP) is to *"ensure that the objectives of mobility and safety are preserved for Center Street [Cascade Highway], the city's only arterial."* The establishment of this overlay zone acknowledges that an increase of vehicular traffic directly onto Center Street will have a deleterious effect on both the safety and mobility functions of that roadway.

Implementation of the overlay zone objective is achieved through the utilization of access management measures, as called for in the TSP.

2.106.02 Regulations

A. Inside the IA Overlay Zone, access permits are required for all projects requiring any type of development permitting from the city of Sublimity that result in additional trip generation or change of use. "Change in use" is defined as a change in land use, an expansion of an existing land use, or a remodel of an existing use that results in increased traffic.

1) Marion County Roadway Access Permits

Permits for access onto Marion County roadways shall be subject to review and approval by Marion County, except where the county has delegated this responsibility to the City of Sublimity, in which case the City of Sublimity shall determine whether access is granted based on adopted based on adopted City of Sublimity standards.

B. Inside the IA Overlay Zone, development involving additional significant trip generation or change of use shall not be permitted to access onto Center Street.

C. Inside the IA Overlay Zone, the location of access placement for a development involving

a change of use must be provided from the lowest functional classification roadway.

Passed by the City Council this [insert] day of [insert month], 2005, by the following vote:

First Reading Ayes: ____ Nays: _____
Second Reading Ayes: ____ Nays: _____

APPROVED BY THE MAYOR, this _____ day of _____, 2005.

_____
Raymond Heuberger, Mayor

ATTESTED BY:

_____
Sue Bernt, City Recorder

Filed in the office of the City Recorder this _____ day of _____, 2005.

APPENDIX N

City of Sublimity Code Section 2.202.03 Amendment Ordinance

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE CITY OF SUBLIMITY DEVELOPMENT CODE CHAPTER 2.202.03(N) TO IMPLEMENT THE RECOMMENDATIONS OF THE SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN

WHEREAS, the City of Sublimity has adopted the Sublimity Interchange Area Management Plan (IAMP), attached hereto as Exhibit A, for the purposes of preserving the long-term function of the Sublimity Interchange in accordance with OAR 734-051-0155(5); and

WHEREAS, the Sublimity IAMP obligates the City to enact language changes to its Development Code to implement the recommendations of the IAMP; and

WHEREAS, this Ordinance amends City of Sublimity Development Code Chapter 2.202.03(N); and

NOW, THEREFORE, THE CITY OF SUBLIMITY ORDAINS AS FOLLOWS:

SECTION 1: City of Sublimity Development Code Chapter 2.202.03(N) is amended to read as follows, with the new text underlined:

2.202.03 General Provisions

N. **Driveways and Points of Access**: Approaches shall be constructed according to City standards and shall meet the minimum separations of five (5) feet between residential driveways, twenty-two (22) feet between commercial and industrial driveways, twenty (20) feet from intersections for residential streets, fifty (50) feet for collectors, and one hundred (100) feet for arterials. The separation shall be measured between the nearest outside edges of each access lane and the edge of the radius of the street.

Construction of driveways and points of access inside the Interchange Area Overlay Zone (IA) shall be subject to the special access provisions of that zone (2.106).

The construction of a duplex on a corner shall provide one driveway per unit per street frontage unless the Planning commission allows a combined access on one street frontage based upon a conflict created by the topography of the lot, the location of a public utility, significant vegetation, or different street classifications.

Adjoining properties are encouraged to combine accesses. For public safety purposes, and wherever possible, driveways shall align with the access points to properties across the street and other street intersections. Where impractical due to lot configuration, driveways shall be as approved by the City's Public Works Director.

Passed by the City Council this [insert] day of [insert month], 200x, by the following vote:

First Reading Ayes: ____ Nays: ____
Second Reading Ayes: ____ Nays: ____

APPROVED BY THE MAYOR, this _____ day of _____, 200x.

_____
Raymond Heuberger, Mayor

ATTESTED BY:

_____
Sue Bernt, City Recorder

Filed in the office of the City Recorder this _____ day of _____, 200x.

ATTACHMENT: "EXHIBIT A: SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN"

APPENDIX O

City of Sublimity Zoning Map Amendment Ordinance

ORDINANCE NO. _____

AN ORDINANCE AMENDING THE CITY OF SUBLIMITY ZONING MAP TO INCLUDE THE ADDITION OF AN INTERCHANGE MANAGEMENT OVERLAY ZONING DISTRICT, SO AS TO IMPLEMENT THE RECOMMENDATIONS OF THE SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN

WHEREAS, the City of Sublimity has adopted the Sublimity Interchange Area Management Plan (IAMP), hereto attached as Exhibit A, for the purposes of preserving the long-term function of the Sublimity Interchange in accordance with OAR 734-051-0155(5); and

WHEREAS, the Sublimity IAMP obligates the City to create an Interchange Management Overlay Zoning District to implement the recommendations of the IAMP; and

WHEREAS, this Ordinance amends the City of Sublimity Zoning Map to depict the boundaries of the Interchange Management Overlay Zoning District; and

NOW, THEREFORE, THE CITY OF SUBLIMITY ORDAINS AS FOLLOWS:

SECTION 1: The official zoning map of the city of Sublimity is amended to include an "Interchange Management Overlay" zoning district, the boundaries of which are indicated on the map attached hereto as Exhibit B.

SECTION 2: All parcels and properties located within the IA Zone boundaries depicted on Exhibit B will herein be subject to the regulations of the IA Zone as articulated in Code Chapter 2.106.

Passed by the City Council this [insert] day of [insert month], 200x, by the following vote:

First Reading Ayes: ____ Nays: ____
Second Reading Ayes: ____ Nays: ____

APPROVED BY THE MAYOR, this _____ day of _____, 200x.

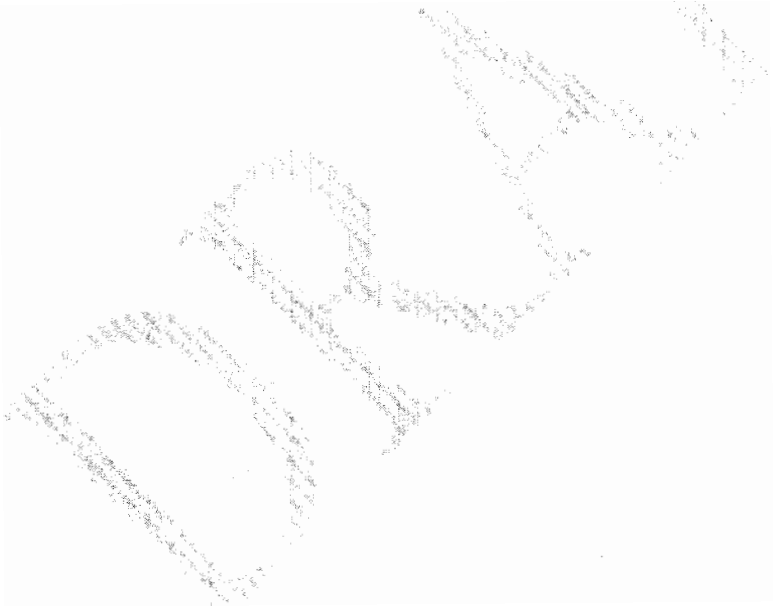
_____
Raymond Heuberger, Mayor

ATTESTED BY:

_____
Sue Bernt, City Recorder

Filed in the office of the City Recorder this _____ day of _____, 200x.

ATTACHMENTS (2): "EXHIBIT A: SUBLIMITY INTERCHANGE AREA MANAGEMENT PLAN"; "EXHIBIT B: INTERCHANGE MANAGEMENT AREA OVERLAY ZONING DISTRICT MAP"



APPENDIX P

Sublimity Interchange Management Area Overlay Zoning District Boundary

Sublimity Inter
Area Managem
Legend
300 0 300

Draft Report

Sublimity Interchange Area Management Plan

Prepared for

Oregon Department of Transportation

December 2005

Prepared by

CH2MHILL

ERRATA SHEETS

Summary of Comments on REPORT

This page contains no comments

Printed on Recycled and Recyclable Paper

This page contains no comments

Acknowledgments

~ Project Staff ~

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Kristen Kibler

~ Public Agency Contributors ~

City of Stayton

Gerry Aboud, Mayor

Mike Faught, Public Works Director

Steve Goeckritz, Community Development Director

City of Sublimity

Gene Ditter, City Councilman

Alan Frost, Public Works Director

Mid-Willamette Valley Council of Govt's

Judith Ingram Moore

~ Public Agency Contributors, cont. ~

Marion County

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Abbreviations and Acronyms

ADT	average daily traffic
ATR	automatic traffic recorder
CLOMR	Certified Letter of Map Revision (FEMA)
DEQ	Department of Environmental Quality
DLCD	Department of Land Conservation and Development
EA	Environmental Assessment
EFU	Exclusive Farm Use
ECSI	Environmental Cleanup Site Information (DEQ database)
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
HDM	Highway Design Manual
IAMP	Interchange Area Management Plan
LOS	level of service
LWI	Local Wetlands Inventory
MCBFHA	Mill Creek Basin Flood Hazard Area
MOU	Memorandum of Understanding
NHS	National Highway System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OHP	*Oregon Highway Plan*
OSHPO	Oregon State Historic Preservation Office
OTC	Oregon Transportation Commission
OTIA	Oregon Transportation Investment Act
OTP	*Oregon Transportation Plan*
OWRD	Oregon Water Resources Department
PMT	Project Management Team
REA	Revised Environmental Assessment

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SPIS	Safety Priority Index System
STIP	State Transportation Improvement Program
TDM	transportation demand management
TMC	turning movement count
TPR	Transportation Planning Rule
TSP	Transportation System Plan
UGB	urban growth boundary
V/C	volume-to-capacity ratios
VMT	vehicle miles traveled

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Executive Summary

The Sublimity Interchange, located at the junction of Oregon 22 and Cascade Highway in Marion County, Oregon, will be undergoing modifications and improvements. This Interchange Area Management Plan (IAMP) documents the land use and transportation strategies developed to protect the function of the Sublimity Interchange over the long-term (20-plus years) in light of these planned improvements, as directed by Oregon Administrative Rule (OAR) 734-051-0155(6).

Evaluation of interchange ramp and bridge alternatives occurred as a result of earlier planning and design efforts; the interchange ramp and bridge design was approved through an Environmental Assessment (EA) by the Federal Highway Administration (FHWA) in 1995. However, this study did evaluate the operational functioning of the ramp terminals, as proposed.

Operations analyses performed indicate that ~~both~~ interchange ramp terminals will require signalization by the year 2025. A signal was assumed at Whitney ~~Drive~~ in 2006, and the realignment of Golf Lane with Whitney ~~Drive~~ is assumed to take place within the 20-year timeframe of this project. Analysis indicates that some adjustments to the signalization at Cascade Highway and Shaff Road would be required in the future to synchronize signal operations along Cascade Highway.

Land use analysis conducted as part of the IAMP indicates the proposed facility would be adequate to handle proposed land uses as well as potential land uses that could arise from the conversion of land zoned for farm use subject to Measure 37. Future development of industrial and commercial properties would likely lead to the signalization of the new access for the backage road during the 20-year timeframe.

Alternatives analyzed for this IAMP were access-related in nature, and the preferred alternative package contains access management recommendations for Cascade Highway both north and south of the interchange within the 1,320-foot Interchange Area Management Area limits.

An effective access management strategy will help ensure compatibility between future transportation and land use needs (both local and regional) while optimizing mobility and safety conditions at the interchange and on Cascade Highway. This IAMP presents the following access management recommendations:

- A backage access road ~~should~~ be built behind the properties located northeast of the interchange, extending from Cascade Highway (at a point approximately 1,580 feet north of the interchange ramp terminus) to Sublimity Boulevard (at a point approximately 470 feet west of the Sublimity Boulevard/Cascade Highway intersection). Upon redevelopment, the properties located in this section would need to access the backage road instead of Cascade Highway. All private approaches to Cascade Highway in the Interchange Access Management Area Limit would be closed and access relocated to the backage road. These access recommendations are illustrated on Figure 4-9 of this document.

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- The City of Sublimity ~~should~~ amend its Development Code to create an "Interchange **Overlay Zone" that will prohibit future development on properties along Cascade** Highway (northeast of the interchange) without the presence of an alternate access road.
- Access control ~~should~~ be purchased along the roadway property frontage of Tax Lot# 091W03A00100.The existing access serving this lot and Tax Lot# 091W03A0200 will be allowed to retain access to Cascade Highway.
- The existing approach serving Tax Lot# 091W03A00300 will be consolidated with the approach serving Tax Lots# 091W03A00200 and 091W03A00100.
- A frontage access road should be built from a point on Cascade Highway directly across from the proposed backage road (approximately 1,580 feet north of the interchange ramp terminus), to tie in with the existing driveway serving Tax Lots# 091W03A00300, 091W03A00200, and 091W03A00100. The existing access currently serving Tax Lots# 091W03A0200 and 091W03A00100 would be closed and access relocated to the frontage road.

  The Oregon Department of Transportation (ODOT) ~~should~~ grant deviations for several accesses south of the interchange, including Whitney ~~Drive~~ Golf Lane (with proviso that it be realigned, as agreed, with Whitney ~~Drive~~ as warranted in the future), and access to the ODOT Park-and-Ride lot.
- ODOT ~~should~~ grant deviations for Sublimity Boulevard and several private driveway **accesses north of the interchange, based on the City of Sublimity Development Code** changes noted earlier.
- ODOT ~~should~~ grant a deviation for the intersection of Sublimity Boulevard and the westbound interchange ramp terminals, as the future project is designed.
- The Fern Ridge Road and Santiam Street at-grade intersections should be modified or eliminated to improve access management and safety conditions along Oregon 22.

In addition to access management recommendations, this IAMP also includes the following physical improvement and traffic management recommendations:

- Reconstruct the Oregon 22 entrance ramps to provide standard merge operations onto Oregon 22.
- Widen Cascade Highway from and including Sublimity Boulevard through the Shaff Road/Fern Ridge Road intersection.
- Realign Golf Lane across from Whitney Street.
- ~~Signalize the Oregon 22 ramp termini - Sublimity Boulevard/Cascade Highway intersection (north of interchange).~~
- ~~Signalize the Oregon 22 ramp termini/Cascade Highway intersection (south of intersection).~~
- Signalize the Whitney Street - Golf Lane/Cascade Highway intersection.

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- The City of Sublimity ~~should~~ amend its Development Code to create an "Interchange Overlay Zone" that will prohibit future development on properties along Cascade Highway (northeast of the interchange) without the presence of an alternate access road.
- Access control ~~should~~ be purchased along the roadway property frontage of Tax Lot# 091W03A00100.The existing access serving this lot and Tax Lot# 091W03A0200 will be allowed to retain access to Cascade Highway.
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- The Oregon Department of Transportation (ODOT) ~~should~~ grant deviations for several accesses south of the interchange, including Whitney ~~Drive~~, Golf Lane (with proviso that it be realigned, as agreed, with Whitney ~~Drive~~ as warranted in the future), and access to the ODOT Park-and-Ride lot.
- ODOT ~~should~~ grant deviations for Sublimity Boulevard and several private driveway accesses north of the interchange, based on the City of Sublimity Development Code changes noted earlier.
- ODOT ~~should~~ grant a deviation for the intersection of Sublimity Boulevard and the westbound interchange ramp terminals, as the future project is designed.
- The Fern Ridge Road and Santiam Street at-grade intersections should be modified or eliminated to improve access management and safety conditions along Oregon 22.

In addition to access management recommendations, this IAMP also includes the following physical improvement and traffic management recommendations:

- Reconstruct the Oregon 22 entrance ramps to provide standard merge operations onto Oregon 22.
- Widen Cascade Highway from and including Sublimity Boulevard through the Shaff Road/Fern Ridge Road intersection.
- Realign Golf Lane across from Whitney Street.[12]
- ~~Signalize the Oregon 22 ramp termini - Sublimity Boulevard/Cascade Highway intersection (north of interchange).~~
- ~~Signalize the Oregon 22 ramp termini/Cascade Highway intersection (south of intersection).~~
- Signalize the Whitney Street - Golf Lane/Cascade Highway intersection.[13]

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- Coordinate traffic signal operations along Cascade Highway due to the close spacing of signalized intersections. 1
- When traffic demand requires, install a right-turn pocket on the eastbound Oregon 22 exit ramp approach to Cascade Highway. 2
- When traffic demand requires, install right-turn pockets on the Shaff Road/Fern Ridge Road approaches to Cascade Highway. 3
- Provide bus and carpool service to the existing park-and-ride facility. This facility is ~~not~~ currently served by bus routes or formal carpool programs. Expansion of service to this facility would aide in managing traffic demand through the IAMP area.
- 4 ~~The Fern Ridge Road and Santiam Street at-grade intersections should be modified or eliminated to both for access management and safety along Oregon 22.~~

This document includes a complete description of the IAMP development process, land use assumptions, existing conditions analysis, access-related alternative evaluation, and traffic operations analysis. Short-term, medium-term, and long-term transportation strategies for the Sublimity Interchange Area are provided.

This IAMP was prepared in collaboration with ODOT, Marion County, the City of Stayton, and the City of Sublimity.

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SECTION 1

Background

Purpose and Intent

Oregon Administrative Rule (OAR) 734-051-0155(6) states: "Interchange Area Management Plans are required for new interchanges and should be developed for significant modifications to existing interchanges..." This is a "project-based" IAMP, and is being prepared in accordance with the recommendation in the above OAR because of planned modifications and reconstruction of the Sublimity Interchange, located at the junction of Oregon 22 (North Santiam Highway) and Cascade Highway in Marion County, Oregon. The intent of the IAMP is to provide a consensus framework plan among all affected public jurisdictions and agencies to protect the state's investment in the Sublimity Interchange facility. Preparation of this document was conducted in accordance with state IAMP guidelines.[1]

This IAMP evaluates the transportation effects of the proposed interchange improvements and land use plans within the study area. Future commercial, industrial, and residential developments are expected to occur within the influence area of the interchange. The IAMP will recommend operational and physical improvements and access management techniques to maximize the operation of the interchange to accommodate future growth.

The purpose of this IAMP is to develop a ~~strategy~~ plan[1] for the Sublimity Interchange that will protect the function of the interchange for at least 20 years. The Sublimity Interchange was proposed for modification and reconfiguration in the *Joseph Street Environmental Assessment*.[2] The original design was subsequently revised and there is currently an interchange design scheduled for construction in 2008-2009 that includes improvements to the entrance ramps, but not the exit ramps.

Problem Context

The current Sublimity Interchange poses safety and operational issues in that both the east and westbound entrance ramps to Oregon 22 terminate in stop signs. As a result, motorists are forced to quickly accelerate to highway speed from a complete stop. Westbound travelers must enter Oregon 22 traffic from a stop and accelerate up-hill, as the interchange is located at the top of a knoll. Traffic on Oregon 22 is traveling at 55 miles per hour or more, and during peak periods offers few breaks. Eastbound traffic enters on the top of a knoll, but with limited sight distance. Significant numbers of Stayton and Sublimity area residents traveling to jobs in the Salem area use the Sublimity Interchange.

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1 *Interchange Area Management Plan Guidelines (Final Draft)* Prepared by: David Evans and Associates, Inc. with Angelo Eaton & Associates. October, 2005.

2 *Joseph Street-Stayton North City Limits Environmental Assessment* (prepared by ODOT, March, 1995); *Joseph Street-Stayton North City Limits Revised Environmental Assessment* (prepared by ODOT , May, 1995)

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course of action

The primary traffic issue within the interchange influence area is the location and function of access points to Cascade Highway. The Golf Lane access is very near the south side interchange ramp terminus. Currently, Golf Lane serves only a few houses. However, existing zoning would allow for more residential development, creating a potential operational conflict. Sublimity Boulevard, which provides access to the business cluster in the northwest quadrant of the interchange, is slightly off-set from the existing interchange ramp terminals on the north side of the interchange. In the south-east quadrant, recent efforts have been made to improve traffic operations and control the access to Cascade Highway by prohibiting left turns to Martin ~~Street.~~ There is a traffic signal at the intersection of Fern Ridge Road-Shaff Road and Cascade Highway. On the north side of the interchange, the roadway is a two lane road, with a paved shoulder on the west side. Bicycle lanes are provided from Division Street through Sublimity.

Project History and Phasing

The planned modification and reconstruction of the Sublimity Interchange is part of a much larger ODOT undertaking, the Joseph Street-North Stayton City Limits project (henceforth referred to as the "Joseph Street project"). The Joseph Street project was conceived in the late 1980s and the Environmental Analysis for the project was approved by the Federal Highway Administration in 1995.

The selected alternative of the Joseph Street project entailed the following transportation improvements:

- Conversion of approximately 8.5 miles of two-lane Oregon 22 to a four-lane divided highway. Includes a 100-foot separation between the centerline of the westbound and the centerline of the eastbound travel lanes (to permit future expansion to a six-lane roadway within the right-of-way required for this project;
- Construction of new interchanges at Aumsville-Shaw Highway and Golf Club Road;
- Reconstruction/modification of existing interchanges at Silver Creek Falls and Cascade Highways (Sublimity Interchange).
- Implementation of full access control.
- Construction of new frontage roads.

Joseph Street project improvements were designed to be constructed in two major phases.

- Phase 1, which has already been completed, included the widening of Oregon 22 to four lanes between Joseph Street to MP 12, the construction of new interchanges at Aumsville-Shaw Highway and Golf Club Road, and the construction of Golf Lane (to provide access for properties whose approaches to Oregon 22 were removed).
- Phase 2, yet to be completed, will occur in two stages: Stage 1 entails the reconstruction/modification of the Sublimity Interchange; Stage 2 entails the widening of Oregon 22 from two to four lanes from MP 12 to MP 14.1.

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- Stage 1 is currently underway, with physical improvements to the Sublimity Interchange programmed to begin in 2008. The proposed improvements will provide for standard merge entrance ramp operations. This IAMP is being prepared as part of Stage 1. Stage 1 improvements are shown on Figure 1-1.
- Stage 2 will be completed when necessary funding is available. Stage 2 improvements are shown on Figure 1-2.

The project area was identified as Oregon 22 between milepoint (MP) 5.16 and MP 14.1. The Joseph Street project entailed the following proposed improvements: widening Oregon 22 to four lanes in the project area; installing complete access control; and "Phase 1", already completed, entailed the segment of Oregon 22 from Joseph Street (MP 5.44) eastward to the MP 12.

Interchange Function

Oregon 22 is an Oregon Transportation Commission (OTC) designated expressway, and is classified by the Oregon Highway Plan as a highway of statewide significance and a Statewide Freight Route. Oregon 22 is also part of the National Highway System (NHS). Oregon 22 serves as a major connector between the Mid-Willamette Valley and Central Oregon.

Functional classifications of roadways in the vicinity of the Sublimity Interchange are summarized in Table 1-1.

TABLE 1-1
Roadway Functional Classifications

Roadway	Functional Classification
Oregon 22 (North Santiam Highway)	Rural Principal Arterial – Other*
Cascade Highway (outside city limits)	Arterial**
1st Street (Cascade Highway south of Oregon 22)	Principal Arterial***
Center Street (Cascade Highway north of Oregon 22)	Arterial****
Fern Ridge Road	Major Collector***
Shaff Road	Minor Arterial***
Martin Drive	Local***
Whitney Street	Local***
Golf Lane	Local***
Sublimity Boulevard	Local****
9th Street	Local****

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TABLE 1-1
Roadway Functional Classifications

Roadway	Functional Classification

Sources:

* *Oregon Highway Design Manual* (2003)

** *Marion County Rural Transportation System Plan* (1998)

*** *Stayton Transportation System Plan Final Draft* (2004)

**** *Sublimity Transportation System Plan* (1998)

The Sublimity Interchange is an important facility for the communities of Stayton and Sublimity, and serves the following functions:

- Commercial/Industrial: The interchange directly serves the downtowns of each community, and the businesses therein. As the commercial and industrial-zoned areas of these communities continue to develop, the Sublimity Interchange will increasingly function as an integral economic development asset.
- Residential Commuting: A significant number of Stayton and Sublimity residents utilize the interchange to access Oregon 22 for their daily commutes into the Salem-Keizer area.
- Agricultural: The interchange serves a farm-to-market function for the numerous agricultural operations in the area.

Sublimity Interchange modifications and associated local improvements must be planned and implemented to accommodate the multi-functional nature of the interchange.

Goals and Objectives

It is the goal of this IAMP to propose access management, construction and land use measures to interactively augment the effectiveness of the interchange modification design. This report documents the results of the project planning process used to achieve this stated goal for the Sublimity Interchange.

As stated in Policy 3C of the 1999 Oregon Highway Plan, *"it is the policy of the State of Oregon to plan for and manage grade-separated interchange areas to ensure safe and efficient operation between connecting roadways"*. From this definition and a consideration of project-specific local transportation issues, the generalized objectives of the Sublimity IAMP are to:

- Prolong the useful life of the state's investment in the Sublimity Interchange
- Control or decrease, through access management measures, the number of conflict points on Cascade Highway in the vicinity of the Sublimity Interchange
- Provide feasible and equitable driveway relocation alternatives for property owners with current direct access to Cascade Highway
- Balance the need for the interchange to support community development interests with the need for safe and efficient operation within the interchange area

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- Establish agreements with local governments on how to effectively manage the long-term function of the interchange
- Monitor how the interchange capacity is managed through cooperation with local governments
- Provide certainty for property and business owners and local governments

IAMP Study Area

The Sublimity IAMP project study area is comprised of Oregon 22 between the Golf Club Road Interchange and the Mill Creek Bridge on Oregon 22, and Cascade Highway between SW 9th Street in Sublimity and Fern Ridge Road SE-Shaff Road in Stayton. The study area is shown on Figure 1-3.

Cascade Highway is alternatively called, respectively, Center Street inside Sublimity city limits and North 1st Avenue inside Stayton city limits. The study area encompasses the southern portion of the City of Sublimity, the northeastern portion of the City of Stayton, and portions of unincorporated Marion County.

The boundaries of the IAMP study area were developed based on a review of the surrounding roadway network and land use patterns as well as existing and future travel patterns. The parameters of the study area take into account:

- Required state IAMP regulations
- Required state access management regulations: the IAMP study area includes all land uses and roadways located within 1,320 feet of the existing Sublimity Interchange. This distance corresponds to the spacing standard outlined in the OAR 734-051 Division 51 rules for interchange ramps.
- Transportation facilities and traffic operations
- The mutual impact of existing natural and cultural resources
- The mutual impact of existing and planned land uses

Related Work Products

- The Oregon 22 Sublimity Interchange modernization project is an approved project in the 2006-2009 ~~Draft~~ STIP. The project is described in the STIP as a "Partial Interchange Reconstruction". This IAMP is part of the final planning for this project.
- Integral to the preparation of this IAMP is the *Joseph Street - North Stayton City Limits Environmental Assessment*[3]. This EA and subsequent REA, which were approved by the Federal Highway Administration (FHWA), provide the rationale for Sublimity

[3] Both the *Joseph Street – Stayton North City Limits Environmental Assessment* and *Revised Assessment* were consulted in this IAMP planning process. Source information: *Joseph Street – North Stayton City Limits Environmental Assessment* (ODOT and FHWA) March, 1995; *Joseph Street – North Stayton City Limits Revised Environmental Assessment* (ODOT and FHWA) May, 1995.

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Interchange area improvements and serves to document the determination that project actions will not have a significant impact on the human environment.

- The City of Stayton Transportation System Plan (TSP) lists two Capital Improvement Projects (aside from the Sublimity Interchange project) that are located in the Sublimity Interchange influence area. These are excerpted below:
  - *Cascade Highway/1st Avenue Widening from Highway 22 to Regis Street – widen to 5 lanes with sidewalks.*
  - *Cascade Highway/Whitney Street signalization with EB and WB Left Turn Lanes and Realign Golf Lane.*[4]

  Both of the above projects were factored into the operational analysis and alternatives decision-making process for this IAMP.
- The City of Sublimity Transportation System Plan lists the City's objectives for street network circulation and access management in the immediate vicinity north of the Sublimity Interchange.

Public Involvement

The purpose of the public involvement program is to build a planning process that (1) balances the needs and issues of residences and businesses in the Sublimity Interchange area, including those who depend on the highway, and (2) has the informed support and acceptance of these communities and interests. One key goal of the program is to elicit public discussion of the issues affecting the selection of access relocation alternatives to ensure future safe and efficient conditions in the vicinity of the Sublimity Interchange along Cascade Highway.

Detailed discussion and results of the public involvement process for the Sublimity IAMP project is given in Appendix A of this document.

[4] Source: *City of Stayton Transportation System Plan* (Final Draft 2004); Table 8-1 Capital Improvement Cost – Street Improvements; p. 8-1

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SECTION 2

Existing Conditions Inventory and Data Analysis

Regulatory Framework

The Sublimity IAMP study area contains land from three jurisdictions: Marion County, the City of Sublimity, and the City of Stayton. IAMP improvements are therefore subject to applicable land use regulations for each jurisdiction, as well as state and federal regulations.

State, county, and local regulations pertaining to IAMP actions are addressed in the Plan and Policy Review, located in Appendix B.

Existing Land Use

The Sublimity IAMP study area contains a mixture of urban and agricultural land uses. The Sublimity Interchange lies between the communities of Stayton (population 7,360) and Sublimity (population 2,160)[5]. In the immediate vicinity the land is used primarily for agricultural purposes. A general description of land uses in the study area is as follows:

- **NW Quadrant:** commercial and light industrial uses along Sublimity Boulevard; low-density single-family residences along Cascade Highway.
- **NE Quadrant:** farm use.
- **SW Quadrant:** farm use; a few single-family residences.
- **SW Quadrant:** state-owned park-and-ride lot; medium-density single and multi-family residences; commercial establishments; elder-care residential facility.

Comprehensive Plan Designations

Comprehensive Plan land use designations in Marion County, the City of Stayton, and the City of Sublimity are coincident with the zoning designations for these respective public agencies. Relevant zoning district designations are addressed below.

Zoning Designations

Planned interchange improvements will take place solely within unincorporated Marion County, and will therefore only be subject to applicable Marion County zoning code regulations. However, longer-term IAMP recommendations will involve utilizing land inside Sublimity and/or Stayton jurisdictional limits. Additionally, the potential for

[5] Source: *2004 Oregon Population Report.* Portland State University Population Research Center. Population numbers given are year 2004 estimates.

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increased traffic in the interchange is tied to the type and intensity of development allowed in each of the zoning districts in the IAMP study area. For this reason, IAMP study area zoning regulations for Sublimity and Stayton are addressed here in addition to Marion County.

Zoning designations in the Sublimity IAMP study area are shown in Figure 2-1.

Marion County Zoning

Existing Marion County zoning districts in the study area are as follows:

- Exclusive Farm Use (EFU)
- Urban Transitional Farm (UTF)

Project Relevant Issues

- Public road improvements are permitted outright in all Marion County zones providing that such improvements are in conformance with the *"applicable comprehensive plan and the standards of the Department of Public Works"* [per Marion County Zoning Ordinance 25.10(b)]. The Marion County Comprehensive Plan does not contain any language constraining transportation improvements in an EFU zone. Therefore, Marion County zoning regulations do not constrain planned Sublimity Interchange improvements.

City of Stayton Zoning

Existing City of Stayton zoning districts in the Sublimity IAMP study area are as follows:

- Commercial-Retail (CR)
- Interchange Development (ID)
- High-Density Residential (HD)
- Multiple-Family Residential (MD)
- Single-Family Residential (LD)

Project Relevant Issues

- Public road improvements are permitted outright in the CR and ID zones [per Stayton Development Code 17.16.690.2(j) and 17.16.710.2(i), respectively].

- Public road improvements are conditionally permitted in the HD, MD, and LD zones [per Stayton Development Code 17.16.680.3(f), 17.16.670.3(b), and 17.16.660.3(b), respectively]. Although no IAMP improvements are planned to occur in any of these three zones, any change which results in transportation-related public improvements in these zones would be subject to site review by the City of Stayton.

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City of Sublimity Zoning

Existing City of Sublimity zoning districts in the Sublimity IAMP study area are as follows:

- Commercial (COM)
- Industrial (IND)
- Future Industrial
- Low-Density Residential (R-1)
- Medium-Density Residential (R-2)

Project Relevant Issues

- Public road improvements are permitted outright in all City of Sublimity zones [per Sublimity Development Code 2.403.01.D] provided that *"the right of way is not expanded to more width than prescribed for the street in the Public Facilities segment of the Comprehensive Plan."*

Transportation Facilities and Traffic Operations

This section summarizes the existing transportation conditions within the study area, provides assumptions and methodologies to be used in the traffic operational analyses, and catalogues existing transportation system facilities and services. To the extent possible, physical as well as operational characteristics of the roadways, intersections and transportation services are described.

Existing Transportation Facilities

Vehicular Facilities

The following section describes the existing physical characteristics of the study area roadways and the study intersections. Figure 2-2 shows traffic control and channelization in the study intersection.

- **Oregon 22** is the major east-west highway in Marion County. It is located between the cities of Stayton and Sublimity, and is connected to both cities via an interchange at Cascade Highway. In addition to the Cascade Highway interchange, ~~two~~ other interchange locations, Golf Club Road and ~~Fern Ridge Road~~, provide access to and from Stayton and Sublimity. Santiam Street provides ~~a fourth~~ connection between Oregon 22 and the City of Stayton. Golf Club Road and Cascade Highway are full interchanges, while Fern Ridge Road and Santiam Street are stop controlled at-grade intersections located east of the study interchange.

  Both the east- and westbound Oregon 22 entrance ramps terminate in stop signs. Drivers enter Oregon 22 traffic from a full stop (right-turn only), and are required to accelerate up-hill due to the topography of the highway. In the vicinity of the Sublimity Interchange, Oregon 22 is a two-lane undivided, access controlled highway. The posted speed limit is 55 mph.

  The Oregon 22 eastbound exit ramp terminates in a shared left and right turn lane that is stop controlled at Cascade Highway. At this intersection, Cascade Highway has one

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from the westbound ramp

through travel lane in each direction, with a shared through and right-turn lane for southbound travel and a shared through and left-turn lane for northbound travel.

The Oregon 22 westbound exit ramp ~~forms the east leg of the Cascade Highway/Sublimity Boulevard intersection. It consists of a single lane with shared left, through and right-turn movements.~~ **The ramp is stop controlled at its approach to** Cascade Highway. At this intersection, Cascade Highway has one travel lane in each direction, with a shared through and left-lane for northbound travel and a shared left, through and right-turn lane for southbound travel.

- **Cascade Highway** is a major north-south arterial that provides the primary access to the cities of Sublimity and Stayton from Oregon 22.

  North of Oregon 22, Cascade Highway is a two lane roadway with paved asphalt shoulders on its west side. The posted speed limit on the minor arterial is 45 mph.

  South of Oregon 22, Cascade Highway is generally a two lane roadway with paved asphalt shoulders. Left turn pockets are provided at the Whitney Street and Shaff Road-Fern Ridge Road intersections. As described in the Pedestrian Facilities section, a portion of Cascade Highway, from Whitney Street to the south, is served by a sidewalk. The posted speed limit on Cascade Highway is 45 mph.

  Between the Oregon 22 eastbound ramps and Whitney Street, the width of Cascade Highway is less than the City of Stayton's standard street width of 40 feet for principal arterials. Two bridges are located on Cascade Highway within the City of Stayton project limits. Mill Creek Crossing occurs south of Golf Lane and Lucas Ditch crossing occurs south of Martin Drive.

- **9th Street** forms a T-intersection with Cascade Highway in the southern portion of Sublimity and provides access to a residential area. All approaches to the intersection are single lanes, with no dedicated turn pockets. The west approach to the intersection is stop controlled.

- **Sublimity Boulevard** is located just north of Oregon 22, and aligns with the interchange's westbound ramps. All approaches to the intersection are single lanes, with no dedicated turn pockets. The east leg is comprised of the Oregon 22 westbound ramps. The west leg is a two lane roadway providing access to the business cluster in the northwest quadrant of the interchange including an insurance agency, motorcycle/car dealerships, a tire shop, and a hotel. The east and west approaches to the intersection are stop controlled.

- **Golf Lane**, located just south of Oregon 22, is a two lane local roadway. At Cascade Highway, a shared right-left turn lane is stop controlled. Cascade Highway has a shared through-right lane for southbound travel and a shared through-left lane for northbound travel. Currently this road serves a small number of residences; however, the adjacent undeveloped parcels are zoned for additional housing development. Across Cascade Highway from this intersection is the access to an ODOT park-and-ride lot.

- **Whitney Street** consists of one travel lane in each direction. At Cascade Highway, a shared right-left turn lane is stop controlled. Cascade Highway has a shared through-

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splits into two legs approaching Cascade Highway. The northern leg carries traffic to and from Sublimity; the southern leg to and from Stayton. Both legs consist of a stop-controlled single lane with shared left, through, and right turn movements. The two legs intersect part way up the ramp

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one leg of

right lane for northbound travel and a through lane with a left-turn pocket for southbound travel. Further to the east of Martin Drive, Whitney Street connects to a single family residential area. Adjacent to Cascade Highway, Whitney Street services commercial and retail properties. The Whitney Street intersection with Cascade Highway is scheduled to be signalized in 2006.

- **Martin Drive** is a right turn in, right turn out only connection to Cascade Highway with access to Whitney Street. The area served by Martin Drive and Whitney Street is primarily a small commercial/retail base area that includes a gas station with a mini-mart, fast-food restaurant, liquor store, and pharmacy.
- **Shaff Road-Fern Ridge Road** provides a key east-west route in northern Stayton and helps relieve traffic congestion through the City. It is a two lane roadway with left-turn pockets at the signalized intersection with Cascade Highway.

Truck Routes

Through the project area, Oregon 22 and Cascade Highway are designated as truck routes. Oregon 22 is also designated as a Freight Route in the 1999 Oregon Highway Plan. Truck routes designated by the City of Stayton serve the following areas: the industrial area on the west side of the city, NORPAC in central Stayton, and Morse Brothers south of Stayton. Shaff Road-Fern Ridge Road is a designated City of Stayton truck route.

Bicycle Facilities

Dedicated bicycle lanes are provided on Cascade Highway from the northern portion of the study area (vicinity of Division Street) through the City of Sublimity. Through the remainder of the IAMP study area, bicyclists must utilize the available roadway shoulders or share the vehicle travel lanes.

Bicycle lanes are also provided on a segment of Fern Ridge Road, east of Cascade Highway to Wildflower Drive.

Pedestrian Facilities

A sidewalk is provided on the east side of Cascade Highway from just north of Whitney Street continuing south through the City of Stayton. Throughout the remainder of the study area, pedestrians on Cascade Highway must utilize the available roadway shoulders.

Shaff Road-Fern Ridge Road and Whitney Street also have a sidewalk on the south side of the roadway, while Martin Drive has a sidewalk on the north side.

Public Transportation & Other Alternative Modes

Transit service in the Stayton/Sublimity area is provided by the Chemeketa Area Regional Transit Service (CARTS) and the Wheels of Joy dial-a-ride system for disabled persons. Based on current and future ridership projections, neither would have a significant effect on area traffic patterns.

Laidlaw Transit provides bus service for the North Santiam School District. Within the study area, Cascade Highway and Shaff Road-Fern Ridge Road are designated as school bus routes.

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A Park-and-Ride facility with 94 stalls and semi-covered bicycle racks is located in the southeast quadrant of the Oregon 22/Cascade Highway interchange.

Rail/Pipelines/Others

Willamette Valley Railroad services the City of Stayton on a spur line originating in Woodburn. Two to three trips per week currently service the area. Two at-grade crossings, Washington Street at NORPAC and Locust Street/Wilco Road, are located south and west of the IAMP study area, respectively.

The City of Sublimity has no railroad service.

There are no airports in the direct vicinity of the study area. A full service commercial airport is located in Salem, approximately 15 miles to the east. Several small private airstrips and a heliport at the Santiam Hospital are within a 20 mile radius.

Existing Facilities Deficiencies

Deficiencies in the existing transportation network are outlined in the Marion County and City of Stayton ~~Draft~~ Transportation System Plans. These deficiencies are noted below:

Missing sidewalk links within the study area include:

- Shaff Road – north side from Stayton Middle School to Cascade Highway
- Fern Ridge Road – north side Cascade Highway to west of Summerview Way
- Cascade Highway – west side from Oregon 22 to Shaff Road
- Cascade Highway – east side from north of Whitney to Oregon 22

Arterials and Collectors with deficient pavement widths include:

- Shaff Road from western UGB to west of Cascade Highway
- Cascade Highway south of Oregon 22 Eastbound Ramps to Whitney Street

Existing Traffic Conditions

Traffic Operations Performance Measures

Operational performance measures are outlined below for the three jurisdictions within the study area: ODOT, City of Stayton and City of Sublimity.

ODOT

The intersections and approaches adjacent to the Oregon 22 interchange are under ODOT jurisdiction.

The Oregon Highway Plan outlines specific performance ~~measures to~~ be maintained along ODOT facilities as part of their Mobility ~~Standards.~~ **These standards are intended to** maintain mobility along important **roadway sections and vary according to functional** classification, location, and role within the National Highway System. Table 2-1 summarizes the mobility standards set by the Oregon Highway Plan.

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TABLE 2-1
Maximum Volume to Capacity Ratios for Peak Hour Operating Conditions Outside of the Portland Metropolitan Area

	Land Use Type/Speed Limits					
	Inside Urban Growth Boundary				Outside Urban Growth Boundary	
Highway	STAs	MPO	Non-MPO outside of STAs where non-freeway speed limit <45 mph	Non-MPO where non freeway speed limit >=45 mph	Unincorporated Communities	Rural Lands
Interstate Highways and Statewide (NHS) Expressways	N/A	0.80	0.70	0.70	0.70	0.70
Statewide (NHS) Freight Routes	0.85	0.80	0.75	0.70	0.70	0.70
Statewide (NHS) Non-Freight Routes and Regional or District Expressways	0.90	0.85	0.80	0.75	0.75	0.70
Regional Highways	0.95	0.85	0.80	0.75	0.75	0.70
District/Local Interest Roads	0.95	0.90	0.85	0.80	0.80	0.75

Source: 1999 *Oregon Highway Plan* (OHP)

Interstates and Expressways shall not be identified as Special Transportation Areas (STAs). For the purpose of this mobility policy of volume-to-capacity ratio standards, the peak hour shall be the 30th highest annual hour. This approximates weekday peak hour traffic in larger urban areas.

- **Oregon 22, North Santiam Highway** is a Statewide Expressway and NHS Freight route, non-MPO within the UGB with a speed >45 mph. The maximum acceptable V/C ratio for this facility is 0.70.
- **The interchange ramps with Oregon 22 at Cascade Highway** have a maximum volume-to-capacity ratio of 0.85 given their categorization as District/Local Interest Roads and Inside Urban Growth Boundary, non-MPO where non-freeway speed limit <45 mph.
- **Cascade Highway at the interchange ramps with Oregon 22** have a maximum volume-to-capacity ratio of 0.75 given its categorization as Regional Highway and Inside Urban Growth Boundary, non-MPO where non-freeway speed limit >=45 mph.

City of Stayton

The intersections south of the Oregon 22 interchange are within City of Stayton jurisdiction.

The City of Stayton TSP, Section 3 (Transportation Goals and Policies) establishes level of service standards for the City of Stayton as follows:

- Signalized Intersections - Level-of-Service D
- Unsignalized Intersections - Level-of-Service E

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City of Sublimity

The intersections north of the Sublimity Interchange are within the City of Sublimity jurisdiction. Marion County mobility standards were applied to these intersections.

- Signalized Intersections – Level-of-Service D
- 4-way Stop Controlled Intersections – Level-of-Service D
- 2-way Stop Controlled Intersections – Level-of-Service E

Existing Traffic Volumes

Manual turning movement counts were collected at eight intersections along Cascade Highway on February 3, 2005. The duration of each intersection count is shown below:

- Cascade Highway and 9th Street: 4 hours from 6 AM to 10 AM.
- Cascade Highway and Sublimity Boulevard: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Oregon 22 Eastbound ramps: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Oregon 22 Westbound ramps: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Golf Lane: 4 hours from 6 AM to 10 AM.
- Cascade Highway and Whitney Street: 16 hours from 6 AM to 10 PM.
- Cascade Highway and Martin Drive: 4 hours from 6 AM to 10 AM.
- Cascade Highway and Shaff Road-Fern Ridge Road: 16 hours from 6 AM to 10 PM.

These intersections were included in the IAMP scope of work to represent the influence area of the Sublimity Interchange. In addition to these intersections, the Oregon 22 operations at the interchange entrance ramps were analyzed utilizing the ODOT highway traffic data. The vehicle turning movement data is compiled in Appendix C.

Peak hour turning movement counts were seasonally adjusted to represent the 30th Highest Hour design volumes based on ODOT's permanent Automatic Traffic Recorder (ATR) at station # 22-010, which is located on a segment of highway that closely resembles the traffic operations and geometric characteristics of Oregon 22.

The seasonal factor for volumes on Oregon 22 and Cascade Highway was interpolated from values between February 1 and February 15, 2003. The average seasonal factor was calculated to be 1.19.

The derived 30th Highest Hour design volumes were then balanced along Cascade Highway between adjacent study intersections. The directional traffic volumes were adjusted until the difference between them was less than 10 percent. The derived traffic volumes at the study intersections are shown in Figure 2-3.

Existing Intersection Operations

Existing (2005) V/C ratios, level-of-service and vehicle queues were computed for the eight study intersections and Oregon 22 entrance ramps based on the 30th Highest Hour design volumes. Table 2-2 shows the results of the existing operations analyses. All locations that do not meet the applicable jurisdiction's standards are highlighted in the table. Appendix D includes the traffic operations worksheets for the existing 30th highest hour conditions.

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A Synchro model was constructed for the study area based on the collected traffic turning movement counts balanced to the 30th Highest Hour design volumes, peak hour factors, truck percentages and field observations.

The Synchro model uses the methodology in the 2000 Highway Capacity Manual to analyze both signalized and stop-controlled intersections. The model also computes the level-of-service (LOS) and volume-to-capacity (V/C) ratio necessary to determine whether the intersection meets the applicable mobility standards from the local municipalities and the Oregon Highway Plan.

TABLE 2-2
Existing Intersection Analysis Summary
2005 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Oregon 22 Approaches				Ramp Approaches			
Oregon 22 eastbound entrance ramp	0.70	0.30	-	-	0.85	0.40	-	4/2
Oregon 22 westbound entrance ramp	0.70	0.41		-	0.85	0.74		8/3
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at 9th Street	E	-	A	1	E	-	B	1/4
Cascade Highway at Sublimity Boulevard/ Oregon 22 westbound ramps	0.75/6	0.04	-	1	0.85	0.57	-	3/5
Cascade Highway at Oregon 22 westbound entrance ramp	0.75	0.46	-	-				
Cascade Highway at Oregon 22 eastbound ramps	0.75/8	0.30	-	2	0.85	>1.0	-	15/7
Cascade Highway at Golf Lane	E	-	A	1	E	-	D	1/9
Cascade Highway at Whitney Street	E	-	B	2	E	-	F	19/10
Cascade Highway at Martin Drive	-	-	-	-	E	-	B	1/11
Cascade Highway at Shaff Road-Fern Ridge Road	D	-	E	31	D	-	D	17/

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A Synchro model was constructed for the study area based on the collected traffic turning movement counts balanced to the 30th Highest Hour design volumes, peak hour factors, truck percentages and field observations.

The Synchro model uses the methodology in the 2000 Highway Capacity Manual to analyze both signalized and stop-controlled intersections. The model also computes the level-of-service (LOS) and volume-to-capacity (V/C) ratio necessary to determine whether the intersection meets the applicable mobility standards from the local municipalities and the Oregon Highway Plan.

TABLE 2-2
Existing Intersection Analysis Summary
2005 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]
	Oregon 22 Approaches				Ramp Approaches			
Oregon 22 eastbound entrance ramp	0.70	0.30			0.85	0.40		4
Oregon 22 westbound entrance ramp	0.70	0.41	-	-	0.85	0.74	-	8
	Cascade Highway Approaches				Cross Street Approaches			
Cascade Highway at 9th Street	E	-	A	1	E	-	B	1
Cascade Highway at Sublimity Boulevard/ Oregon 22 westbound ramps	0.75	0.04	-	1	0.85	0.57	-	3
Cascade Highway at Oregon 22 westbound entrance ramp	0.75	0.46	-	-	-	-	-	-
Cascade Highway at Oregon 22 eastbound ramps	0.75	0.30	-	2	0.85	>1.0	-	15
Cascade Highway at Golf Lane	E	-	A	1	E	-	D	1
Cascade Highway at Whitney Street	E	-	B	2	E	-	F	19
Cascade Highway at Martin Drive	-	-	-	-	E	-	B	1
Cascade Highway at Shaff Road-Fern Ridge Road	D	-	E	31	D	-	D	17

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TABLE 2-2
Existing Intersection Analysis Summary
2005 30th Highest Hour Design Volumes

Intersection	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]	Mobility Standard[1]	V/C Ratio[2]	LOS[2]	Queue (veh)[2,3]

[1] ODOT mobility standards are based on volume-to-capacity ratios. Stayton and Sublimity standards are based on level of service.

[2] Results are reported for approach with worst operational characteristics.

[3] ODOT intersections are calculated with the 2-minute rule. Stayton and Sublimity intersections show 95th percentile queues.

Existing Operational Deficiencies

The results of the existing operational analyses show that two stop-controlled intersection approaches to Cascade Highway, the Oregon 22 eastbound exit ramp and Whitney Street, operate below the required mobility standards. Both approaches are characterized by extensive vehicle queuing during the design hour. Additionally, although the overall intersection LOS of Cascade Highway at Shaff Road/Fern Ridge Road is at an acceptable LOS D, the Cascade Highway approaches operate at LOS E, with significant vehicle queuing.

Existing Safety Conditions

Accident and Safety Analysis

A summary of the accidents within the study area was prepared for the period between January 1, 1999 and December 31, 2003.

Table 2-3 summarizes the accidents along Oregon 22 between mileposts 12.00 and 14.50. For reference, the approximate locations of the existing Oregon 22 entrance and exit ramps are as follows:

- Eastbound Exit ramp - MP 13.0
- Eastbound Entrance ramp - MP 13.2
- Westbound Exit ramp - MP 13.4
- Westbound Entrance ramp - MP 13.5
- Fern Ridge Road intersection - MP 14.3

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TABLE 2-3
Five-Year Accident History: January 1, 1999 through December 31, 2003
Oregon 22 Mainline Crash Rates and Severity of Accidents

Milepost			1999-2003 Average Annual Daily Traffic (AADT)	Number of Accidents (Over 5 Years)					Average Annual Crash Rate (Crashes per Million Vehicle-Miles)
From	To	Segment Features		Property Damage Only	Injury	Fatal	Total Crashes	Average Annual	
12.00	12.50	mainline section west of Sublimity Interchange	12,120	1	2	0	3	0.60	0.27
12.50	13.00	Eastbound exit ramp	11,880	1	0	1	2	0.40	0.18
13.00	13.50	Eastbound entrance ramp & westbound exit ramp	11,880	8	9	2	19	3.80	1.75
13.50	14.00	westbound entrance ramp	11,880	4	2	0	6	1.20	0.55
14.00	14.50	Fern Ridge Road intersection	11,060	3	8	0	11	2.20	1.09
12.00	**14.50**	-	**11,764**	**17**	**21**	**3**	**41**	**8.20**	**0.76**

A total of 41 crashes were reported along Oregon 22 between milepost 12.00 and 14.50 during the five year study period. Approximately half of the crashes occurred in the direct vicinity of the Sublimity Interchange and slightly over one-fourth occurred at the Fern Ridge Road intersection. Three fatality accidents occurred within the interchange vicinity during the study timeframe. The remainder of the accidents was roughly evenly split between property damage only and injury only.

The 2003 Crash Rates by Jurisdiction and Functional Classification table from the ODOT 2003 Crash Rate Tables indicates an average crash rate for "other freeways/expressways" as 0.87 crashes per million vehicle-miles. The half-mile segments immediately surrounding the Sublimity Interchange (between mileposts 13.00 and 13.50) and the Fern Ridge Road intersection (between mileposts 14.00 and 14.50) experience a higher than average crash rate (1.09.). However, the rate for the overall Oregon 22 area surrounding the Sublimity Interchange (0.76) remains below this average rate.

Tables 2-4 and 2-5 provide details of the conditions during the accidents as well as the type and severity.

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TABLE 2-4
Five-Year Accident History: January 1, 1999 through December 31, 2003
Oregon 22 Crash Conditions

	Oregon 22 Mainline	
Condition	**Number of Accidents**	**Percentage of Total**
Weather		
Clear	28	68.3%
Cloudy	7	17.1%
Rain	4	9.8%
Snow	0	0.0%
Unknown	2	4.9%
Roadway Surface		
Dry	34	82.9%
Wet	5	12.2%
Ice	0	0.0%
Snow	0	0.0%
Unknown	2	4.9%
Light		
Day	28	68.3%
Dimly Lit	3	7.3%
Dark	6	14.6%
Dusk	3	7.3%
Dawn	1	2.4%

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TABLE 2-5
Five-Year Accident History: January 1, 1999 through December 31, 2003
Oregon 22 Crash Descriptions

	Oregon 22 Mainline	
Condition	**Number of Accidents**	**Percentage of Total**
Collision Type		
Rear End	12	29.3%
Turning	6	14.6%
Fixed Object	8	19.5%
Sideswipe	3	7.3%
Struck at Angle	3	7.3%
Pedestrian	1	2.4%
Head On	3	7.3%
Other	5	12.2%
Severity		
PDO	17	41.5%
Injury Only	21	51.2%
Fatality	3	7.3%
Crash Cause		
Failed to yield right-of-way	8	19.5%
Other - improper driving	1	2.4%
Speed too fast for conditions	18	43.9%
Followed too closely	5	12.2%
Made improper turn	2	4.9%
Alcohol or drugs involved	2	4.9%
Mechanical defect	1	2.4%
Drove on Wrong Side of 2-Way Rd	1	2.4%
No Code	3	7.3%

The majority of the accidents on Oregon 22 occurred during clear, dry, daylight conditions. A factor in many of the accidents involved speeding and failure to appropriately yield. The stop-controlled entrance ramp configuration is likely a large contributing factor to these accidents, as vehicles enter the highway from a complete stop.

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Table 2-6 summarizes the accidents along Cascade Highway between milepoints 0.61 and 1.59. Marion County utilizes milepoints to represent distances on county roads; therefore, each 0.01 milepoint is approximately 50 feet. For reference, the approximate milepoint locations of intersections along Cascade Highway are listed below:

- Shaff Road/Fern Ridge Road - Milepoint 0.61
- Eastbound Entrance/Exit ramp - Milepoint 1.09
- Sublimity Blvd - Milepoint 1.20
- 9th Street - Milepoint 1.59

TABLE 2-6
Five-Year Accident History: January 1, 1999 through December 31, 2003
Cascade Highway Mainline Crash Rates and Severity of Accidents

Milepost		Segment Features	1999-2003 Average Annual Daily Traffic (AADT)	Number of Accidents (Over 5 Years)			Total Crashes	Average Annual	Average Annual Crash Rate (Crashes per Million Vehicle-Miles)
From	To			Property Damage Only	Injury	Fatal			
0.60	0.85	Shaff Road/ Fern Ridge Road	12,020	7	3	0	10	2.00	1.82
0.85	1.10	Eastbound entrance/exit ramp	11,780	2	1	0	3	0.60	0.56
1.10	1.35	Sublimity Blvd/westbound ramps	9,310	10	6	0	16	3.20	3.77
1.35	1.60	9th Street	7,920	2	2	0	4	0.80	1.11
0.60	**1.60**	-	**10,260**	**21**	**12**	**0**	**33**	**6.60**	**1.76**

A total of 33 crashes were reported along Cascade Highway between Shaff Road/Fern Ridge Road and 9th Street during the five year study period. Half of the accidents occurred near the intersection of Cascade Highway and Sublimity Boulevard/Oregon 22 Westbound exit ramp, and just under one-third of the total accidents occurred in the vicinity of the Shaff Road/Fern Ridge Road intersection. No fatality accidents occurred along the one mile study corridor within the study timeframe. Of the 33 crashes, approximately two thirds resulted in property damage only while the remaining one third resulted in injuries.

Cascade Highway north of Oregon 22 is categorized as an arterial. The average crash rate for Suburban Non-Freeway Arterials is 0.60 crashes per million vehicle-miles. Both quarter-mile segments north of the interchange experience accidents at a rate higher than average 2003 Oregon crash rates. The segment immediately north of the interchange (including the intersection with Sublimity Boulevard/Oregon 22 Westbound exit ramp) is over five times as great as this average. Cascade Highway south of Oregon 22 is categorized as a principal arterial. The average crash rate for this type of segment is 1.34 crashes per million vehicle-miles. The quarter-mile segment that includes the intersection of Shaff Road/Fern Ridge

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Road experiences a higher than average crash rate, but overall, the southern portion of Cascade Highway remains below the average rate.

Tables 2-7 and 2-8 provide details of the conditions during the accidents as well as the type and severity of accidents along Cascade Highway.

TABLE 2-7
Five-Year Accident History: January 1, 1999 through December 31, 2003
Cascade Highway Crash Conditions

	Cascade Hwy Mainline	
Condition	**Number of Accidents**	**Percentage of Total**
Weather		
Clear	22	66.7%
Cloudy	6	18.2%
Rain	3	9.1%
Snow	0	0.0%
Unknown	2	6.1%
Roadway Surface		
Dry	27	81.8%
Wet	6	18.2%
Ice	0	0.0%
Snow	0	0.0%
Unknown	0	0.0%
Light		
Day	31	93.9%
Dimly Lit	1	3.0%
Dark	1	3.0%
Dusk	0	0.0%
Dawn	0	0.0%

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TABLE 2-8
Five-Year Accident History: January 1, 1999 through December 31, 2003
Cascade Highway Crash Descriptions

	Cascade Hwy Mainline	
Condition	**Number of Accidents**	**Number of Accidents**
Collision Type		
Rear End	17	51.5%
Turning	8	24.2%
Fixed Object	0	0.0%
Sideswipe	1	3.0%
Struck at Angle	6	18.2%
Pedestrian	0	0.0%
Head On	1	3.0%
Other	0	0.0%
Severity		
Property damage only	21	63.6%
Injury [1]ly	12	36.4%
Fatality	0	0.0%
Crash Cause		
Failed to yield right-of-way	13	39.4%
Other - improper driving	0	0.0%
Speed too fast for conditions	15	45.5%
Followed too closely	4	12.1%
Made improper turn	0	0.0%
Alcohol or drugs involved	0	0.0%
Mechanical defect	1	3.0%
Drove on Wrong Side of 2-Way Rd	0	0.0%
No Code	0	0.0%

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Similar to Oregon 22, the majority of the accidents on Cascade Highway occurred during clear, dry, daylight conditions. Over half of the accidents on Cascade Highway involved rear end collisions. Speed and failure to yield to the right-of-way were factors in almost eighty-five percent of the accidents.

Access management requirements and deficiencies for the Sublimity Interchange are described in Section 4 of this report.

Natural and Cultural Resources

The Sublimity IAMP study area contains land from three local jurisdictions: Marion County, the City of Sublimity, and the City of Stayton. Project improvements could therefore potentially trigger environmental protection regulations of any or all of these jurisdictions, as well as State and Federal regulations. This section examines the existence of natural and cultural resources in the study area and related potential project constraints presented.

The existence of any Goal 5 resources are addressed in this section. Goal 5 is a broad Oregon statewide planning goal that covers a variety of environmental and other resources. Goal 5 and related Oregon Administrative Rules (Chapter 660, divisions 16 and 23) describe how cities and counties are to plan and zone land to conserve resources listed in the goal.

Topography

The topography of the study area contains both flat and low rolling terrain. The main feature of the landscape is Mill Creek, which runs primarily east-west through the study area. Low ridges step up from the flatlands adjacent to the creek. Topography in the immediate vicinity of the Sublimity Interchange is described by quadrant below.

NE Quadrant of Interchange

From the point where it passes under Oregon 22 northward, Cascade Highway SE ascends approximately 50 feet in less than a quarter-mile, dips slightly, then rises again as it intersects with 9th Street in Sublimity.

SE Quadrant of Interchange

The southeast quadrant of the interchange contains the flat floodplain and wetland area adjacent to Mill Creek. A subdivision with new homes on fill materials is located in the floodplain depression. Moving southward toward the center of Stayton, a low ridge exists with an elevation gain of approximately 50 feet.

SW Quadrant of Interchange

The ridge that described in the NE Quadrant is present to the southwest of the interchange and presents a relatively steep grade. The existing two-way highway interchange ramp in this quadrant cuts through this ridge, with a resulting slight hill to the north of the ramp and a steeper hill to the south of the ramp.

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NW Quadrant Interchange

The terrain to the northwest of the intersection of Oregon 22 and Cascade Highway SE rises approximately 30-40 feet. Sublimity Boulevard SE drops from this ridge to its intersection with Cascade Highway SE.

Project Relevant Issues

- The northbound grade on Cascade Highway SE and adjacent ridges present sight-distance issues for motorists at the two-way highway ramp intersections as well as the intersections of Sublimity Boulevard and Golf Lane. Closely-spaced slope changes have an adverse effect on safety in the interchange area. Interchange rehabilitation efforts will require more earthwork during construction and may require additional stabilization, which will have budget and schedule implications.

Hydrology

The project study area lies within the Willamette River Subbasin, in the Middle Willamette Subbasin, in the Mill Creek Watershed. Mill Creek, after passing through the study area, flows northwestward to its convergence with the Willamette River in the City of Salem. Within the study area for this IAMP, Mill Creek runs south of Oregon 22 from the west end of the study area. The creek passes through a culvert under Cascade Highway SE just south of Golf Lane and then traverses under Oregon 22 approximately a quarter-mile east of Cascade Highway.

Project Relevant Issues

- There are hydrologic features contained in the study area that are classified as Goal 5 Resources (as defined in Oregon Administrative Rules Division 23). Sublimity IAMP actions may be subject to State and/or local regulations that are in place to protect Goal 5 resources, as will be discussed in greater detail in the next section.

Riparian Corridors

The Mill Creek riparian corridor located inside the study area includes the perennially flowing Mill Creek, several intermittent streams, and a wetland area measuring just over one acre.

The section of Mill Creek running through the study area is included on the Department of Environmental Quality's (DEQ's) 303(d) list of water quality-limited streams. The DEQ 2003 303(d) list identifies the section of Mill Creek in the study area as water quality limited for Fecal Coliform.

According to the Oregon Department of Fish and Wildlife, the study area section of Mill Creek is spawning and rearing habitat for winter steelhead and fall Chinook, and is rearing and migration habitat for spring Chinook.

Project Relevant Issues

- Sublimity IAMP actions are subject to State Department of Land Conservation and Development (DLCD) Goal 5 ordinance regulations concerning land use actions inside the Mill Creek riparian corridor. Proposed Sublimity IAMP use actions are allowed in riparian corridors [per OAR 660-023-0090(8)(a)], provided that these actions "are designed and constructed to minimize intrusion into the riparian area."