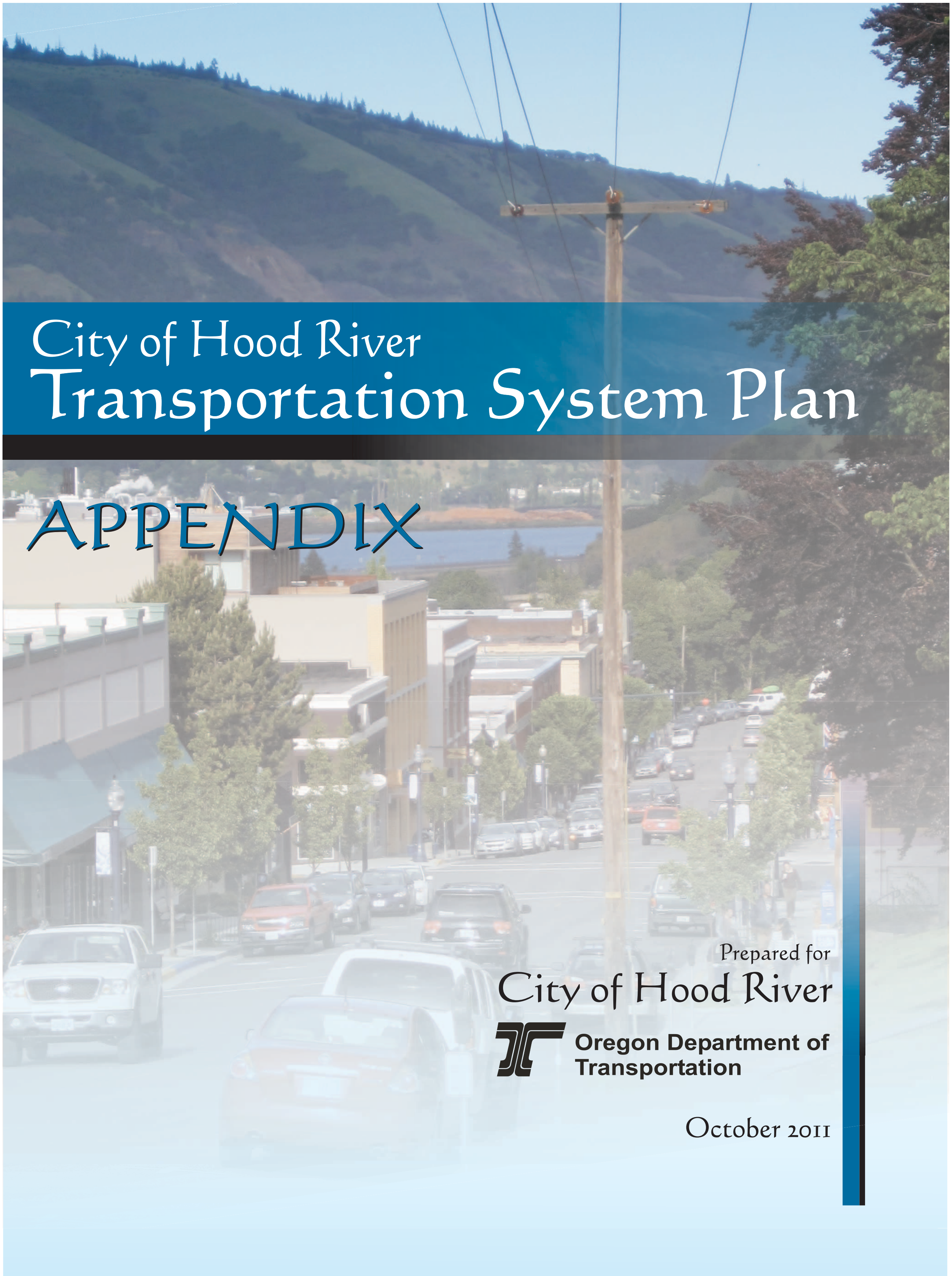

City of Hood River

Transportation System Plan

APPENDIX

Prepared for

City of Hood River

Oregon Department of Transportation

October 2011

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Appendix

Appendix A: Background Document Review Memorandum

Final Technical Memorandum #1

DATE: July 9, 2010

TO: City of Hood River TSP PMT

FROM: John Bosket, PE – DKS Associates
Mat Dolata – DKS Associates
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Elliot Akwai-Scott – Alta Planning + Design
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SUBJECT: **Background Document Review**
Hood River TSP Update P010068-003

This memorandum includes a review of planning documents, policies, and regulations applicable to the 2010 Hood River Transportation System Plan (TSP) update. The City's current TSP will serve as the foundation for the update process, upon which new information obtained from system analysis and stakeholder input will be applied to address changing transportation needs through the year 2031. As new strategies for addressing transportation needs are proposed, compliance and coordination with the plans, policies, and regulations described herein will be required.

The following plans, studies, ordinances, administrative rules, and policies are summarized:

City/ Local Plans, Policies, and Ordinances

- City of Hood River Transportation System Plan (1999, updated 2006)
- City of Hood River Comprehensive Plan (1978, Amended through 2006)
- Hood River Municipal Code (HRMC)
- City of Hood River Transportation Systems Development Charge Ordinance (2000)
- Port of Hood River Strategic Plan
- Hood River Frontage Road Feasibility Study and Split Diamond Interchange Analysis (HNTB Corporation, Revised Draft June 2009)
- Hood River Middle School Safe Routes to School Action Plan
- Hood River School District Transportation Department
- Traffic Impact Studies
- City of Hood River Parking Study (2006)
- Urban Growth Management Agreement between City of Hood River and Hood River County (2003).

County Plans, Policies, and Ordinances

- Hood River County Transportation System Plan (2003)
- Hood River County Bicycle Plan (2010)
- Hood River County Comprehensive Plan
- Hood River County Development Ordinance
- Hood River County Coordinated Transportation Plan (2009)
- Hood River Valley Parks and Recreation Capital Facilities Master Plan

State Plans, Policies, and Regulations

- Oregon Transportation System Planning Guidelines (2008)
- Oregon Transportation Plan (2006)
- 1999 Oregon Highway Plan (amended 2006)
- Oregon Bicycle and Pedestrian Plan (1995)
- I-84 Hood River Interchange Area Management Plans (Draft)
- Oregon Statewide Planning Goals
- Transportation Planning Rule (OAR 660-012) (Amended through 2006)
- ODOT Access Management Rules (OAR 734-051)
- State Agency Coordination Program (1990) (OAR 731-015)
- ODOT Highway Design Manual
- Exit 64 – East Hood River Interchange Study (2005)
- Hood River – Mt. Hood (OR 35) Corridor Plan (Volumes 1 and 2)
- SR 35 Columbia River Crossing Draft EIS
- Historic Columbia River Highway Master Plan
- Historic Columbia River Highway Programmatic Agreement
- ODOT Statewide Transportation Improvement Program (STIP)

City/ Local Plans, Policies, and Ordinances

City of Hood River Transportation System Plan (1999, updated 2006)

The current Hood River TSP was originally adopted in 1999 and last updated in 2006. The TSP provides a plan for the development of the City's transportation infrastructure, addressing improvements to roadways, new pedestrian and bicycle facilities, improvements in public transit service, and transportation demand management strategies required to address the City's transportation needs through the year 2015 horizon. It also includes transportation goals, policies, and strategies to address the identified transportation needs and identifies current facilities, future needs, and recommended projects for pedestrian, bicycle, transit, and motor vehicle modes. Key elements of the TSP include:

- access spacing requirements for City and State facilities,
- functional classification of roadways,
- local street connectivity locations,
- roadway design standards, and
- planned transportation improvement projects

The TSP project list represents the most recent list of 5-year transportation Capital Improvement Projects (CIP) for the City. This TSP update will review all elements of the TSP and update goals, policies, standards, and projects as needed.

City of Hood River Comprehensive Plan (1978, Amended through 2006)

The City of Hood River's Comprehensive Plan provides policies and implementation strategies related to a long-term vision of managing growth in the City. These policies and strategies are organized according to goals. As an acknowledged plan, these goals, policies, and strategies have been found to be consistent with County and State goals and policies.

The Comprehensive Plan goals mirror statewide planning goals, while the policies and implementation strategies are customized to local conditions. Goals, policies, and strategies from the Hood River Comprehensive Plan that apply to updating the TSP address the following issues:

- Public involvement (Goal 1)
- Land use planning (Goal 2)
- Cultural and natural resources (Goal 5)
- Air, water, and land resources (Goal 6)
- Parks and recreation (Goal 8)
- Economic development (Goal 9)
- Public facilities (Goal 11)
- Transportation (Goal 12)
- Energy (Goal 13)
- Urbanization (Goal 14)

Finding: <u>Goal 1.</u> The TSP update will provide several opportunities for public involvement. Draft goals, policies, alternative sets of improvements, and implementation measures will be reviewed and refined through a series of Project Management Team (PMT) meetings, TSP Advisory Committee (TSPAC) meetings, a Bicycle Group tour and meetings, community workshops, City briefings with community groups and individual stakeholders, and City Planning Commission/City Council work sessions.

<u>Goal 2.</u> City land use planning policies outline the legislative and quasi-judicial land use procedures that are used for objective and effective land use decision making. Legislative procedures, which are detailed in the City's Development Code, will be needed to adopt and implement the TSP update and any associated changes to the Development Code and Comprehensive Plan text.

Goal 2 in the Comprehensive Plan also establishes the Plan Map and designated land uses in the city, which are further detailed and implemented by zoning regulations, addressed in the City Zoning Code and Zoning Map. The TSP needs to develop transportation improvements and facilities that are appropriate for these designations or propose to change the designations and zoning through a legislative process. Given the factual basis for planning that Goal 2 requires, preliminary findings are provided as part of this report and will be prepared for the adoption phases of this update.

<u>Goal 5.</u> Part of the TSP update scope is to modify street plans to accommodate topography and Goal 5 natural resources. Previous TSP street plans did not fully account for these factors.

Goal 5 policies and implementation strategies also call for providing open space and natural areas in conjunction with public facilities when possible. This should be considered for any new roadways and facilities planned and constructed in association with the TSP.

One historic Goal 5 resource found within the study areas is the Historic Columbia River Highway. Plans and standards found in the City's Development Ordinance and the Historic Columbia River Highway Master Plan should provide guidance about preservation and development related to the highway.

<u>Goals 6 and 13.</u> Access management, transportation system management, and transportation demand management – particularly providing more transportation alternatives – can increase mobility, reduce congestion and pollution, protect air, water, and land resources, and reduce energy consumption. Access management standards and plan, transportation system management strategies, and improving pedestrian and bicycle facilities will all be key components of the TSP update.

<u>Goal 8.</u> TSP policies, projects, and implementation strategies shall coordinate with facilities planned in the City Parks and Recreation Master Plan and by Hood River Valley Parks and Recreation District 2005 Parks and Recreation Capital Facilities Master Plan. Further, multi-use paths and other pedestrian and biking facilities were planned through the I-84 IAMP process and will be expanded upon in the TSP update. The update shall also improve connections to and between existing and planned recreational facilities in the city.

<u>Goal 9.</u> An objective of the I-84 IAMPs was to improve truck circulation and the movement of goods at these key access points in the city, so as to support its economic development. Access management plans and land use plans developed as part of the IAMP also serve this objective. The TSP update will continue with this work in analyzing additional potential circulation improvements, access management measures, and land use changes.

<u>Goals 11 and 12.</u> Goal 11 and 12 policies and implementation actions focus on maximizing investments in existing infrastructure and in areas inside the City's Urban Growth Boundary (UGB).

Goal 11 policies and implementation strategies emphasize the coordination of urban development with provision of public facilities including water, sewer, and transportation. Policies and projects developed for TSP should be coordinated with the

City's other public facilities master plans. Goal 12 policies and strategies emphasize a creating and maintaining a safe, accessible, and efficient transportation system. Transportation goals, policies, and implementation strategies of the Comprehensive Plan are to be articulated and detailed in the City's TSP.

Goal 14. Goal 14 addresses urbanization and its policies and strategies focus on serving the area within the UGB and maximizing these investments. The TSP must coordinate with other City public facilities master plans and formulate land use management strategies that do not to create development pressure on areas that are not in the City's long-range plans and have not undergone necessary planning.

Hood River Municipal Code (HRMC)

The Hood River Municipal Code (HRMC) is comprised of a subdivision ordinance (Title 16) and a zoning ordinance (Title 17). The following chapters focus on transportation-related elements of the HRMC. Further discussion of select sections is included below.

Chapter 13.28 HRMC – Access Spacing, Driveways and Curb cuts
Chapter 16.08.020 (2) (k) HRMC - Preliminary Plat Submission Requirements and Approval Criteria
Chapter 16.12 HRMC – General Design and Improvement Standards
Chapter 16.12.020 (D) HRMC – Traffic Study
Chapter 17.06.030 (6) HRMC - Conditional Uses Approval Criteria
Chapter 17.08.050 HRMC Zone Changes and Plan Amendments – TPR
Chapter 17.16.040 (E) and 17.16.050 (D) HRMC – Traffic and Circulation
Chapter 17.20 HRMC – Transportation Circulation and Access Management

Access and Circulation. Sections 16.12.020 and 16.12.030 deal with vehicular and pedestrian access and circulation, and are implemented as part of land divisions. Vehicular access and circulation code regulates access options and spacing, block formation, and Future Street Plans.

Motor vehicle access to public streets requires permits and may also require traffic studies or fulfilling conditions of approval in order to obtain access. The following access options are provided:

- Option 1: Access from an existing or proposed alley or mid-block lane
- Option 2: Access from a private street (in a planned unit development) or driveway connected to an adjacent property that has access to a public street (i.e. shared driveway).
- Option 3: Access from an adjacent public street, with encouragement to close or consolidate existing access points.
- Residential land division on an arterial street: Access from an alley, local or collector, street, and consolidated driveways serving two or more lots when access from an alley, local, or collector street access not practicable.
- Double-frontage lots: Access from the street with the lowest functional classification.

Access spacing requirements in the code refer to the guidelines in the TSP. Code provisions, however, are more specific about driveway and street spacing on local streets (22 feet) compared to the more general guidance in the TSP. The code allows for restricting direct access or requiring access consolidation, shared access, or greater access spacing when the City, County, or ODOT deem them necessary to protect the function, safety, and operation of the public roadway being accessed.

Subsection 16.12.020(I) addresses connectivity and block standards. The following block standards are established according to land use designation/zoning:

a. Four Hundred (400) feet length and 1,200 feet perimeter in the in the Central Business District;
b. Six Hundred (600) feet length and 1,600 feet perimeter in residential zones (R-1, R-2, and R-3);
c. Not applicable to the Industrial zone (I); and
d. Eight Hundred (800) feet length and 2,000 feet perimeter in all other zones.

Future Street Plans must demonstrate how access can be provided to land within 600 feet of the boundaries of the site. They are conceptual plans that, even when adopted, do not establish precise alignments. Future Street Plans must be prepared for all tentative partition and subdivision plans within the Urbanizing Area as shown in Figure A-1, Local Street Connectivity Plan Study Area, in Section 16.12.020.

Section 16.12.030 (Pedestrian Access and Circulation) provides design standards and general connectivity provisions for pedestrian and bicycle facilities. All developments, except single family detached housing on individual lots must provide a continuous pedestrian and/or multi-use pathway system.

Chapter 17.20 is dedicated to transportation circulation and access management. The access management standards apply to "all development on arterials and collectors within the City and UGA and to all properties that abut these roadways as part of site plan review process." The standards address driveway spacing and design as well as joint and cross access, reverse frontage access, and non-conforming access.

The chapter establishes bicycle parking standards for uses subject to site plan review. It centralizes regulations of transportation uses, specifying which transportation uses are permitted outright and which are permitted subject to site plan review.

Street Improvement Standards. Title 16 addresses transportation standards, requiring that streets within or adjacent to a proposed development be improved pursuant to the provisions of the TSP and Title 16. *Section 16.12.060 (Public Facility Standards)* includes street design standards for the following functional classifications of streets in Hood River:

- Minor arterials
- Industrial and commercial downtown streets.
- Collectors
- Local residential streets
- Neighborhood infill streets
- Cul-de-sacs.

The standards differentiate arterial streets into urban minor arterials that are two-lane (one-way), two-lane (two-way), or three-lane (two-way), and local residential streets into four designs (Options "A" through "D") based on right-of-way width and on-street parking. Title 16 recognizes that street design is influenced by factors other than functional classification, including the following:

a. Street classification in the Transportation System Plan;
b. Anticipated traffic generation;
c. On-street parking needs;
d. Sidewalk and bikeway requirements based on anticipated level of use;
e. Requirements for placement of utilities;
f. Street lighting;
g. Minimize drainage, slope, and sensitive lands impacts;
h. Street tree location, as provided for in Section 16.12.050;
i. Protection of significant vegetation, as provided for in Section 16.12.040;
j. Safety and comfort for motorists, bicyclists, and pedestrians;
k. Street furnishings (e.g., benches, lighting, bus shelters, etc.), when provided;
l. Access needs for emergency vehicles; and
m. Transition between different street widths (i.e., existing streets and new streets), as applicable.

<u>Land Use</u>. Title 17 (Zoning) regulates land use in the City and implements the land use designations and goals and policies established in the Comprehensive Plan. The following zones implement the City's Comprehensive Plan designations.

- Urban Low Density Residential Zone (R-1)
- Urban Standard Density Residential Zone (R-2)
- Urban High Density Residential Zone (R-3)
- Office/Residential Zone (C-1)
- General Commercial Zone (C-2)
- Light Industrial Zone (LI)
- Industrial Zone (I)
- Open Space/Public Facility Zone (OS/PF)
- Environmental Hazard Zone (EH)
- Columbia River Recreational/Commercial Zone (RC)

The city is largely zoned for low and standard density residential~~,~~ (R-1 and R-2). Three large clusters of High Density Residential zoning (R-3) are designated in the following locations: between I-84 and the Historic Columbia River Highway (HCRH) between 13th and 20th Streets, north of May Street surrounding the hospital, and southeast of the downtown district. There are also significant areas of General Commercial zoning (C-2) downtown, surrounding I-84 Interchanges at Exits 62 and 64, along the HCRC (OR 30/Cascade Avenue) west of 13th Street, along Country Club Road and Westcliff Drive west of Exit 62, and adjacent to 12th and 13th Streets south of May Street. Most of the city's industrial zoning is located in the Port area between I-84 and the Columbia River, and in smaller pockets along the south side of I-84 between Exits 62 and 63.

The City's zoning code provides use standards and development standards (e.g. setbacks) for each zone. Transportation facilities permitted pursuant to *Subsection 17.20.050(A) (Standards for Transportation Improvements)* are permitted outright in the City's residential, commercial, and industrial zones but they are not specified as permitted in the Open Space/Public Facility Zone. The Environmental Hazard Zone is an overlay zone, and transportation facilities are regulated according to the underlying zoning. The Columbia River Recreational/Commercial Zone permits maintenance of existing roads and parking areas outright, and permits the construction, reconstruction, and relocation of roads and parking areas subject to site plan review.

Parking regulations are detailed in each zoning district. Bicycle parking regulations are detailed in Section 17.20.040 of the development code.

<u>Planned Developments.</u> Planned Developments are regulated by Chapter 17.07. In evaluating Planned Developments, proposals are subject to all the requirements of land divisions in Title 16 that are discussed above. Conditional Use decision criteria (Chapter 17.06) are used as the approval criteria for proposed Planned Developments. Adequate transportation facilities are criteria specified for both Conditional Uses (Section 17.06.030) and Planned Developments (Section 17.07.090).

Finding: Access management standards and plans will be developed as part of the TSP update and access management plans were developed as part of the I-84 IAMPs, to be incorporated into the TSP as part of the update.

The TSP is intended to improve connectivity in the city by modifying and building on existing street plans and Future Street Plans. The TSP update will work to improve on- and off-street pedestrian, bicycle, and multi-use facilities and, thus, improve multi-modal mobility and accessibility around the city and in accordance with existing code provisions.

Transportation improvements are allowed outright in City residential, commercial, and industrial zones, pursuant to transportation circulation and access management provisions in Subsection 17.20.050(A), when the improvements are identified in the TSP. Projects that are not designated in the TSP are subject to site plan review~~,~~ pursuant to Subsection 17.20.050(B). As such, it is important to identify all key projects for development in the updated TSP.

The land use strategies developed for the TSP will either draw on existing land use regulations; propose amendments to the City Comprehensive Plan text or Development Code; or some combination thereof. Procedures for the quasi-judicial and legislative actions that may be involved in adopting the TSP are detailed in *Chapter 17.08 (Zone Changes and Plan Amendments)* and *Chapter 17.09 (Review Procedures)* of the City's code.

City of Hood River Transportation Systems Development Charge Ordinance (2000)

The City's Transportation Systems Development Charge (TSDC) was adopted as *Ordinance 1805* in year 2000 as a means to supplement funding for transportation improvements needed with growth and development in the city. Incorporated into the

City's code as *Chapter 13.56 (Transportation Systems Development Charges),* TSDCs may be an improvement fee, reimbursement fee, or both an improvement and reimbursement fee pursuant to Section 13.56.030. The charges are to be collected for new construction, expansion, remodel or exterior alterations of any building or structure, change of use, or any improvement that result in an amount of added trips as determined by the City Engineer.

TSDCs are only authorized to be spent on capital improvements of the transportation system include expenditures related to debt repayment. Furthermore, the capital improvement must increase capacity, whether it increases the level of performance provided by existing facilities or provides new facilities. The improvement projects must be specified in the City of Hood River Transportation Systems Development Charge report adopted by the City pursuant to Section 13.56.080. The TSDC code also describes the methodology used in establishing the charge, installment payments, exemptions, and credits.

Finding: The TSP update must coordinate with projects already included in the City of Hood River Transportation Systems Development Charge report as well as update the report based on projects recommended as part of the TSP update. Amendments to the TSDC code may be considered if needed.

Port of Hood River Strategic Plan

The *Port of Hood River Strategic Plan* was completed in March 2006 that sets out goals and strategies for managing its resources. In particular, it addresses the Hood River Bridge, the Waterfront Business Park, and Marina. This plan is currently under revision.

Developing a Master Plan for the Waterfront Business Park was the primary objective for that asset in the Strategic Plan. The objective and action items give direction to the Master Plan to do the following:

- build upon the existing Light Industrial zoning in the area;
- incorporate elements of prior planning efforts;
- include a new alignment for 2nd Street and pedestrian trail system; and
- recommend alternative uses for the Expo Center and alternative sites for events currently held at the Expo Center.

The Strategic Plan commits to working with ODOT and the Washington Department of Transportation (WSDOT) to assess replacing the Hood River Bridge and determining measures for maximizing the life of the existing bridge. The Strategic Plan's objective for the Marina entails updating the Marina Park Plan to support recreational and commercial uses, incorporating elements of the 1997 Marina Landscape Plan and the 2001 Marina River Walk Plan.

Hood River Frontage Road Feasibility Study and Split Diamond Interchange Analysis (HNTB Corporation, Revised Draft June 2009)

This report was developed as part of a study to determine the feasibility of constructing a frontage road along the north side of I-84 between the Exit 63 and Exit 64 interchanges in Hood River. The primary purpose of the frontage road was to remove short trips from the freeway that commonly travel between the two closely spaced interchanges. As an alternative to the frontage road, a new split diamond interchange incorporating Exits 63 and 64 was also considered.

I-84 Frontage Road

The frontage road concept was developed to remove local trips from I-84 by providing an alternate route. The proposed frontage road would connect the waterfront with Port Marina Park via a two-lane road paralleling I-84 to the north. This would also provide a second access to the waterfront, potentially removing trips from the Exit 63 interchange.

Because of the low design speed of the frontage road and the out-of-direction travel and delay that would be experienced to travel between the frontage road and the downtown area, the frontage road is generally only used by drivers with an origin or destination near the ends of the frontage road itself (i.e., the waterfront, Port Marina Park, Interstate Bridge, and Marina Way commercial district). With usage varying according to the quality of access to 2nd Street, projected weekday p.m. peak hour volumes on the frontage road range from 125 to 200 vehicles per hour. This would equate to a high-volume local street or a low-volume collector street. The reduction in local trips from the freeway mainline was estimated at 13 to 16%. Operationally, the frontage road has little effect on the surrounding transportation system, with minor negative impacts on the 2nd Street corridor through the Exit 63 interchange.

In summary, the I-84 frontage road concept improves connectivity for local traffic with trip origins or destinations in the immediate vicinity, but does not significantly benefit I-84 or the interchanges at Exits 63 and 64.

Exit 63/64 Split Diamond Interchange
The construction of a split diamond interchange would link Exits 63 and 64 by removing the on and off-ramps between these interchanges and replacing them with collector-distributor roadways paralleling each side of I-84 that join the ramp terminal intersections at 2nd Street and Button Bridge Road. This alternative was primarily focused on removing local trips from the freeway and eliminating weaving maneuvers on I-84 between the closely spaced interchanges.

To relieve some of the congestion that would be caused by combining the eastbound and westbound on-ramps, additional slip off-ramps were proposed to connect into the collector-distributor roads. However, even with these added ramps, all four ramp terminals at the Exit 63 and 64 interchanges fail to meet mobility standards, with the Exit 63 ramp terminals operating with volume to capacity ratios greater than 1.0.

The added delay at the Exit 63 and 64 ramp terminals causes a diversion of approximately 110 vehicles per hour during the weekday p.m. peak through the downtown and around Button Junction (OR 35/ State Street intersection). While the impact of this diversion on the OR 35/ State Street intersection is minor, it results in a reduction of capacity at the already failing 2nd Street/ Oak Street intersection of approximately 20%.

In summary, while a split diamond interchange including Exits 63 and 64 would remove weaving and local trips from the freeway mainline, it will not function adequately without substantial improvements such as a new five-lane overcrossing at 2nd Street with additional turn lanes at the ramp terminals. However, the need for a project of this magnitude may not be realized by the year 2031.

Hood River Middle School Safe Routes to School Action Plan

The Hood River Middle School (HRMS) Safe Routes to School Action Plan was created in 2008 by staff, parents and community officials involved with the school to address safety concerns for children biking and walking to school. The Plan outlines the existing state of student transportation at Hood River Middle School, where most children are driven to school, and discusses how the bicycling and walking environment around the school could be improved to encourage students to walk and bike.

When the Action Plan was written, Hood River Middle School had participated in three consecutive Walk and Bike to School Days, from 2006 to 2008. Each year for this event, the school surveyed walking and bicycling students about what conditions they encountered on their trip to school. The surveys consistently found a lack of bike lanes, intermittent paths and sidewalks, poor road surface for bicyclists, poor lighting, difficult crossings, and speeding vehicles to be obstacles to walking and bicycling at Hood River Middle School.

Lastly, the Action Plan explains the efforts undertaken by Hood River Middle School to improve bicycle safety. The school offers an elective bicycling class, holds an annual triathlon with the sponsorship of a local bicycle shop, and provides low cost bicycle helmets to students. Further strategies to increase safety are identified as part of the Action Plan. Potential infrastructure improvements around the school were recommended by community members and detailed in a separate map that was not available for review. The Action Plan prioritizes outreach and education of drivers and bicycling students relating to sharing the road with other users and compliance with helmet laws, and crosswalk enforcement at a major intersection along State Highway 281 just one block away from the school.

Hood River School District Transportation Department

The Hood River County School District (HRCSD) Transportation Department is responsible for transporting students to and from school and for other school-sponsored activities such as field trips. Basic information about the Transportation Department is provided on the HRCSD website[1]. In conjunction with supplementary local guidance regarding the safe placement of school bus stop locations, the School District uses the Oregon Department of Education's Oregon Pupil Transportation Manual as a policy guide for student transportation.

Oregon Pupil Transportation Manual (2006)

This manual published by the Oregon Department of Education (ODE) provides a detailed overview of state laws and Oregon Administrative Rule (OAR) regulations as they pertain to student transportation and school bus operation. The Manual also provides advisory content on safe bus operation and the proper administration of a school bus transportation program by school officials.

At the core of the Pupil Transportation Manual is ORS 327.043, the state law that requires school districts to provide transportation for students. It reads:

> **ORS 327.043 When district required to provide transportation; waiver.**
> *(1) A school district is required to provide transportation for elementary students who reside more than one mile from school and for secondary school students who reside more than 1.5 miles from school. A district is also required to provide transportation for any student identified in a supplemental plan approved by the State Board of Education.*
> *(2) Notwithstanding subsection (1) of this section, the State Board of Education may waive the requirement to provide transportation for secondary school students who reside more than 1.5 miles from school. A district must present to the board a plan providing or identifying suitable and sufficient alternate modes of transporting secondary school students.*

This law affects transportation patterns during times immediately before and after school hours by influencing the mode choice of students and their parents. While elementary and middle school students living within one mile of school, and high school students living within or 1.5 miles of school are not necessarily provided school bus transportation, this distance is generally regarded as feasible for walking or bicycling travel. However, it is the informal practice of many school districts to allow elementary and middle school students living inside the one mile bussing boundary of their school to catch the bus as it passes through neighborhoods where walking or bicycling to school is difficult. Subsection 2 is an important exception to this requirement, as it is likely that the

[1] http://www.hoodriver.k12.or.us/1692105513349973/site/default.asp May 2009

waiver of the provision of school bus transportation for secondary (high school) students would change local travel patterns as students shift from using the school bus to other travel modes.

Traffic Impact Studies

The City of Hood River provided Traffic Impact Studies and other Transportation Studies for approved developments and projects within the city that have not yet been constructed and occupied. As these developments would produce additional trips on the transportation system that can not be captured in data collected today, the anticipated generated trips from these developments will be incorporated into future traffic volume projections. This list of impact studies is provided below.

Hood River Transportation District Transit Center (02/04/2009) – temporary occupancy
Engineer: URS Corporation
Location: Wasco St east of Rand Rd

Cascade Ave/Rand Rd Signal Cost Share (2/13/2009)
Engineer: DKS Associates, Inc.
Location: Rand Rd and Cascade Ave.

Mt. Adams Traffic Signal Cost Share (7/6/2007)
Engineer: DKS Associates, Inc.
Location: Country Club Rd and Cascade Ave.

Providence Hood River Parking Garage (March 2010) – under review
Engineer: Kittelson & Associates, Inc.
Location: 13th Street and May Street

City of Hood River Parking Study (2006)

The provision of adequate parking in the downtown has been a concern for area businesses. In response, the City commissioned a downtown parking study, which was completed in 2006. Key findings include:

- The parking system in downtown Hood River is operating at a high level of efficiency, occupancy, and turnover.
- The current parking system will become more constrained, leading to a deficit of 66 to 139 stalls by 2011 if new parking resources are not developed.
- Encouraging employees and visitors to park in off-street surplus areas will mitigate this condition for two to three years.
- The east sector of downtown is more challenging in that on-street occupancies are very high and off-street locations are not readily available.
- Employee parking should be moved from the constrained east sector to other areas of downtown.

In response, a recommended set of policies were developed in addition to near-term, medium-term, and long-term actions. These focused on management of off-street parking areas to ensure visitors have access to on-street parking, protection and development of future off-street parking areas, and regulations to ensure future development provides adequate parking or otherwise pays a fee.

Urban Growth Management Agreement between City of Hood River and Hood River County (2003)

A. PUBLIC WORKS CONSTRUCTION STANDARDS

~~1. When a parcel in the UGA is initially partitioned and creation of a street is required (with the exception of subdivisions and PUD's,) development may proceed initially with streets to County road standards. Subsequent land divisions shall require improvement of the initial street and extensions thereof to the City standards.~~

1. All new streets shall be built to City standards at the initial land division where a street is required.

2. Streets in subdivisions and PUD's shall be initially developed to the City's improvement standards.

3. In all cases, right-of-ways in compliance with the City standards shall be required.

4. All newly created utility easements in the UGA shall be dedicated to the public.

County Plans, Policies, and Ordinances

Hood River County Transportation System Plan (2003)

The Hood River County Transportation System Plan was adopted in July 2003. The County TSP includes a number of goals, policies and strategies that are related to the City TSP, including the following:

2.4.1 Goal A. Transportation Balance – Design a balanced transportation system that maximizes the efficiency of the existing system, provides transportation options at appropriate minimum service standards, reduces reliance on the single occupant automobile where other modes or choices can be made available, and takes advantage of the inherent efficiencies of each mode, while providing a safe, convenient, and economic transportation system to serve area needs that is in harmony with the County's land uses.

- Policy A1 – Provide a county road system that meets the needs for travel between and tough the county, recognizing the needs for both local and through travel, with OR 35 and the Hood River Highway (281) as the primary through routes.
- Policy A5 – Ensure accommodation of truck freight to serve the farming and forestry sectors of the county's economy.
- Strategy – Participate in efforts to explore the need for and feasibility of long-term improvement to the bridge between Hood River and White Salmon/Bingen, Washington.

2.4.2 Goal B. Connectivity – Provide a transportation system with connectivity among modes within and between the County's urban areas and rural service centers, with ease of transfer among modes and between local and state transportation systems.

- Policy – In lieu of major capacity expansions, strive to maintain existing travel times for both autos and freight through high levels of facility management (acceleration/deceleration lanes, turn refuges, coordinated signals, and access management).
- Strategy – Investigate the need for improvements to the Highway 35/I-84 interchange. Participate in other studies that are exploring changes to this intersection.

2.4.3 Goal C. – Highway and Roadway Congestion – Define minimum levels of service and assure balanced, multi-modal accessibility to existing and new development to achieve the goal of compact, highly livable urban areas and rural community centers.

- Strategy – Ensure coordination between the County and the State to effectively implement access management requirements as mandated for state highways in OAR 734-051 and to balance state requirements with the needs of specific land uses and property owners.

Goal 2.4.7 Goal G. Social and Land Use Impacts – Develop a transportation system that supports planned land uses and balances the expansion of transportation facilities with the protection of social, cultural and environmental resources.

- Strategy – Promote cooperation between ODOT and local governments in planning and project development.
- Work with ODOT to ensure that the needs and input of local property owners in the County are balanced with mobility objectives and state requirements in approving or controlling access to properties located adjacent to state highways.
- Consider the findings of ODOT's draft Environmental Impact Statements and Environmental Assessments as integral parts of the land use decision-making procedures.

Goal 2.4.8 Goal H. Economic Impacts – Expand and diversify the County's economy through the efficient movement of goods, services and passengers in a safe, energy-efficient and environmental sound manner.

- Promote I-84/OR 35 as an alternate route from Portland to Mt Hood recreation areas. Specific strategies could include signage on I-84 near Troutdale and Hood River identifying OR 35 as an alternative route.

Hood River County has limited jurisdiction within the City of Hood River. There is a small extent of County roads and Urban Growth Area – land inside the City of Hood River's UGB that is not yet annexed to the City and is jointly managed by the City and County. The main County roads within the TSP study area are Country Club Road, Frankton Road, Westcliff Drive, Belmont Avenue.

The TSP includes the most recent list of 5-year transportation Capital Improvement Projects (CIP) for the County.

Hood River County Bicycle Plan (2010)

The Bicycle Plan is an update of the 2003 County Transportation System Plan bicycle element. The Plan identifies and prioritizes a list of twenty recommended bicycle projects. The projects include important connections for bicycle travel to or from Hood River and will be considered in planning bicycle facilities within the city. Relevant projects include:

- Westcliff Drive Multi-Use Path (westward from Cascade Avenue)
- Country Club Road Bike Lanes and Sidewalk (westward from Cascade Avenue)
- Frankton Road Bike Lanes and Sidewalk (southward from Country Club Road)
- Brookside Drive Bike Lanes and Sidewalks (westward from OR 281)
- OR 35 Bike Shoulders (southward from US 30)
- OR 281 Bike Shoulders (southward from Brookside Drive)
- US 30 / OR 35 Intersection Improvements

Hood River County Comprehensive Plan

As noted above, Hood River County has limited jurisdiction in the TSP study area. However, excerpts of pertinent goals, policies, and strategies for Goals 2 and 14 are provided below.

Goal 2 – Land Use Planning

A. Goals

1. Governmental agency management plans shall be consistent with Hood River County's Comprehensive Plan.

2. To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions. City, County, State, and Federal agency and special district actions related to land use shall be consistent with this Comprehensive Plan.

B. Policies

3. Review and comment on various management plans and policies developed and adopted by governmental agencies in Hood River County.

C. Strategies

1. Affected governmental agencies shall seek and enter into special district cooperative agreements with Hood River County.
9. Promote cooperation between the Oregon Department of Transportation (ODOT) and local governments in planning and project development.
11. Utilize access management to limit the impacts of new development on highway congestion.
12. Maintain standards for setbacks adjacent to state rights-of-way.

Goal 14 – Urbanization: Urban Growth Area Management Policies and Procedures

I. Purpose. It is the purpose of the Urban Growth Policies for the Hood River UGA to:

A. Contain urban development within areas planned for future expansion where basic urban services such as sewer, water facilities, police and fire protection can be efficiently and economically provided.

B. Conserve resources through orderly development of land.

C. Preserve farm land and open space outside the UGB.

D. Make more efficient use of local tax dollars in locating facilities and providing services within the UGA.

E. Provide property owners greater security in long-range planning and investments.

F. Make it possible for utility extensions, and transportation facilities to be designed and located so as to more closely match population growth. G. Preserve and enhance the livability of the area.

II. Policies

C. Roads: As part of the process to adopt the County Transportation System Plan in July 2003, the Board of County Commissioners adopted the City of Hood River's Transportation System Plan to apply to the Hood River Urban Growth Area. On July 28, 2003, the City of Hood River and the Board of County Commissioners also adopted a revised version of the Urban Growth Area Management Agreement (UGAMA). Section "L" of the Hood River UGAMA states, in part, that, "All new streets shall be built to City standards at the initial land division where a street is required."

Basic goals, policies, and strategies addressing land use planning (Goal 2), transportation planning (Goal 12), and urbanization (14) should be taken into consideration in developing the TSP.

Hood River County Development Ordinance

The County's Development Ordinance is a unified document that includes its zoning regulations and subdivision regulations. The following subsections give an overview of transportation-related elements of the Development Ordinance.

Street Improvement Standards

Section 18.32 of the subdivision regulations provides street improvement standards, including urban and rural local road cross-sections and requirements for connectivity within the development and to surrounding development, but these are not applicable inside the City's Urban Growth Area (UGA). Otherwise street standards are addressed by the County's TSP.

Article 17 of the County's Development Ordinance addresses zoning and land use regulation in the Hood River UGA, the area inside the City's UGB not yet annexed into the City. The UGA is jointly managed by the City and County. Supplementary Provisions in Article 17 regulate access, parking, vision clearance, and other transportation-related elements in this area.

Access Management

The Development Ordinance recognizes that state access management and spacing standards will be applied to state roads. For County roads, the standards in the table below apply.

County Access Management Standards

Classification of Intersecting Road	Minimum Spacing Between Public Roads	Minimum Spacing Between Private Driveways
Collector	300 feet	100 feet
Local	150 feet	50 feet from public road

Land Use

Within the TSP study area, County zoning applies in the UGA. Regulations may apply to land inside the study area that is jointly managed by the County and City of Hood River, and to County roads within the study area. The Development Ordinance regulates uses and development standards (e.g. setbacks) in these zones.

Hood River County Coordinated Transportation Plan (2009)

The 2009-2012 coordinated plan meets state and federal requirements for Special Transportation Fund (STF) agencies. The Plan identifies needs in providing transportation services to low-income, senior and disabled individuals. The Plan identifies strategies for transit service providers, including Columbia Area Transit (CAT) to address needs related to service, coverage, operations, funding, information, and planning.

Hood River Valley Parks and Recreation Capital Facilities Master Plan

The 2005 Hood River Valley Parks and Recreation District (Parks District) Capital Facilities Master Plan is an update to the Parks District's original Master Plan completed in 1998. While the 1998 Master Plan only addressed parks and recreational needs in Hood River, the 2005 Master Plan addresses the entire Park District, encompassing all areas of Hood River County with the exception of Cascade Locks. The Master Plan includes an inventory of existing parks and recreational assets, and sets development priorities for new facilities and facility improvements through the year 2014. Prioritization of projects in the plan was based on a needs assessment that considered the geographic distribution of facilities throughout the Parks District, and from feedback gathered by a user survey distributed in April 2003.

Many Parks District facilities provide important services to Hood River residents who walk or bicycle for recreation, but several facilities are also used for transportation purposes. For example, the Indian Creek Trail serves as an important connector for walking traffic. The 2003 needs assessment survey found the Indian Creek Trail to be one of the five most visited Parks District facilities. The trail, still under development, will reach 3.3 miles from 2nd Street and E Hazel Avenue to Hood River Valley High School when completed. Currently, the north and south ends of the trail exist separately and do not connect. The Capital Facilities Master Plan identifies completion of the Indian Creek Trail as "Priority 1: A primary development goal – actively pursued by the Parks District." A more detailed description of the Indian Creek Trail can be found at the Hood River Valley Parks and Recreation website at http://www.hoodriverparksandrec.org/facilities_trails.asp.

The 2003 needs assessment survey included in the Capital Facilities Master Plan demonstrates latent demand for trails and greenways in Hood River County, and for bicycling and walking facilities in general. In response to "What type of pathway or trail is needed most in Hood River Valley?", 29% of survey respondents identified bike lanes as most needed, with another 25% responding that off-street paved trails were most needed, indicating interest in bicycling and walking facilities for transportation as well as recreation purposes. The survey also asked respondents the open-ended question, "What do you feel are the most needed recreation facilities or activities in the valley?" The most popular answer to this question was "biking trails", with the more general "trails" also receiving a significant number of responses.

The Capital Facilities Master Plan identifies a Loop Trail System as a Priority 2 project through 2014, for which "Opportunities to develop should be acted on as they present themselves." The Loop Trail System would provide local and regional links connecting existing and proposed trails around the Parks District. The Parks District envisions the Loop Trail System as a long-term goal that will be developed piece by piece over time. An Implementation Concept Plan for the development of this project is included in the Capital Facilities Master Plan Appendix.

State Plans, Policies, and Regulations

Oregon Transportation System Planning Guidelines (2008)

This document provides guidance for the preparation and update of Transportation System Plans required under the Transportation Planning Rule OAR 660-012-000 through 660-012-0070. It updates the previous TSP guidance document, which was prepared by ODOT in 2001, and includes "step-by-step guidance for plan preparation [and] has been refocused to place greater emphasis on the linkage between local needs and the availability of transportation funding." It also includes appendices that provide additional guidance regarding mobility standards, financing, and the Oregon Transportation Plan (OTP).

The four chapters included in the Transportation System Planning Guidelines 2008 document are listed below:

Chapter 1: A System Planning Overview

Chapter 2: Guidance for the Preparation of Transportation System Plan (TSP) Updates

Chapter 3: Step-by-Step Guidance for (first-time) Plan Preparation

Chapter 4: Extensive appendices covering a wide range of policy guidance on transportation and land use issues

Oregon Transportation Plan (2006)

The Oregon Transportation Plan (OTP) was adopted by the Oregon Transportation Commission (OTC) in 2006. The OTP is a comprehensive plan that addresses the future transportation needs of the State of Oregon through the year 2030. It considers all modes of transportation, including airports, bicycle and pedestrian facilities, highways and roadways, pipelines, ports and waterway facilities, public transportation, and railroads.

Seven goals with associated policies and strategies are provided in the plan to address the core challenges and opportunities facing transportation in Oregon. The seven goals are:

- Goal 1 – Mobility and Accessibility
- Goal 2 – Management of the System
- Goal 3 – Economic Vitality
- Goal 4 – Sustainability
- Goal 5 – Safety and Security
- Goal 6 – Funding the Transportation System
- Goal 7 – Coordination, Communication and Cooperation

There are also six key initiatives identified to reflect the desired direction of the plan and to frame the plan implementation. These initiatives are:

1. Maintain the existing transportation system to maximize the value of the assets. If funds are not available to maintain the system, develop a triage method for investing available funds.
2. Optimize system capacity and safety through information technology and other methods.
3. Integrate transportation, land use, economic development and the environment.
4. Integrate the transportation system across jurisdictions, ownerships and modes.
5. Create a sustainable funding plan for Oregon transportation.
6. Invest strategically in capacity enhancements.

The TSP update will be developed to be consistent with the goals and policies of the OTP. It will emphasize, as the updated OTP has, maintaining and building upon existing investments and using system management, technology, and transportation options to maximize the existing state highway system through the city.

1999 Oregon Highway Plan (amendments to 2010)

The Oregon Highway Plan (OHP) was created in 1999 and reaffirmed as a modal element of the 2006 OTP. The OHP defines policies and investment strategies for Oregon's state highway system. 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 OHP addresses the following issues:

- Efficient management of the system to increase safety, preserve the system, and extend its capacity
- Increased partnerships, particularly with regional and local governments
- Links between land use and transportation
- Access management
- Links with other transportation modes
- Environmental and scenic resources

The policy element contains several policies and actions that are relevant to the Hood River TSP, described in the following subsections.

Under Goal 1: System Definition, the following policies are applicable:

Policy 1A (State Highway Classification System)

Action 1A.1 categorizes state highways for planning and management decisions.

- Under this policy, I-84 is classified as an Interstate Highway, which provides connections to major cities and regions within Oregon and facilitates movement to and from other states. The operational objective for Interstate Highways is to provide safe and efficient high-speed travel in urban and rural areas. ODOT's mobility standard requires an operating v/c ratio of no greater than 0.70 for I-84.

- Oregon 35 is classified as a Statewide Highway, which provides inter-urban and inter-regional mobility and provides connections to larger urban areas, ports and major recreational areas not directly served by Interstate highways. It has a mobility standard requiring the highway operate at or below a volume to capacity (v/c) ratio of 0.70. The posted speed on Oregon 35 south of the Button Bridge Junction is 55 mph.
- The Historic Columbia River Highway (HCRH)-US 30, which splits off from the I-84 at Exit 62. It runs east through Hood River and is also referred to as Cascade Ave, Oak Street and State Street (names are following the route west to east). Highway 281 (Hood River Highway) intersects the HCRH at 13th. Both the HCRH and Hwy 281 are classified as District Highways. The operational objective for District Highways is to allow safe and efficient moderate to low-speed travel in urban and urbanizing areas for traffic flow, as well as bicycle and pedestrian movements. District highways generally have a posted speed of 25 to 45 mph within the city. A volume to capacity (v/c) ratio standard of 0.85 is designated at the interchange ramp terminals and 0.90 away from the interchanges. In addition, the HCRH has unique design and operational requirements consistent with its historic designation.

The TSP will support the existing highway classifications and will enhance the ability of I-84, Oregon 35, Oregon 281 and the HCRH-US30 to serve in their defined functions.

Policy 1B (Land Use and Transportation)

- Policy 1B, recognizes the need for coordination between state and local jurisdictions. Action 1B.7 gives special highway segment designations for specific types of land use patterns to foster compact development. The three segment designations available are Special Transportation Area, Commercial Center, and Urban Business Area. The City of Hood River did not choose to pursue any special designations for state highways under Policy 1B in 1999 or 2006.

Policy 1C (State Highway Freight System)

Policy 1C addresses the need to balance the movement of goods and services with other uses. In addition, Action 1C.4 states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes.

Finding: The OHP designates I-84 as part of the National Highway System and as a designated freight route between Portland and points east. Both I-84 and OR 35 are on the State Highway Freight System. The current Hood River Exit 64 Interchange Project will replace the existing access ramps from and to the I-84 mainline with new ramps. This project is expected to reduce delay for vehicles accessing the freeway at this location, including commercial vehicles, and increase safety. Through improved ramp geometry and operations, the likelihood of vehicles queuing onto I-84, as occasionally occurs today, will be significantly reduced. This would also be a major improvement for through and local freight traffic on I-84 and Oregon 35.

Policy 1F (Highway Mobility Standards)

Policy 1F sets mobility standards for ensuring a reliable and acceptable level of mobility on the highway system. Action 1F.1 requires that highways operate at a certain level of mobility, depending on their location and classification. Part of this action also requires that freeway interchanges be managed to maintain safe and efficient operation of the freeway through the interchange area.

The OHP directs that the maximum volume to capacity (v/c) ratio for the ramp terminals of interchange ramps be the smaller of the values of the v/c ratio for the crossroad or 0.85. Within the TSP study area, I-84 is inside the Hood River UGB, but outside of the boundary of a Metropolitan Planning Organization (MPO). As such, the v/c ratio that applies to the I-84 mainline is 0.70. As a Statewide Highway with a speed limit of 55 mph, the v/c standard for Oregon 35 is 0.70. The v/c ratio standard for the HCRH and OR 281, which are both District Highways of less than or equal to 35 mph posted speed, is 0.90.

Policy 1G (Major Improvements)

Policy 1G requires maintaining performance and improving safety by improving efficiency and management before adding capacity. Action 1G.1 directs agencies to make the fewest number of structural changes to a roadway system to address its identified needs and deficiencies through the 20-year planning horizon, and to protect the existing highway system before adding new facilities to it. The action ranks four priorities of projects, as follows:

- Preserving the functionality of the existing system
- Making minor improvements to improve the efficiency and capacity of the existing system
- Adding capacity to the existing system
- Building new transportation facilities.

The intent of Action 1G.2 is to ensure that major improvement projects to state highway facilities have been through a planning process that involves coordination between state, regional, and local stakeholders and the public, and that there is substantial support for the proposed improvement.

Under Goal 2: System Management, the following policies are applicable:

Policy 2B (Off–System Improvements)

Policy 2B helps local jurisdictions adopt land use and access management policies. The TSP will include sections describing existing and future land use patterns, access management, and implementation measures.

Policy 2D (Public Involvement)

Public involvement in transportation and planning and project development will be a critical part of the TSP process.

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 through engineering, education, enforcement, and emergency services. One component of the TSP is to identify existing crash patterns and rates and to develop strategies to address safety issues. Proposed improvements will aim to reduce the vehicle crash potential and/or improve bicycle and pedestrian safety by providing upgraded facilities that meet current standards.

Under Goal 3: Access Management, the following policies are applicable:

Policy 3A (Classification and Spacing Standards)

Policy 3A sets access spacing standards for driveways and approaches to the state highway system. Action 3A.1 directs access management along state highways based on access management guidelines. Action 3A.2 relates to establishing spacing standards on state highways. Action 3A.3 calls for management of location and spacing of traffic signals along state highways.

The TSP will include access management policies and standards for inclusion in the HRMC and will identify recommended traffic signal spacing guidelines, in addition to identifying a framework of future traffic signals in the City.

Under Goal 4: the following policies are applicable:

Policy 4B, Action 4B.4

Action 4B.4 requires that highway projects encourage the use of alternative passenger modes to reduce local trips.

The TSP will address ways to encourage the use of alternative passenger modes to reduce trips on highways and other facilities. This would include improvement to bicycle and pedestrian facilities and consideration of transit movement along roadways.

Oregon Bicycle and Pedestrian Plan (1995)

The provision of safe and accessible bicycling and walking facilities in an effort to encourage increased levels of bicycling and walking is the goal of the Oregon Bicycle and Pedestrian Plan, which is an element of the Oregon Transportation Plan (OTP) that was most recently adopted in September 2006. The Plan provides actions that will assist local jurisdictions in understanding the principals and policies that ODOT follows in providing bike and walkways along state highways. In order to reach the plan’s objectives, the strategies for system design are outlined, including:

- Providing bikeway and walkway systems and integrating with other transportation systems.
- Providing a safe and accessible biking and walking environment.
- Developing educational programs that improve bicycle and pedestrian safety.

The document includes the Policy & Action Plan and the Bikeway & Walkway Planning Design, Maintenance & Safety. The Policy & Action section contains background information, legal mandates and current conditions, goals, actions and implementation strategies ODOT proposes to improve bicycle and pedestrian transportation. The Bikeway & Walkway Planning Design, Maintenance & Safety section assists ODOT, cities and counties in designing, constructing and maintaining pedestrian and bicycle facilities. Design standards are recommended and information on safety is provided.

I-84 Hood River Interchange Area Management Plans (Draft)

The Interchange Area Management Plans for Exits 62, 63, and 64 in Hood River represent a cooperative effort between ODOT, the City of Hood River, Hood River County, and the Port of Hood River to provide a comprehensive long-range plan for providing safe and efficient travel through the interchange areas through the planning horizon year 2031.

Separate plans are being developed for the Exit 62 interchange area and the combined Exit 63 and 64 interchange area. Both plans will include recommended improvement projects for the interchanges and surrounding surface street system, access management plans for the interchange crossroads, and implementing policies and code language for local plans. When completed, the plans will be adopted by the Oregon Transportation Commission as facility plans, with implementing policies and code language adopted as appropriate by the City and County and recommended transportation improvements incorporated into local Transportation System Plans.

While the plans are still under development, current recommendations for the transportation system that would be incorporated into the City of Hood River Transportation System Plan are summarized below:

Exit 62

- Close the Cascade Avenue/ Country Club Road intersection and realign Country Club Road to intersect with a future Mt. Adams Avenue extension (included in current TSP), which would intersect with Cascade Avenue approximately 900 feet east of the Exit 62 interchange. Traffic signals would be needed in the future at the intersections on Mt. Adams Avenue with Country Club Road and Cascade Avenue.
- Improve the Exit 62 interchange, including a five-lane overcrossing, turn lanes on ramps, and traffic signals at the ramp terminals.
- Widen Cascade Avenue from Exit 62 to the future Mt. Adams Avenue extension to include two travel lanes in each direction. Design treatments for the HCRH are being developed for this corridor.
- Widen Cascade Avenue from Mt. Adams Avenue to Rand Road to include two travel lanes, a center turn lane, and bicycle lanes (included in current TSP).
- Modify the lane geometry at the Cascade Avenue/ Rand Road intersection and construct a traffic signal (signal in current TSP).
- Infill sidewalk and bicycle lanes on surface streets, including Country Club Road, Rand Road, Cascade Avenue, and Frankton Road.

Exit 63/64

- Modify lane geometry and construct a traffic signal at the intersection on OR 35 at State Street/ HCRH.
- Restrict turning movements to right-in and right-out only at the intersection on 2nd Street at Cascade Avenue.
- Restrict turning movements to right-in, right-out, and southbound left-in only at the intersection on 2nd Street at Riverside Drive.
- Construct a traffic signal at the intersection on 2nd Street at Oak Street.
- Extend the I-84 eastbound off-ramp at Exit 63.
- Widen the westbound off-ramp at Exit 63 to include an additional left turn lane.
- Widen the 2nd Street overcrossings of I-84 and the Union Pacific Railroad to accommodate an additional southbound through lane.
- Remove parking on 2nd Street between Cascade Avenue and Oak Street and restripe the roadway to include an additional southbound lane, ending as a right turn lane at Oak Street.
- Install traffic monitoring cameras in the interchange areas along I-84 and queue detection devices on interchange off-ramps.

Oregon 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. In particular, the following goals are relevant to this project:

- Statewide Planning Goal 1 (Citizen Involvement) - Goal 1calls for "the opportunity for citizens to be involved in all phases of the planning process."
- Statewide Planning Goal 2 (Land Use Planning) - Goal 2 requires that land use decisions be made in accordance with a comprehensive plan, and that suitable "implementation ordinances" to put the plan's policies into effect must be adopted. It requires that plans be based on "factual information"; that local plans and ordinances be coordinated with those of other jurisdictions and agencies; and that plans be reviewed periodically and amended as needed. Goal 2 also contains standards for taking exceptions to statewide goals. This section is implemented by OAR 660, Division 4.
- Statewide Planning Goal 11 (Public Facilities and Services) - Goal 11 calls for efficient planning of public services such as sewers, water, law enforcement, and fire protection. The goal's central concept is that public services should to be planned in accordance with a community's needs and capacities rather than be forced to respond to development as it occurs. It is implemented by OAR 660, Division 11.
- Statewide Planning Goal 12 (Transportation) - The goal aims to provide "a safe, convenient and economic transportation system." It asks for communities to address the needs of the "transportation disadvantaged." Goal 12 is implemented by the Transportation Planning Rule which is summarized below.

The TSP will be developed in compliance with the statewide planning goals.

Transportation Planning Rule (OAR 660-012) (Amended through 2006)

The Transportation Planning Rule (TPR) implements Oregon Statewide Planning Goal 12, which supports transportation facilities and systems that are safe, efficient, and cost-effective and are designed to reduce automobile reliance. The objective of the TPR is to reduce air pollution, congestion, and other livability problems, and to maximize investments made in the transportation system.

660-012-0020 – Elements of Transportation System Plans

All jurisdictions in Oregon must prepare a TSP unless exempted by the Director of the Department of Land Conservation and Development (DLCD). Section –0020 of the TPR specifies what is required in a TSP, and the following elements apply to the City of Hood River:

- Inventory and assessment of existing conditions
- Forecasts of transportation needs
- Road system plan

- Public transportation plan
- Bicycle and pedestrian plan
- Air, rail, water, and pipeline plans as applicable
- Transportation system and demand management plans
- Financing program
- Implementing policies and land use regulations.

660-012-0035 – Evaluation and Selection of Transportation System Alternatives
Section –0035 describes standards and alternatives available to agencies weighing and selecting transportation projects, including benefits to different modes, land use alternatives, and environmental and economic impacts.

660-012-0045 – Implementation of the Transportation System Plan
The TPR requires local governments to adopt land use regulations consistent with state and federal requirements "to protect transportation facilities, corridors and sites for their identified functions." This policy is achieved through a variety of measures, including:

- Access control measures that are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities;
- Standards to protect future operations of roads;
- A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;
- A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites;
- Regulations to provide notice to ODOT of land use applications that require public hearings, involve land divisions, or affect private access to roads; and
- Regulations assuring that amendments to land use designations, densities and design standards are consistent with the functions, capacities and performance standards of facilities identified in the TSP. (See also OAR 660-012-0060.)

The TPR does not regulate access management. ODOT adopted OAR 734, Division 51, to address access management.

660-012-0050 – Transportation Project Development
Section –0050 requires that transportation projects be reviewed for compliance with local and regional plans and, when applicable, undergo a NEPA environmental review process.

660-012-0060 – Plan and Land Use Regulation Amendments
Amendments made to Section –0060 in 2005 are among the most significant changes that have been made to the TPR since the last update of the City's TSP. The amendments instruct local jurisdictions how to determine whether an amendment to its adopted plans or land use regulations has a significant affect on a transportation facility.

Section –0060 specifies a category of facilities, improvements, and services that can be assumed to be "in-place" or committed and available to provide transportation capacity over a 20-year planning horizon. The TPR guides local jurisdictions in determining what transportation improvements are "reasonably likely to be provided by the end of the planning period" when considering amendments to local plans and land use regulations.

Finding: The existing Hood River TSP includes all the required elements of a TSP specified in Section –0020, so it is expected that the update will continue to comply with these requirements.

In terms of evaluating and selecting alternatives (Section –0035), a guiding set of goals and policies will be established early in the TSP update process (Task 2, draft TSP Chapter 2). From there, a series of Project Management Team (PMT) meetings, TSP Advisory Committee (TSPAC) meetings, Bicycle/Pedestrian Group meetings, HCRH Advisory Committee meetings, briefings with community groups and individual stakeholders, community workshops, and Planning Commission/City Council work sessions will be used to review and refine a set of preliminary alternatives into final recommendations regarding projects, funding plans, and other implementation measures.

The TSP update is scoped to address some of the implementation measures identified in Section –0045. Access control will be developed by preparing standards for all classifications of streets in the city. However, the TPR does not specifically regulate access management and it is expected that ODOT, as part of this project, will monitor for compliance with its Access Management Rule (OAR 734-051).

Compliance with mobility standards on state facilities will be either maintained, met, or improved by incorporating projects and implementation strategies from the City's I-84 IAMPs. The City's existing TSP does not specify mobility standards for local roadways and that also should be considered during the update process.

Addressing provisions of both Sections –0045 and –0060, the update process should also strengthen land use review, agency coordination, and plan and land use regulation amendment procedures insofar as they significantly affect the transportation system. Local code can be amended to explicitly call for coordinated review of land use decisions with ODOT for proposals that potentially have significant effects on state facilities, beyond requiring notice of hearings to be sent to ODOT as an affected agency.

The existing Hood River Development Code does include requirements for adequate public facilities, including transportation facilities, as an approval criterion for conditional uses, planned developments, and site plans (Sections 17.06.030, 17.07.090, 17.16.040, and 17.16.050). It is an option to more explicitly identify in code that conditions to development proposals will be applied in order to minimize impacts and protect transportation facilities, corridors or sites or to mitigate a significant effect, pursuant to Section –0060, as part of the update process.

The code already includes language that implements most of Section –0060 of the TPR. *Section 17.08.050 (Transportation Planning Rule (Legislative and Quasi-Judicial))* defines how proposals significantly affect a transportation facility and outlines the measures that need to be taken if a proposed amendment to an adopted plan or land use regulation does significantly affect a transportation facility. Section –0060 also describes how projects are determined to be "reasonably likely" and how reasonably likely projects can be used in determining significant effect. The TSP update process is an opportunity for the City of Hood River to identify what, if any, planned improvements in the adopted

TSP may be considered “reasonably likely” to be funded and built within the 20-year planning horizon. “Reasonably likely” projects overall could include projects in the STIP, locally adopted transportation or capital improvement programs, and in the TSP, which includes a funding plan.

ODOT Access Management Rule (OAR 734-051)

The intention of ODOT’s Access Management Rule is to balance the safety and mobility needs of travelers along state highways with the access needs of property and business owners. ODOT’s rule sets guidelines for managing access to the state’s highway facilities in order to maintain highway function, operations, safety, and the preservation of public investment consistent with the policies of the 1999 OHP. Access management rules allow ODOT to control the issuing of permits for access to state highways, state highway rights of way and other properties under the State’s jurisdiction

In addition, the ability to close existing approaches, set spacing standards and establish a formal appeals process in relation to access issues is identified. These rules enable the State to set policy and direct location and spacing of intersections and approaches on state highways, ensuring the relevance of the functional classification system and preserving the efficient operation of state routes. Regulating access can:

- Protect resource lands
- Preserve highway capacity
- Ensure safety for segments of state routes with sharp curves, steep grades or obstructed sight distance.

ODOT applies the Urban access standards for state highways within the City of Hood River UGB. These standards will be used in the TSP to analyze the current access conditions, determine existing deficiencies, and provide direction for establishing a connectivity plan. These standards will be applied to all rights-of-way under the State’s jurisdiction in the City of Hood River.

State Agency Coordination Program (1990) (OAR 731-015)

State agency coordination programs describe what agencies will do to comply with Oregon’s land use planning program. Specifically, they describe how an agency (that is, ODOT) will meet its obligations under ORS 197.180 to carry out its programs affecting land use in compliance with the statewide planning goals and in a manner compatible with acknowledged comprehensive plans. Any needed local agency coordination not already accomplished or underway would occur before or as part of final project design.

The consistency of the proposed alternatives with other agency plans documented herein will meet the stipulations of the state agency coordination program.

ODOT Highway Design Manual

This manual contains standards for the design of state highways and various highway elements. While detailed design drawings will not be created as part of this study, elements such as the general alignments, roadway widths, and criteria for installation of turn lanes will be considered for evaluating the feasibility of construction and determination of right of way needs for the alternatives developed.

Table 10-1 in the *Highway Design Manual* displays the maximum allowable volume to capacity ratios for the 30th highest annual hour of traffic for use in the design of highway projects. These standards are to be applied to conditions forecasted to exist 20 years after completion of the proposed improvement. If the applicable mobility standard can not be met, a design exception should be sought. Sections from that table relevant to the study area are presented in the table below.

Applicable 2003 Highway Design Manual Mobility Standards

Highway Category	Inside Urban Growth Boundary	
	Non-MPO outside of STAs where non-freeway posted speed <45 mph	Non-MPO where non-freeway posted speed ≥45 mph
Interstate Highways	0.70	0.65
Statewide (NHS) Freight Routes	0.70	0.70
District / Local Interest Road	0.80	0.75

Elements of alternatives developed that include the construction or modification of state facilities must be designed in accordance with the requirements of the *Highway Design Manual*. To ensure feasible construction of proposed alternatives, these design standards must be used when laying out roadway alignments, turn lanes, and other roadway elements. Also, the ability of proposed highway improvements to adequately accommodate future traffic demand will be evaluated through the use of the mobility standards from the *Highway Design Manual*, rather than those from the *Oregon Highway Plan*.

Exit 64 – East Hood River Interchange Study (2005)

ODOT's Exit 64-East Hood River Interchange Study was prepared in 2005 to address the capacity and safety problems at the I-84/Oregon 35 interchange. This work was called for in the 1999 Hood River TSP to determine the best way to address the problems at the existing East Hood River interchange. The study considered a number of alternatives, including a split diamond, with braided ramps, a tight urban diamond, and modified diamond interchanges with roundabouts.

The study serves as a reference for subsequent Interchange Area Management Plans and does not contain any specific policies relevant to this TSP. This plan did address other I-84 interchange options originally raised in the 1999 TSP and provided guidance for access management and circulation options to consider during interchange project development.

Hood River – Mt Hood (OR 35) Corridor Plan (Volumes 1 and 2)

The OR 35 Corridor Plan (Volume 1) and Supporting Documentation (Volume 2) was adopted by the Oregon Transportation Commission (OTC) as an amendment to the Oregon Highway Plan on August 13, 1999. It is the product of a cooperative effort between ODOT, Hood River County, the cities of Hood River and Cascade Locks, ports of Hood River and Cascade Locks, Confederated Tribes of the Warm Springs, transportation service providers, other interest groups, and the general public to develop a long-term, multi-modal program for management of and improvement to the Hood River-Mt. Hood Corridor, a priority corridor identified in the OTP.

The two intersections at the I-84/OR 35 (East Hood River) interchange were identified as having major congestion and capacity deficiencies. The corridor plan indicates that OR 35 has high levels of congestion near its connection with I-84 with v/c ratios ranging between 0.70 and greater than 1.0.

The Corridor Plan emphasizes management strategies to enhance the Corridor's ability to serve commuter, recreational, and freight travel. In the rural areas, highway improvements should to be limited to passing lanes or intersection improvements to avoid large-scale widening of the highway. The I-84-East Hood River interchange was identified as a safety problem related to the left turn movement from the ramp termini to north and southbound OR35. The Corridor Plan specified that further study was needed for the interchange to determine a solution. Refinement planning during the first half of 2005 determined that the best solution was the development of a modified interchange and widening of OR35 at I-84 Exit 64 - East Hood River.

SR 35 Columbia River Crossing Draft EIS

The existing Columbia River bridge crossing, which connects White Salmon and Bingen, Washington, and Hood River, Oregon (referred to locally as the Hood River Bridge), was built in 1924. The bridge is a steel structure with a narrow roadway deck width of approximately 18 feet 9 inches and has no pedestrian or bicycle facilities. Pedestrians and bicycles are prohibited from using the bridge. The purpose of the project is to improve multi-modal transportation of people and goods across the Columbia River between the Bingen/White Salmon, Washington and Hood River, Oregon communities. The overall need for the project is to rectify current and future transportation inadequacies and deficiencies associated with the existing Hood River Bridge. Specific needs addressed by the project are related to capacity, system linkage, transportation demand, social demands, economic development, modal interrelationships, safety, and existing bridge and bridge roadway deficiencies. The proposed action is to build a new bridge that would cross the Columbia River between Hood River, Oregon, and White Salmon, Washington. Three alternative alignments are under consideration in the Draft Environmental Impact Statement (DEIS). The existing Hood River Bridge would be removed.

Historic Columbia River Highway Master Plan

The 2006 Revised Master Plan for the Historic Columbia River Highway (HCRH) provides direction for the rehabilitation of the highway and construction of connecting trails along the abandoned sections. The revised HCRH Master Plan updates the 1996 Master Plan, including all the policy recommendations that have been made by the Historic Columbia River Highway Advisory Committee.

The HCRH, constructed from 1914 to 1922, originally ran from Portland to The Dalles. Much of the original highway in Hood River County was abandoned or destroyed when I-84 was built. Many short, discontinuous segments still remain parallel to I-84 in various stages of disrepair. The HCRH exists as city streets through Cascade Locks and Hood River. The only long, contiguous segment of HCRH in the county is east of Hood River connecting OR 35 to Mosier. This segment of the HCRH that passes through the Mosier Twin Tunnels is an active recreation corridor for bicyclists and pedestrians. Managed by the Oregon Parks and Recreation Department, it is closed to motor vehicles traffic and is part of the State Trail System. In the summer of 2002, it was designated as a National Recreation Trail by the US Department of the Interior. This and other portions of the HCRH have high recreational potential and are slated for development of hiking, biking, and wheelchair trails.

The TSP will need to recognize the recommendations and outstanding issues from the 2006 Revised Master Plan including:

- Restore the Historic Columbia River Highway to its 1920s appearance, using the 1924 Mile Post Log and historic photos for guidance. Repair and maintain all contributing historic structures.
- Reconnect the extant segments of the Historic Columbia River Highway to form a continuous visitor attraction.
- Maintain existing pavement, but do not widen, except in the Urban Areas under provisions included in Programmatic Agreements. Future paving will maintain the exposure of curb and drop to gutter as designed and constructed in the HCRH Gutter Restoration project (2006).
- Provide visitor information through interpretive signs, brochures, web site and personal contact.
- Where guardrail protection is needed use two-rail, wooden guardrail, painted white. On sections open to motor vehicle traffic, use steel-backed wooden guardrail. On State Trail sections, use historically accurate guard fence.
- Install triangular, concrete mile posts, as indicated in the 1924 log.
- Where the local street name is other than “Historic Columbia River Highway”, add the Historic Columbia River Highway cap above the street name sign.
- Seek expansion of the All- American Road designation to include all sections of the Highway in Hood River County, for a continuous route.
- Continue collaboration and partnerships with cities, counties, agencies, non-profits and the general public to achieve restoration, reconnection and maintenance of the highway, including implementation of the Programmatic Agreements.
- Provide and enhance visitor facilities at parks and trailheads along the HCRH.

The Updated Master Plan identified the intersection of the Historic Columbia River Highway and Oregon 35, just east of Hood River, which is currently a four-way stop, as a remaining issue. A 2005 study indicated that this intersection is operating at Level of Service F during peak hours. Improvements to this intersection, also referred to as Button Junction, have been scoped by ODOT. While a signalized intersection is required in the future, a restriping option provides an intermediate improvement.

Historic Columbia River Highway Programmatic Agreement

This programmatic agreement details the roles and administrative agreements between the City, County, ODOT, the Oregon State Historic Preservation Officer, and the Federal Highway Administration for managing the HCRH within the City of Hood River. The agreement also defines design and construction provisions including roadway configuration, design, signalization, and signage.

ODOT Statewide Transportation Improvement Program (STIP)

The Statewide Transportation Improvement Program (STIP) is Oregon's four-year transportation capital improvement program. It is the document that identifies the funding for, and scheduling of, transportation projects and programs. It includes projects on the federal, state, city, and county transportation systems, multimodal projects (highway, passenger rail, freight, public transit, bicycle and pedestrian), and projects in the National Parks, National Forests, and Indian tribal lands. Oregon's STIP covers a four-year construction period, but is updated every two years in accordance with federal requirements. The currently approved program is the *2008-2011 STIP*. The *Draft 2010-2013 STIP* is currently under development, and is available for public viewing and comment.

The approved *2008-2011* and *Draft 2010-2013 STIPs* were reviewed for projects that should be considered during the development of the Hood River TSP for complimentary or conflicting traffic impacts. Relevant projects found within the study area are listed below.

2008-2011 STIP

- I-84: Mitchell Point Tunnel to Westcliff Drive - Construct bicycle and pedestrian path
- I-84: Exit 64 Interchange Improvements (under construction)
- Industrial Street: New industrial street (recently completed Anchor Way)

2010-2013 Draft STIP

None

All projects listed above in the 2008-2011 STIP are expected to be completed, therefore are not included in the 2010-2013 Draft project list.

Appendix B: Existing Conditions Memorandum

Existing Conditions Memorandum
(Formerly Final TSP Chapter 3)

DATE: August 31, 2010

TO: City of Hood River TSP PMT

FROM: John Bosket, PE
Garth Appanaitis, EIT
Kristen Svicarovich, EIT
Rory Renfro, Alta Planning + Design
Elliot Akwai-Scott, Alta Planning + Design

SUBJECT: **Existing Conditions Memorandum**
(Formerly Final TSP Chapter 3)

P010068-003

This chapter documents the existing condition of the transportation system in the City of Hood River for the travel modes including pedestrian, bicycles, transit, motor vehicles, rail, and air. Pipeline and water modes of transportation are not being updated; information regarding these two modes will be carried forward from the previous TSP, most recently amended June 23, 2006. The findings from this chapter will provide a baseline for determining the existing transportation needs and will guide the development of future transportation projects within the City of Hood River.

STUDY AREA

The City of Hood River is located adjacent to the Columbia River, approximately 60 miles east of Portland and 20 miles west of The Dalles. The study area for the Transportation System Plan is shown in Figure 3-1 and includes the entire transportation system network within the Hood River Urban Growth Boundary (UGB).

To understand the existing travel characteristics and conditions in the City of Hood River (Hood River), an inventory of the existing transportation infrastructure was conducted in the spring of 2010 to establish the base year conditions. In addition to the citywide inventory, 32 study intersections were selected for focused operational analysis. These intersections are listed below and illustrated in Figure 3-1.

- Cascade Avenue (HCRH) and Westcliff Drive
- Cascade Avenue (HCRH) and I-84 Westbound On/Off Ramps
- Cascade Avenue (HCRH) and I-84 Eastbound On/Off Ramps

- Cascade Avenue (HCRH) and Country Club Road
- Rand Road and Cascade Avenue (HCRH)
- 2nd Street and Portway Avenue
- 2nd Street and Riverside Drive
- 2nd Street and I-84 Westbound On/Off Ramps
- 2nd Street and I-84 Eastbound On/Off Ramps
- 2nd Street and Cascade Avenue
- 2nd Street and Oak Street (HCRH)
- Button Bridge Road and Marina Way
- Button Bridge Road and I-84 Westbound On/Off Ramps
- Button Bridge Road and I-84 Eastbound Off Ramp
- Button Bridge Road (OR35) and I-84 Eastbound On Ramp
- Button Bridge Road and Historic Columbia River Highway
- Frankton Road and Country Club Road
- Frankton Road and May Street
- Indian Creek Road and Brookside Drive
- 12th Street (OR281)and Brookside Drive
- 13th Street (OR281) and Belmont Avenue
- 12th Street (OR281) and Belmont Avenue
- Rand Road and May Street
- 22nd Street and May Street
- 18th Street and May Street
- 13th Street (OR281) and May Street
- 12th Street (OR281) (South Leg) and May Street
- 12th Street (North Leg) and May Street
- 13th Street (OR281) and State Street
- 2nd Street and State Street
- 20th Street and Cascade Avenue (HCRH)
- 13th Street (OR 281) and Oak Street (HCRH)

Figure 3-1 shows the study area and the study intersections that are evaluated in this report. Traffic data was gathered at these locations in order to evaluate the existing traffic conditions.

Land Use Zoning

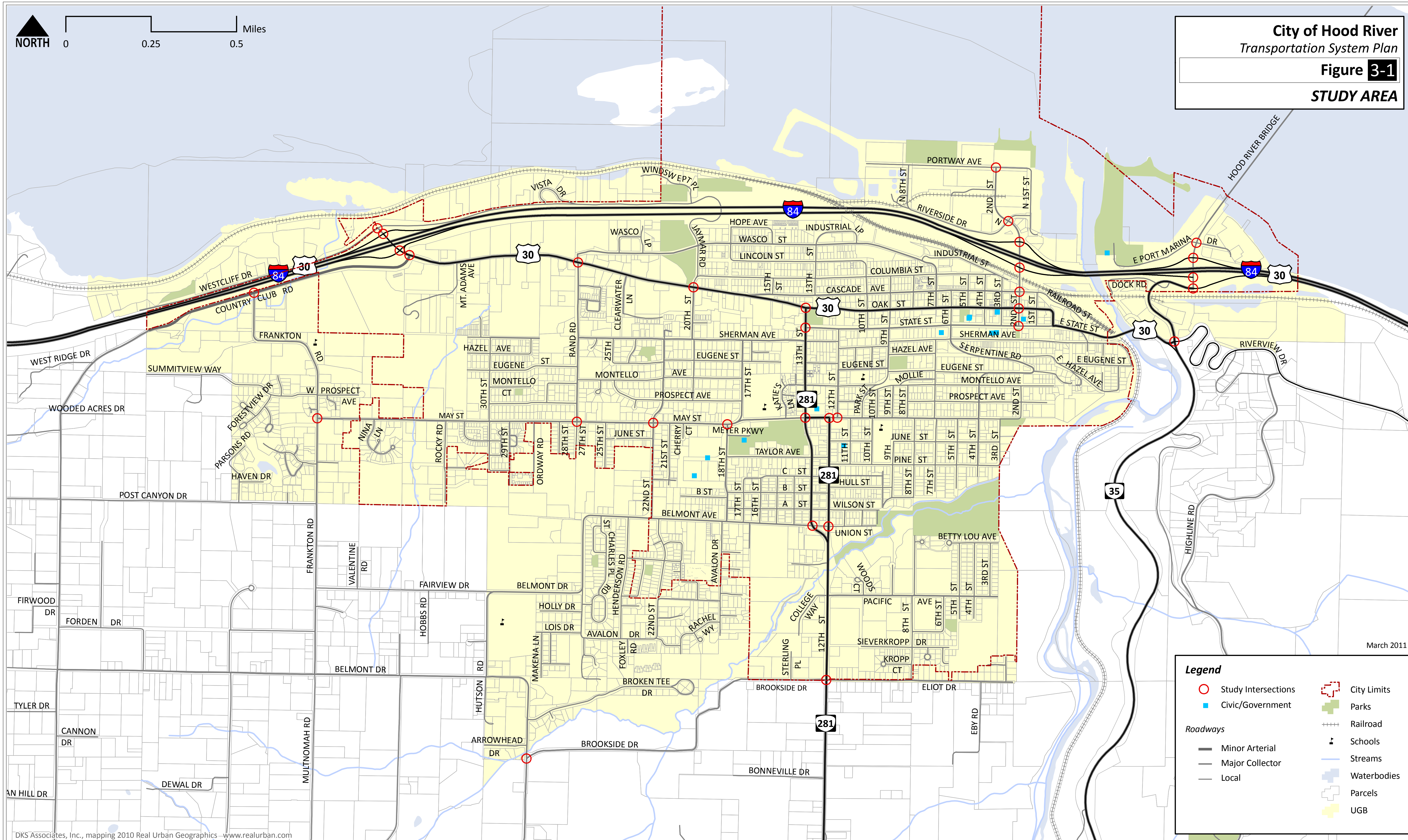
Land use zoning within Hood River is an important factor in understanding the roadway traffic volumes and potential travel patterns. The adopted land use zoning within the Hood River Urban Growth Boundary (UGB) can be seen in Figure 3-2.

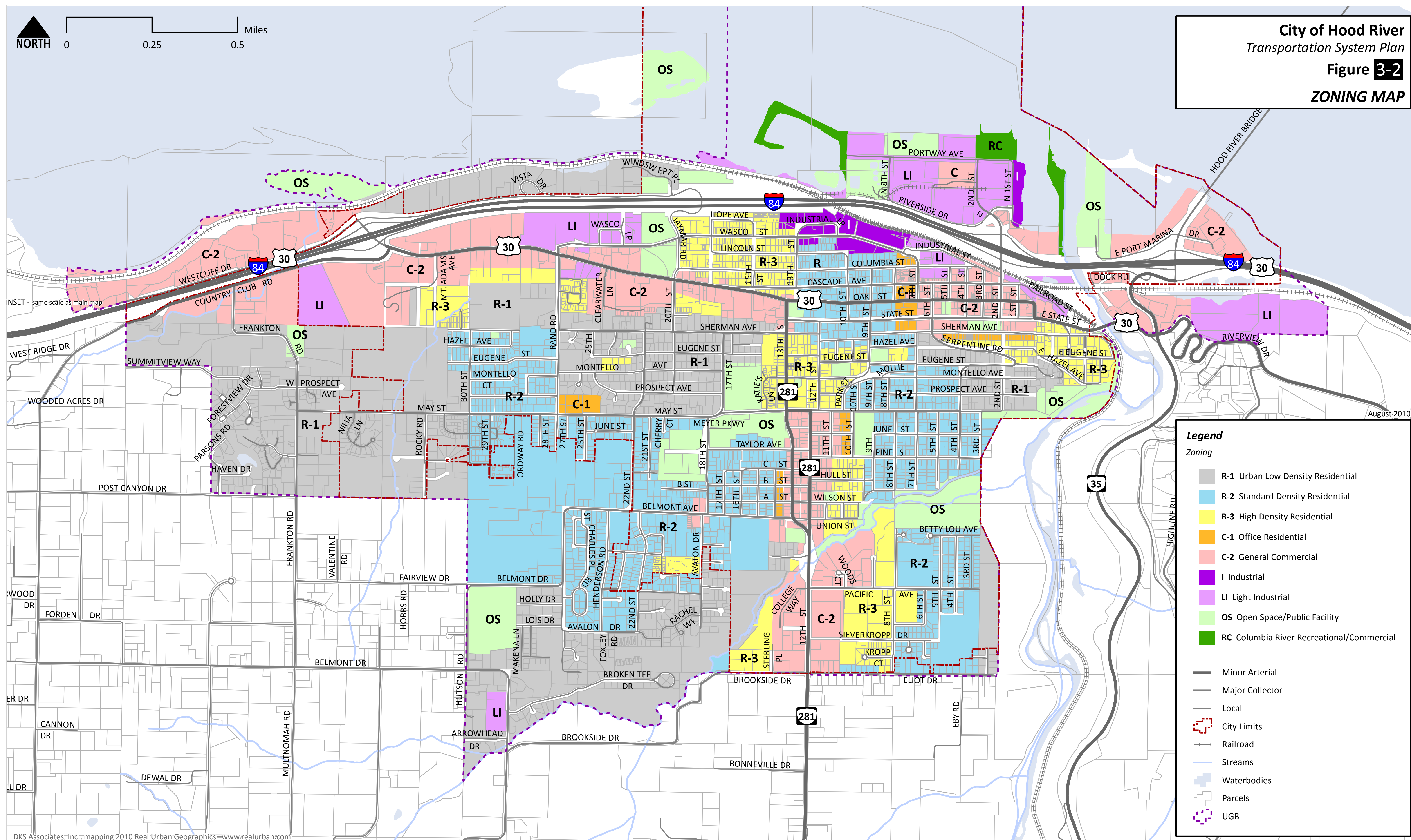
Within the City, most of the commercially-zoned properties are located along the arterial corridors of US 30 and OR 281, with additional commercial lands north of I-84 between the Exit 63 and Exit 64 interchange. Most of the industrial lands are located in the north end of the City near the I-84 corridor. Residential lands are scattered throughout the City, with the highest concentration of residential zoning and future growth potential in the southwest.

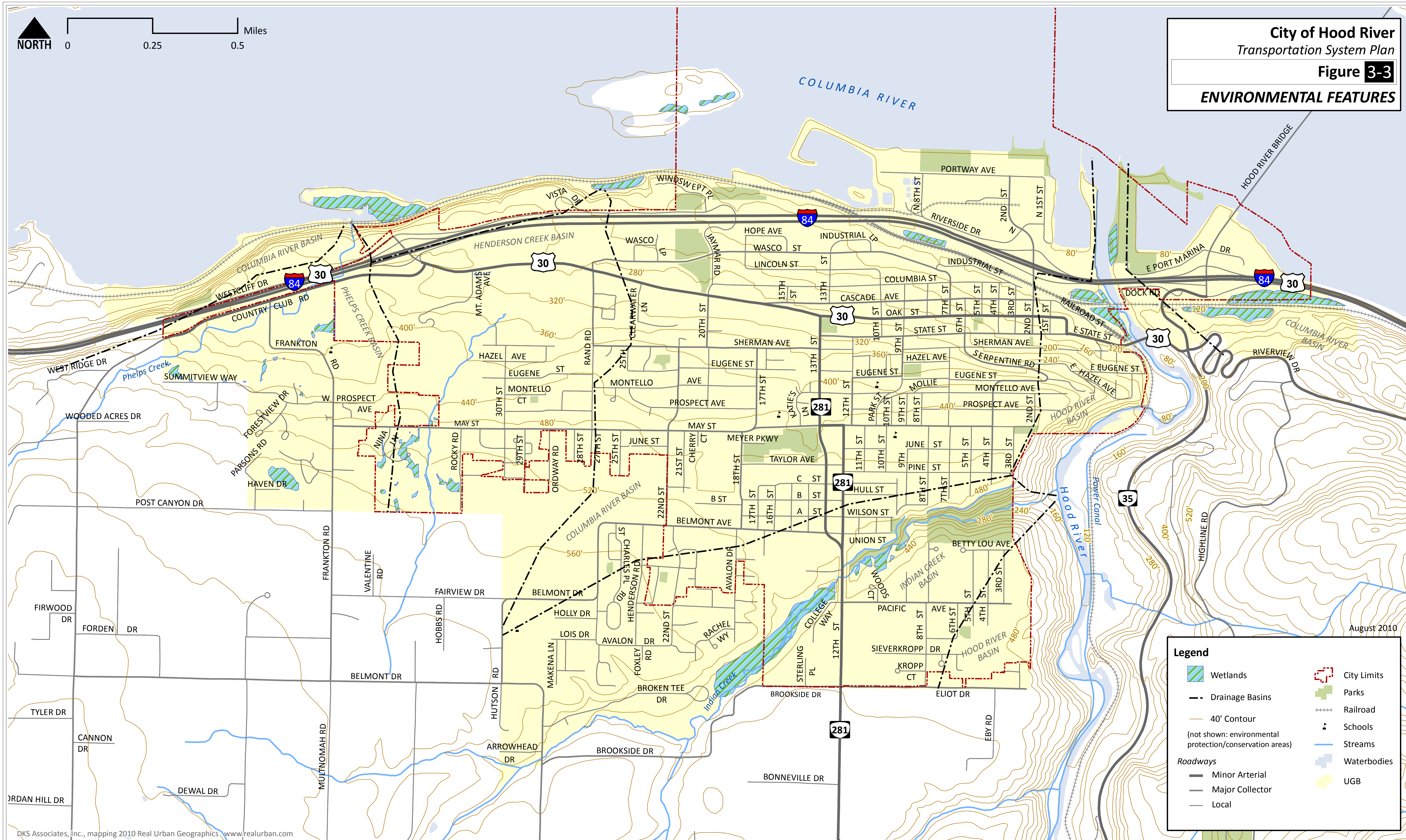
Environmental Features

The layout of the transportation infrastructure is partially dependent on the both the terrain and water features which can be seen in Figure 3-3. The majority of steep slopes in Hood River are located near the creeks and rivers with the rest of the city having relatively mild changes in elevation. Some of the main water features include the Columbia River to the north, Hood River along the eastern side of the city, along with Phelps Creek in the northwest corner and Indian Creek. Indian Creek eventually flows into Hood River before entering the Columbia River.

Protecting environmental resources is important for future generations. Considering environmental features is important when sitting infrastructure to avoid wetlands and other sensitive environmental resources areas, which can often drive up project costs or preclude construction altogether.


City of Hood River
Transportation System Plan
Figure 3-1
STUDY AREA
NORTH
0
0.25
0.5
Miles
Legend
Study Intersections
Civic/Government
Roadways
Minor Arterial
Major Collector
Local
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
March 2011
DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com
84
30
281
35
PORTWAY AVE
RIVERSIDE DR
INDUSTRIAL LP
INDUSTRIAL ST
HOPE AVE
WASCO ST
LINCOLN ST
COLUMBIA ST
CASCADE AVE
OAK ST
STATE ST
SHERMAN AVE
HAZEL AVE
EUGENE ST
MONTELLO AVE
PROSPECT AVE
MAY ST
JUNE ST
PINE ST
HULL ST
WILSON ST
UNION ST
BETTY LOU AVE
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
BROOKSIDE DR
BONNEVILLE DR
BELMONT AVE
BELMONT DR
MEYER PKWY
TAYLOR AVE
SERPENTINE RD
MOLLIE
RAILROAD ST
E STATE ST
E EUGENE ST
E HAZEL AVE
DOCK RD
E PORT MARINA DR
HOOD RIVER BRIDGE
RIVERVIEW DR
HIGHLINE RD
EBY RD
WESTCLIFF DR
COUNTRY CLUB RD
FRANKTON RD
WEST RIDGE DR
SUMMITVIEW WAY
WOODED ACRES DR
W PROSPECT AVE
FORESTVIEW DR
PARSONS RD
HAVEN DR
POST CANYON DR
NINA LN
ROCKY RD
MT. ADAMS AVE
RAND RD
CLEARWATER LN
WASCO LP
JAYMAR RD
VISTA DR
WINDSWEPT PL
FRANKTON RD
VALENTINE RD
FAIRVIEW DR
HOBBS RD
HUTSON RD
MULTNOMAH RD
FIRWOOD DR
FORDEN DR
TYLER DR
CANNON DR
DEWAL DR
AN HILL DR
MAKENA LN
HOLLY DR
LOIS DR
AVALON DR
FOXLEY RD
BROKEN TEE DR
ARROWHEAD DR
CHARLES PL
HENDERSON RD
RACHEL WY
COLLEGE WAY
WOODS CT
STERLING PL
ORDWAY RD
CHERRY CT
KATIE'S LN
PARK ST


City of Hood River
Transportation System Plan
Figure 3-2
ZONING MAP
NORTH
0
0.25
0.5
Miles
INSET - same scale as main map
August 2010
Legend
Zoning
R-1 Urban Low Density Residential
R-2 Standard Density Residential
R-3 High Density Residential
C-1 Office Residential
C-2 General Commercial
I Industrial
LI Light Industrial
OS Open Space/Public Facility
RC Columbia River Recreational/Commercial
Minor Arterial
Major Collector
Local
City Limits
Railroad
Streams
Waterbodies
Parcels
UGB
DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com


City of Hood River
Transportation System Plan
Figure 3-3
ENVIRONMENTAL FEATURES
NORTH
0
0.25
0.5
Miles
COLUMBIA RIVER
HOOD RIVER BRIDGE
COLUMBIA RIVER BASIN
HENDERSON CREEK BASIN
PHELPS CREEK BASIN
INDIAN CREEK BASIN
HOOD RIVER BASIN
Phelps Creek
Indian Creek
Hood River
Power Canal
PORTWAY AVE
RIVERSIDE DR
INDUSTRIAL LP
INDUSTRIAL ST
WINDSWEPT PL
VISTA DR
WESTCLIFF DR
COUNTRY CLUB RD
WEST RIDGE DR
SUMMITVIEW WAY
WOODED ACRES DR
FRANKTON RD
FORESTVIEW DR
PARSONS RD
HAVEN DR
POST CANYON DR
W. PROSPECT AVE
MAY ST
HAZEL AVE
EUGENE ST
MONTELLO CT
MT. ADAMS AVE
RAND RD
CLEARWATER LN
WASCO ST
LINCOLN ST
HOPE AVE
JAYMAR RD
SHERMAN AVE
MONTELLO AVE
PROSPECT AVE
MEYER PKWY
TAYLOR AVE
JUNE ST
BELMONT AVE
BELMONT DR
FAIRVIEW DR
HOLLY DR
LOIS DR
AVALON DR
RACHEL WY
BROKEN TEE DR
BROOKSIDE DR
ARROWHEAD DR
BONNEVILLE DR
COLLEGE WAY
STERLING PL
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
EBY RD
UNION ST
BETTY LOU AVE
WILSON ST
HULL ST
PINE ST
COLUMBIA ST
CASCADE AVE
OAK ST
STATE ST
SERPENTINE RD
E EUGENE ST
E HAZEL AVE
E STATE ST
RAILROAD ST
DOCK RD
E PORT MARINA DR
RIVERVIEW DR
HIGHLINE RD
VALENTINE RD
HOBBS RD
MULTNOMAH RD
HUTSON RD
FIRWOOD DR
FORDEN DR
TYLER DR
CANNON DR
DEWAL DR
JORDAN HILL DR
84
30
281
35
August 2010
Legend
Wetlands
Drainage Basins
40' Contour
(not shown: environmental protection/conservation areas)
Roadways
Minor Arterial
Major Collector
Local
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
UGB
DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com

PEDESTRIANS

Providing facilities and access for pedestrians enhances mobility for both citizens and tourists alike. This section reviews the existing pedestrian areas and facilities in the City of Hood River and highlights areas for improvement in the overall pedestiran environment. The pedestrian facilities discussed are shown in Figure 3-4.

Downtown

Downtown Hood River is a center of pedestrian activity, visited by both local residents and tourists. Sidewalks, ADA-compliant curb ramps, pedestrian wayfinding signage, and amenities such as benches and street trees make the downtown commercial area a complete pedestrian environment. An example of the pedestrian amenities in downtown Hood River can be seen in Exhibit 3-1. Crosswalks are striped at a majority of intersections downtown and traffic speeds are low, which makes walking easy and attractive. Several intersections feature crosswalks marked by contrasting pavement, such as at 2nd Street and Oak Street (HCRH) where crosswalks are marked by concrete pavement. A recently installed midblock crossing of State Street between 4th and 6th Streets includes an actuated overhead flasher to help pedestrians access the Hood River County Library.

Exhibit 3-1. Downtown Hood River sidewalks feature street lighting, café seating, and other pedestrian amenities.

Sidewalks

Outside of downtown, presence of sidewalks on arterial and collector streets generally decreases with distance. Sidewalks are present along most state highways through the city, such as Cascade Avenue (HCRH) in west Hood River and on 12th and 13th Streets (OR281) until 12th Street becomes Tucker Road south of Eliot Drive/Brookside Drive. Arterials near the edge of the UGA including Brookside Drive, Belmont Drive, Frankton Road, and May Street west of Rand Road lack sidewalks, and pedestrians walking on these streets use roadway shoulders where they are available, as is shown in Exhibit 3-2. Although posted speeds have been reduced recently on some of these streets, speeding traffic is still a concern for pedestrians walking on streets with narrow shoulders. On Belmont Drive west of 22nd Street, the shoulder is a marked bike lane, which pedestrians must share with bicyclists as there is no sidewalk.

Exhibit 3-2. Narrow shoulders on Frankton Road in west Hood River.

Sidewalks on neighborhood streets are more common in newer residential developments. Most sidewalks in Hood River are curb-tight, with some sidewalks buffered from the travel lanes by planting strips in older neighborhoods, such as in the area immediately south of downtown. City code requires buffering sidewalks with planter strips when right-of-way is available, but due to space constraints most new sidewalks in Hood River are installed curb tight. Sidewalks with rolled curbs exist on several streets outside the city limits, such as on Summit View Way west of Frankton Road. Rolled curbs are generally not desirable for pedestrians, as they encourage vehicles to park on the sidewalk, forcing pedestrians into the street.

Shared Use Paths

The pedestrian network in Hood River also includes several paths and trails. Along the riverfront, pedestrians use the bicycle and pedestrian bridge across the Hood River to access the Hood River County Museum, and also to connect to a shared-use path at Port Marina Park and from the Event Site to The Hook. An additional shared use path segment connects the Hood River bicycle and pedestrian bridge to 2nd Street at I-84 Exit 63. Pedestrians use the Indian Creek Trail for recreation, but also for transportation between eastside neighborhoods and the Heights.

Hood River residents also use several local accessways that provide efficient north-south walking routes, upslope from the Columbia River. Near what would be 29th Street, an asphalt path between Sherman Avenue and May Street allows pedestrians to cut through the long blocks between 30th Street and Rand Road, which is shown in Exhibit 3-3. Along the 2nd Street right-of-way, up the hill from downtown to Montello Street, a staircase allows pedestrians to avoid the long switchbacks on Serpentine Road, which lacks sidewalks. A shorter staircase along the 9th Street right-of-way between Eugene and Montello allows pedestrians to bypass a segment of Park Street which also lacks sidewalks. These accessways are a key component of the pedestrian network.

Exhibit 3-3. Pedestrian accessway at Montello Avenue.

Pedestrian Counts

Counts of pedestrian, vehicle, and bicycle traffic volumes were taken at 15 key intersections throughout Hood River on May 18, 2010. Although colder than average temperatures and light to heavy rain during the counts likely depressed pedestrian volumes, the counts show clear patterns of pedestrian activity in different areas of the city. The sole downtown area count conducted at 2nd Street and State Street had more than double the number of pedestrians pass through the intersection than at any other location. Relatively high pedestrian volumes were also recorded at several intersections along May Street, and at the intersections of Belmont Avenue and 12th and 13th Streets (OR281). These numbers show pedestrians visiting key commercial destinations, as well as traveling along a key through route for pedestrian travel through the center of the city (May Street). Low pedestrian volumes were recorded in outlying areas of the city, including the intersections of Indian Creek Road and Brookside Drive, Frankton Road and May Street, and Frankton Road and Country Club Road, where no sidewalks or pedestrian facilities are present.

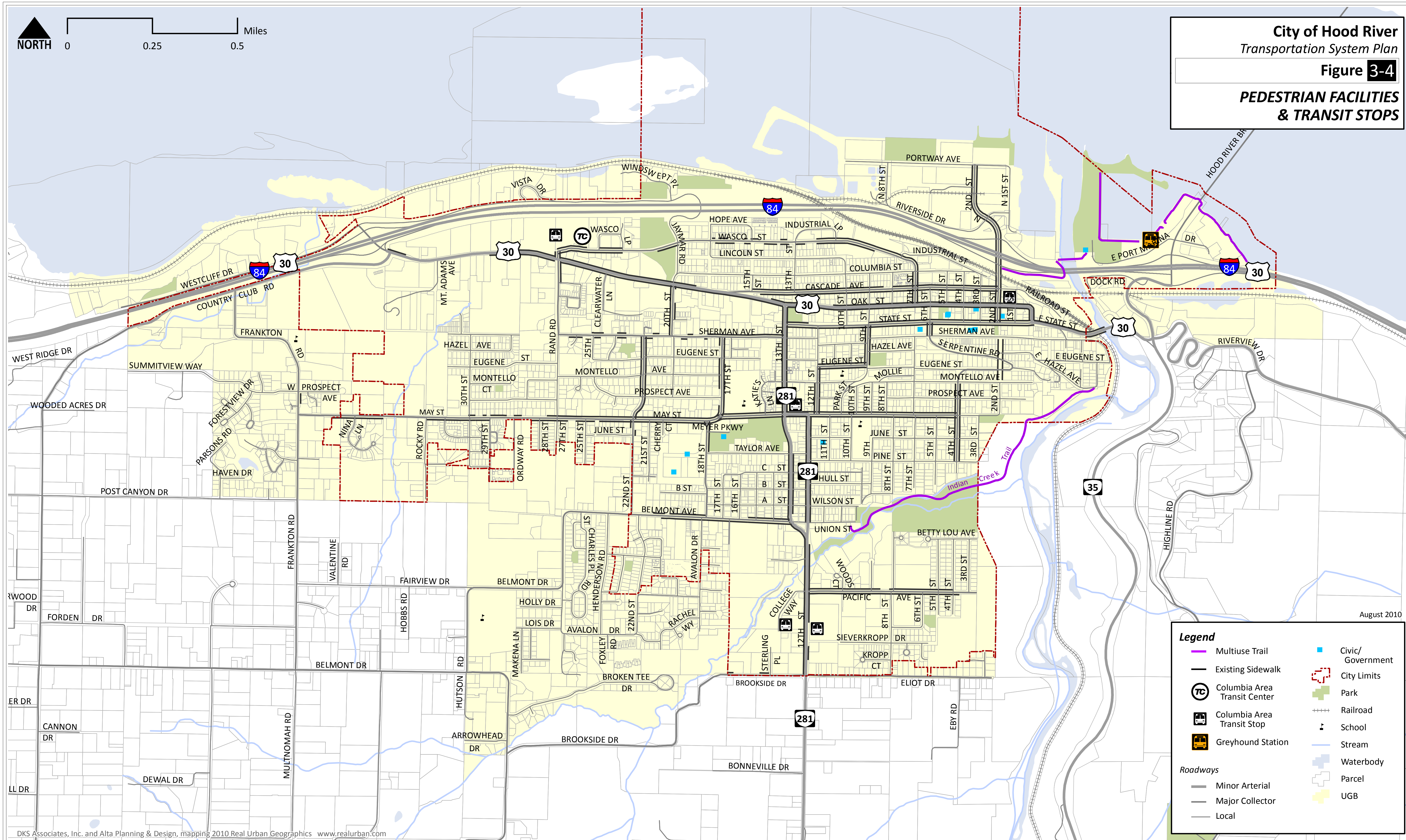
Overview

The Hood River pedestrian network is functionally complete within downtown, but could be improved in other areas. While many low-traffic local streets can function adequately for pedestrians without complete sidewalks installed, several corridors in the unincorporated area within the City's UGA lack sidewalks or sufficiently wide shoulders to accommodate safe pedestrian travel. In areas where sidewalks are available, many curbs do not feature ADA-compliant ramps at intersections to accommodate pedestrians using mobility assistance devices. North to south pedestrian accessways in several parts of Hood River allow pedestrians to move up and down the slope to the Columbia quickly and efficiently, while minimizing out-of-direction travel and exposure to vehicle traffic, while the Indian Creek Trail is a heavily used recreational asset that serves a minor function as a pedestrian route from the Heights to eastside residential neighborhoods.

Existing Issues

Based on the existing pedestrian facilities inventory, the following issues were identified:

- Identify corridors within the UGA for sidewalk improvements to facilitate pedestrian connectivity.
- Address and identify priority areas for ADA-compliant ramps at intersections.
- In response to the proposed Providence Hospital parking structure, the crosswalk at 12th Street (North Leg) and May Street will be closed due to concerns regarding crossing safety. This will further limit pedestrian connectivity in the east-west May Street corridor, where the crosswalk on the south approach at 13th Street has already been removed.


City of Hood River
Transportation System Plan
Figure 3-4
PEDESTRIAN FACILITIES & TRANSIT STOPS
NORTH
0
0.25
0.5
Miles
August 2010
Legend
Multiuse Trail
Existing Sidewalk
Columbia Area Transit Center
Columbia Area Transit Stop
Greyhound Station
Roadways
Minor Arterial
Major Collector
Local
Civic/ Government
City Limits
Park
Railroad
School
Stream
Waterbody
Parcel
UGB
DKS Associates, Inc. and Alta Planning & Design, mapping 2010 Real Urban Geographics www.realurban.com
WESTCLIFF DR
COUNTRY CLUB RD
WEST RIDGE DR
SUMMITVIEW WAY
WOODED ACRES DR
FRANKTON RD
POST CANYON DR
HAVEN DR
FAIRVIEW DR
BELMONT DR
FORDEN DR
CANNON DR
DEWAL DR
MULTNOMAH RD
ARROWHEAD DR
BROOKSIDE DR
BONNEVILLE DR
HUTSON RD
HOBBS RD
VALENTINE RD
MAY ST
ROCKY RD
ORDWAY RD
RAND RD
MT. ADAMS AVE
HAZEL AVE
EUGENE ST
MONTELLO AVE
PROSPECT AVE
SHERMAN AVE
OAK ST
STATE ST
CASCADE AVE
COLUMBIA ST
INDUSTRIAL ST
RIVERSIDE DR
PORTWAY AVE
HOPE AVE
WASCO ST
LINCOLN ST
MEYER PKWY
TAYLOR AVE
BELMONT AVE
UNION ST
WILSON ST
HULL ST
JUNE ST
PINE ST
BETTY LOU AVE
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
EBY RD
HIGHLINE RD
RIVERVIEW DR
DOCK RD
E PORT MARINA DR
HOOD RIVER BR
RAILROAD ST
SERPENTINE RD
E HAZEL AVE
E EUGENE ST
Indian Creek Trail
84
30
281
35

BICYCLES

Providing bicycle facilities helps enhance overall mobility for those who do not have or choose not to use private vehicles, and provides for multi-modal use of roads. Bicycle travel generally facilitiates longer non-motorized trips when compared to walking. This section reviews the existing bicycle facilities in the City of Hood River and highlights areas for improvement in the bicycle network. The bicycle facilities are shown in Figure 3-5.

Bike Lanes

The bicycle network in Hood River includes several bike lanes on city streets, the most recognizable of which is Belmont Drive from Fairview Drive to 22nd Street (Exhibit 3-4). Several other streets in the city have bike lanes for short segments, including 2nd Street between Cascade Avenue (HCRH) and Riverside Drive, and 30th Street south of May Street, although these facilities are missing marked stencils to indicate a bike lane. Pedestrians often share the Belmont Drive bike lane, which is located on the paved roadway shoulder as there is no adjacent curb or sidewalk.

Exhibit 3-4. Belmont Drive bike lane.

The remaining bike lanes in Hood River are located on state highways, such as US 30 (HCRH). While the US 30 (HCRH) bike lanes are well marked along Cascade Avenue (HCRH), it is inconsistent between areas along Oak Street (HCRH) and State Streets where it may disappear or change from a bike lane to a roadway shoulder. The bike lane on Cascade Avenue (HCRH) in west Hood River becomes wide enough to be used as a parking lane on eastbound Oak Street (HCRH) in the vicinity of 13th Street (OR281), and then becomes a narrow shoulder approximately three feet wide between 9th and 10th Streets. The changes are not clearly signed and may catch visiting cyclists by surprise.

Shared Roadways

Several shared roadways exist in Hood River, including Cascade Avenue (HCRH), Wasco Avenue, State Street, May Street, and others. Such streets are designated as recommended bike routes in the City's TSP, although the routes are not typically accompanied by physical roadway improvements. Some segments of these streets are signed as bike routes, but the existing signage is not extensive enough to provide reliable wayfinding for bicyclists. These shared roads are nonetheless used by bicyclists for transportation and recreation purposes, despite the lack of specific bicycling facilities.

Shared roadways in Hood River commonly used by cyclists fall into two categories: direct routes and alternative routes. Frankton Road and May Street are examples of direct routes: arterial and collector streets that may or may not have low traffic volumes or speeds, but provide the only practicable routes to a destination. Many of these streets outside the city limits but within the City UGA are included in the Hood River County Bike Plan for proposed improvements.

Alternative routes are where cyclists commonly elect to travel on a route that is parallel to a more direct arterial street, but offers lower traffic volumes, speeds or other conditions that are more comfortable to the cyclist. For example, Serpentine Road (Exhibit 3-5), provides access between the downtown and May Street with lesser street grades than nearby 7th Street, which is very steep.

Exhibit 3-5. Serpentine Road looking east.

Other shared roadways in Hood River include Westcliff Drive, a low-traffic route on the Historic Columbia River Highway (HCRH) used by recreational cyclists traveling through the city, and OR 35, a significant north-south bike route that is also commonly used by touring cyclists.

Shared Use Paths

As described in the Pedestrian Facilities section, there are several segments of shared use paths throughout Hood River. The bicycle and pedestrian bridge over the Hood River provides an access route between waterfront recreation and employment areas (Exhibit 3-6). Also, although it is not located within the UGB, the Historic Columbia River Highway State Trail several miles east of Hood River is a popular destination for local cyclists and visitors alike.

Exhibit 3-6. Bicycle and pedestrian bridge over the Hood River.

Bike Parking

Bike parking is an important part of bicycling infrastructure, especially at common bicycle trip destinations such as schools, work places, government institutions, and commercial districts. While there are bike racks located throughout downtown Hood River, demand already exceeds capacity in many areas where bicycles are locked to the nearest available fixed object, such as sign poles and parking meters. Many racks located in downtown Hood River are of older designs, such as grid and wave style racks that are not as secure or as space efficient for sidewalk applications as the contemporary standard inverted-U bike racks, also known as staple racks.

Bicycle Counts

As detailed in the Pedestrian Counts section, counts of bicycle, vehicle, and pedestrian traffic volumes in Hood River were taken during cold and rainy conditions, so counts may be assumed to underrepresent bicycling in Hood River compared to typical activity in May. Heavy rain and wind during the evening peak resulted in bicycle traffic volumes at 15 different count locations around the city ranging from zero to four bicycles over a two hour period. Due to this limited range of count volumes, it is difficult to distinguish clear traffic patterns between individual sites. However, when observing bicycle counts across a range of intersections, it is clear that bicyclists are traveling on streets with dedicated bicycle facilities or that are in well-connected areas of the street network. Count locations along Belmont Avenue and May Street had higher bicycle volumes than intersections along Frankton Road and Indian Creek Road, which lack bike facilities and are further from typical bicycling destinations such as the commercial areas in downtown and the Heights.

Overview

The existing bicycle facility network in Hood River is widely used, despite the gaps present in the system. Bike lanes are provided on a portion of key arterial and collector streets, such as Cascade Avenue (HCRH) and Belmont Street (though not in the City limits on Belmont). However, Hood River cyclists face several challenges while cycling through the city. The city's steep slope upward from the Columbia River makes north to south travel difficult without dedicated facilities, as cyclists traveling uphill on shared roadways travel at a much slower pace than vehicles. Also, the connectivity of the street network as a whole, but especially in outlying areas, necessitates traveling on arterial and collector streets without any bicycle facilities. While many current cyclists have become accustomed to these conditions, the lack of facilities may pose safety and comfort concerns that prevent other Hood River residents from considering traveling by bicycle. Finally, the lack of an east to west connection between Sherman Avenue and May Street in the area of 13th Street (OR 281) makes it difficult for cyclists to traverse the middle portion of the city on low-traffic local streets.

Key Routes to Schools

Hood River County School District schools are currently closed for summer. This section will be updated with observations of peak-hour traffic patterns near schools after the 2010-2011 school session begins in September.

May Street Elementary

May Street Elementary is located at the corner of May Street and 10th Street, and enrolls 432 students. Sidewalks exist immediately adjacent to the school campus on May Street, 10th Street, Pine Street and 9th Street, but are fragmented or not present on many neighborhood streets near the school. May Street, a key walking route for many students traveling to school, has sidewalks on both sides between 4th Street and 22nd Street, about a ½-mile from the school to the east and west.

There are seven marked crosswalks nearby the school. High-visibility ladder crosswalks are located across Pine Street at 9th and 10th Streets, across May Street at 9th Street, and across both streets at the intersection of May Street and 10th Street. Standard transverse crosswalks exist across 9th Street at June Street, and across Pine Street at 11th Street.

A path along the east side of the school grounds provides a bicycle and pedestrian connection between June Street and May Street, and also connects to a recently installed bike parking area that is sheltered under a school awning as seen in Exhibit 3-7. While shelter is a key aspect of quality bike parking facilities, the location is on the opposite side of the building from the main entrance, and is not visible from the street, making the racks difficult to find and not affording them public surveillance from passerby. The grid style design of the racks is no longer in favor, as they do not provide an adequate way to lock the frame of the bike, and may damage the wheels of students' bicycles.

Exhibit 3-7. Bike parking at May Street Elementary is sheltered, but features outdated rack designs.

Westside Elementary

Outside the city limits and near the southwest corner of the Hood River urban growth area, Westside Elementary enrolls 525 students in its campus at the intersection of Fairview Drive and Belmont Drive. The area is characterized by low density, rural development, and there are no sidewalks near the school. While students traveling to school from the east can access the school via low-traffic neighborhood streets of Holly Drive and Lois Drive, students from other areas must walk along high-traffic arterial streets. Students traveling to the school from the north, west, and south walk along the shoulders of Belmont Drive and Indian Creek Road, and along Fairview Drive, which has no shoulder. Immediately adjacent to the school on the north, Belmont Drive has bike lanes approximately 4 feet wide, with an adjacent gravel shoulder of an additional 6 to 8 feet on the school side. On the west side of the school, Belmont Drive has shoulders of approximately 4 feet wide on either side. Some students coming from the north travel south on Rocky Road from May Street, and then use an informal trail through private property to access Fairview Drive. The landowner, a teacher, allows this practice because it spares students from traveling nearly a mile longer out-of-direction to reach Frankton Road.

There are four continental crosswalks near the school. Three are across Belmont Drive, two to the west of the school 300 feet south of Fairview Drive and 300 feet north of Indian Creek Road, and one north of the school just east of the parking lot driveway. The fourth crosswalk in the area is across Indian Creek Road at the T-intersection with Belmont Drive.

The school recently added new traffic controls to their parking lot to dictate the circulation for parents driving to pick up and drop off children at the school (Exhibit 3-8). The school signed driveway entrances and exits, and added temporary median barriers to create a one-way loop. A new bike parking area was recently added at the school.

Exhibit 3-8. Westside Elementary parking lot circulation controls.

Hood River Middle School

Hood River Middle School is located at 17th Street and May Street, across the street from Jackson Park. May Street has sidewalks on both sides in the immediate vicinity of the school, while 17th Street has a sidewalk only on the side of the street adjacent the school. Other nearby streets with sidewalks on at least one side include Montello Avenue, Sherman Avenue and 13th Street (OR281), while several other local streets are missing sidewalks. For students coming from further than five blocks to the west, May Street lacks consistent sidewalks past 22nd Avenue, and students may use the narrow roadway shoulder to travel to school.

May Street is the only efficient way to access the school from the east, making it a key route to the school. May Street and the 12th Street/13th Street (OR281) couplet each see heavy traffic, and the intersections of May and 12th Street (OR281) and May and 13th Street (OR281) are each busy intersections with complex turning movements that are difficult to navigate for pedestrians. At 13th Street (OR281), the intersection is not signalized, which means there is no protected walk phase to help students cross the street. The Hood River Middle School Safe Routes to Schools plan identifies these intersections as major obstacles to more students from walking and bicycling to school.

Students coming from the west may approach the school via several high-visibility ladder crosswalks across 17th Street at Prospect Street and Montello Avenue, and across May Street at 17th Street (Exhibit 3-9). However, all three of these crosswalks lack ADA-compliant curb ramps. Two midblock continental crosswalks in front of the school allow students to cross May Street where the school parking lot and Jackson Park are opposite the school.

Exhibit 3-9. Midblock crosswalk across May Street at Hood River Middle School.

For students bicycling to school, bike racks are provided near the northwest corner of the building, at the top of the grassy hill above the track and far from the front entrance of the school. The racks are an outdated grid design which allows only the wheel of the bike to be locked to the rack, meaning students' bicycles may not be secure while they are in class.

Hood River Middle School Safe Routes to School Survey

Hood River Middle School has participated in the ODOT Safe Routes to School program since 2008. Each year, the school surveys students and parents regarding how students travel to and from school and related issues. The results of these surveys help evaluate the progress of the Safe Routes to School program and identify obstacles to students walking and bicycling to school. A comparison of the 2009 and 2010 survey results shows an increase in the percentage of students walking and bicycling to school (Table 3-1), and also shows that more parents perceive the school to encourage walking and bicycling (Table 3-2).

TABLE 3-1: Hood River Middle School Safe Routes to School Survey – How Students Travel To and From School

Year	Walk (to/from)	Bike (to/from)	School Bus (to/from)	Private Vehicle (to/from)	Carpool (to/from)
2009	10% / 13%	0% / 1%	34% / 55%	54% / 27%	2% / 1%
2010	12% / 27%	4% / 3%	34% / 46%	45% / 20%	5% / 4%

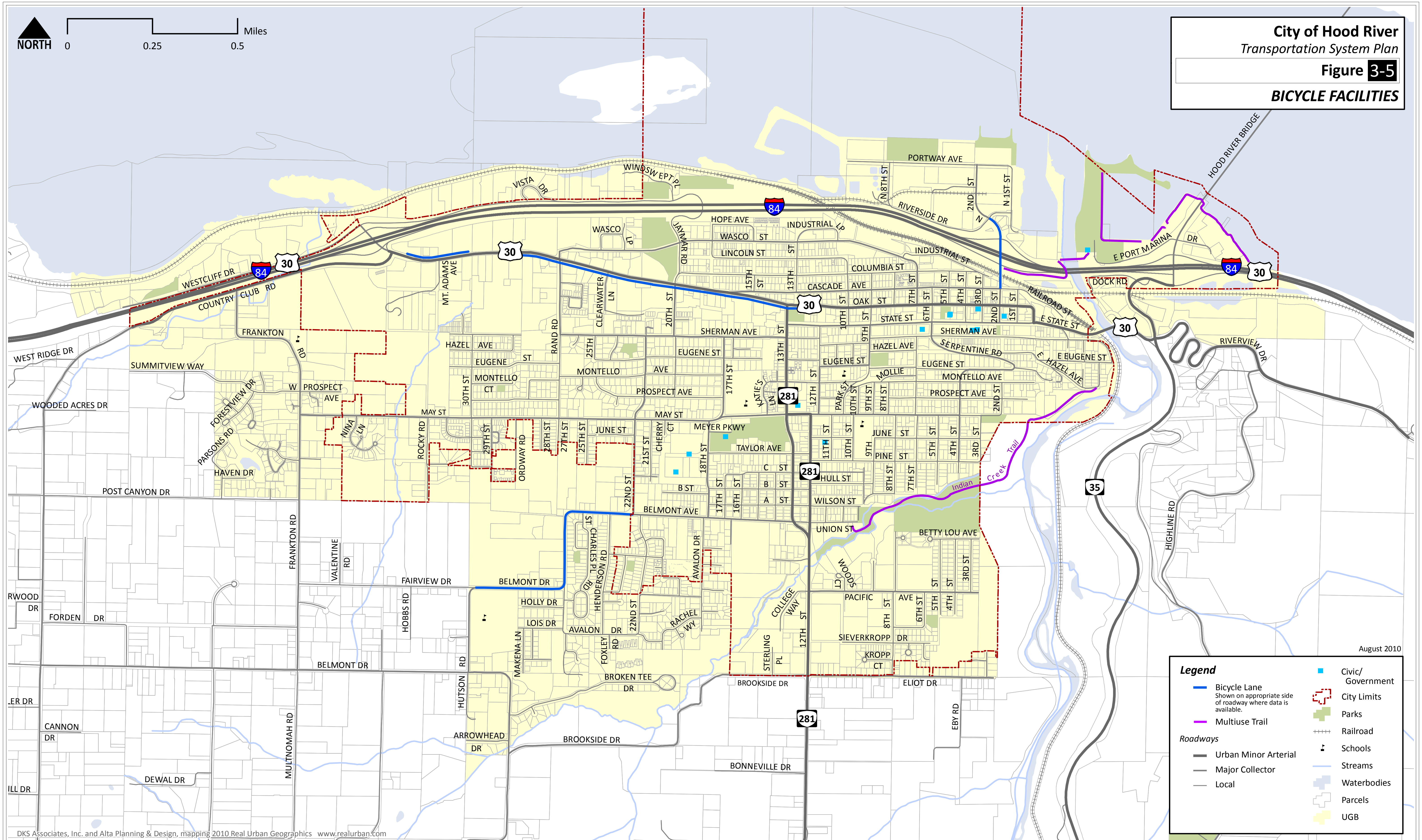
TABLE 3-2: Hood River Middle School Safe Routes to School Survey – How Parents Perceive Whether School Encourages or Discourages Walking and Bicycling to School

Year	Strongly Encourage	Encourage	Neutral
2009	5%	13%	67%
2010	18%	55%	25%

Existing Issues

Based on the existing bicycle and key routes to school facilities inventory, the following issues were identified:

- Bicycle facilities need to be added to primary north-to-south travel routes to accommodate uphill bicycling. Cyclists need to be given dedicated travel lanes so that large speed differentials between motorized vehicles and bicycles can be avoided.
- Bicycle facilities need to be added along 13th Street (OR281) between Sherman Avenue and May Street to aid in north to south travel in the middle portion of Hood River.
- A priority list of need bicycle facilities should be created to address street network connections in the outlying areas of the city.
- Newer, more secure bicycle racks outside schools should be considered along with relocating the racks for higher visibility for security.


City of Hood River
Transportation System Plan
Figure 3-5
BICYCLE FACILITIES
NORTH
0
0.25
0.5
Miles
Legend
Bicycle Lane
Shown on appropriate side of roadway where data is available.
Multiuse Trail
Roadways
Urban Minor Arterial
Major Collector
Local
Civic/ Government
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
August 2010
DKS Associates, Inc. and Alta Planning & Design, mapping 2010 Real Urban Geographics www.realurban.com
HOOD RIVER BRIDGE
PORTWAY AVE
RIVERSIDE DR
INDUSTRIAL LP
INDUSTRIAL ST
E PORT MARINA DR
DOCK RD
RAILROAD ST
E STATE ST
RIVERVIEW DR
WINDSWEPT PL
VISTA DR
WASCO
HOPE AVE
WASCO ST
LINCOLN ST
COLUMBIA ST
CASCADE AVE
OAK ST
STATE ST
SHERMAN AVE
SERPENTINE RD
E EUGENE ST
E HAZEL AVE
HAZEL AVE
EUGENE ST
MOLLIE
MONTELLO AVE
PROSPECT AVE
MAY ST
JUNE ST
MEYER PKWY
TAYLOR AVE
PINE ST
HULL ST
WILSON ST
UNION ST
Indian Creek Trail
BETTY LOU AVE
BELMONT AVE
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
BROOKSIDE DR
BONNEVILLE DR
EBY RD
HIGHLINE RD
WESTCLIFF DR
COUNTRY CLUB RD
WEST RIDGE DR
FRANKTON RD
SUMMITVIEW WAY
WOODED ACRES DR
FORESTVIEW DR
PARSONS RD
HAVEN DR
W PROSPECT AVE
POST CANYON DR
FAIRVIEW DR
BELMONT DR
HOLLY DR
LOIS DR
AVALON DR
BROKEN TEE DR
ARROWHEAD DR
HUTSON RD
MAKENA LN
HOBBS RD
VALENTINE RD
MULTNOMAH RD
FORDEN DR
CANNON DR
DEWAL DR
MT. ADAMS AVE
RAND RD
CLEARWATER LN
JAYMAR RD
ROCKY RD
ORDWAY RD
NINA LN
CHERRY CT
RACHEL WY
COLLEGE WAY
STERLING PL
WOODS CT
HENDERSON RD
CHARLES PL
FOXLEY RD
30
84
281
35

TRANSIT

Transit systems provide a public travel option and can run on regular schedules or can be demand-responsive. Transit allows passengers another way to achieve mobility without using or owning a personal vehicle. It is particularly important for transit-dependent populations: the young, the elderly, persons with disabilities, and/or lower incomes. A transit system can enhance the livability of a city and provide economic benefits by reducing roadway volumes, and providing a safe and efficient means to access shopping and employment centers. The existing transit facilities and issues faced by the City of Hood River are described in this section.

Facilities

The City of Hood River is currently provided public transit service by Columbia Area Transit (CAT), which is operated by the Hood River County Transportation District. The Transit District was formed in 1993 and provides services throughout the county primarily through Dial-A-Ride service and limited intercity routes. Approximately 6 percent of the total ridership from July 2009 to June 2010 were using the intercity route service. The Transit District also provides regional services transporting passengers to the Portland Metropolitan area. CAT has 10 American with Disabilities Act (ADA) accessible service vehicles and annually services 34,000 one-way trips. CAT recently completed construction of a transit center located on Wasco Loop, which includes administrative offices, maintenance and storage facilities for CAT's 10 service vehicles, and has capacity to store two additional vehicles.[1] In addition, CAT has plans to build a Park and Ride lot next to the transit center with room for 16-17 motor vehicles. All Hood River intercity route stops for CAT can be seen in Figure 3-4. The different services provided by CAT are outlined below:

CAT HR-TD-HR Intercity Route

In 2008, CAT established an intercity route that travels from Hood River to The Dalles and back to Hood River Monday through Friday. This service runs three times a day (Morning, Mid-Day, and Evening) and cost $3.00 each way. Twelve stops are located along this intercity route line.

CAT PDX Intercity Route

CAT also operates a intercity route service on Thursdays that travels from The Dalles to Hood River and arrives in Portland. This service then returns to Hood River and The Dalles, but has a three and a half hour layover in Portland. This route has six stops and costs $8 each way.

CAT Dial-A-Ride

Dial-A-Ride is a door to door service offered by CAT throughout Hood River County. CAT is available Monday through Friday and services Hood River, Odell, Parkdale, and Cascade Locks. Rides can be reserved from 24 hours up to fourteen days in advance and rides can be scheduled between 8 a.m. and 4:30 p.m. Each one way trip within the City of Hood River cost $1.25.

CAT also provides a Dial-A-Ride for a once a month trip to Portland, which occurs the second Friday of each month. The bus leaves Hood River at 9 a.m. and then leaves Portland on the return trip to Hood River at 3 p.m. Typically, the Portland destination is the Clackamas Town Center and the fare is $8.00 each way. Reservations are required for this monthly Portland trip.

[1] Schwanz, Dan. Telephone Interview. 8 June 2010.

Greyhound

Although CAT had previously been the local agent for Greyhound, as of May 31, 2010, they are no longer.[2] Instead Greyhound reservations can be made online or over the telephone with Greyhound directly. The bus depot location for Greyhound in Hood River is at the Port of Hood River in front of the Hood River County Chamber of Commerce on Marina Way. Greyhound provides service through Hood River from Portland, OR to The Dallas and onto Stanfield, OR along I-84. Traveling to Portland, Greyhound services Hood River three times a day on Monday through Sunday, departing at 4:25 a.m., 3 p.m., and 5 p.m. Traveling to Stanfield, Greyhound services Hood River twice daily on Monday through Sunday departing at 12:55am and 1:55pm. The Greyhound stop location can be seen in Figure 3-4. Once reaching either Portland or Stanfield, travelers can then select north south routes along I-5, I-84, or I-90.

Bicycle and Pedestrian Access to Transit

Columbia Area Transit operates a variety of services for Hood River residents. However, short-term bicycle parking, ADA-compliant curb ramps, benches and shelters are key improvements at bus stops that would improve safety, comfort, and convenience to bicyclists and pedestrians accessing transit.

Existing Issues

Based on the existing transit facilities inventory, the following issues were identified:

- Consistent and increased annual funding could allow for local intercity route and/or flex-route transit service within the City, yet allow CAT to maintain its current dial-a-ride and regional system.
- Improvements are needed near transit stops to provide short-term bicycle parking, ADA-compliant curb ramps, benches, and shelters. These improvements make transit more attractive and convenient for Hood River residents.

TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) is a term used to describe any action that removes single occupancy vehicle (SOV) trips from the roadway network during the peak travel demand periods. Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel, with focus typically being placed on large employers.

In Hood River, carpooling is a strategy of TDM that is being used by residents. Carpooling is supported by CAT, which informs the public about Carpool Match NW; a website that facilitates carpooling opportunities in cities around the region.

Employers in Hood River are not required to participate in the state's ECO-rule program for transportation demand management, since the City is located outside of a Metropolitan Planning Organization (MPO).

Three vanpools are being operated out of Hood River to transport residents to the Portland Metropolitan area. In addition, one vanpool takes residents to The Dallas. Each vanpool has

[2] Columbia Area Transit. http://community.gorge.net/hrctd/, accessed June 1, 2010.

between 12-14 passengers, with some passengers being Washington residents coming from White Salmon and Bingen. No incentives have been set up for employees using the vanpools.

Existing Issues

Based on the existing transportation demand management, the following issues were identified:

- Employers need to be educated about the benefits of carpool incentives.
- Employers need to be educated about Oregon's Business Energy Tax Credit (BETC) for energy conservation related to transportation projects.

MOTOR VEHICLES

The use of private motor vehicles is a common method of transportation to, from, and within the City of Hood River. Existing motor vehicle facilities, volumes, intersection operations, safety, and issues within the City of Hood River are described in this section. Motor vehicles give drivers flexibility in route and destination, are a critical mode of travel for freight movement, and are important for travelers living on the outskirts of Hood River.

Motor Vehicle Facilities

The motor vehicle system within the City of Hood River includes city streets and state highways. The existing jurisdiction, classifications, and access standards of these facilities are documented below.

Roadway Jurisdiction

Roadway operation and maintenance responsibilities of the various roads within the Hood River UGB depend on the roadway's jurisdiction. The State highways, which include I-84, US 30, OR 35, and OR 281, are under the jurisdiction of the Oregon Department of Transportation (ODOT), and the City of Hood River is responsible for the remainder of the roads within the city limits. The exceptions are designated private roadways, where maintenance and improvements are the responsibility of the owner. Outside of the city limits but within the UGB, Hood River County is responsible for the roadways, but require City standard development of streets pursuant to the Urban Growth Management Agreement between the City and County.

Functional Classification

Functional classification is the designation of a roadway by the level of access or mobility it is intended to provide. The City of Hood River has four designated functional classifications which include local residential, collector, arterial, and commercial/industrial downtown. Typically local streets provide more access but less mobility, collectors transition between access and mobility, and arterials have less access but more mobility. Depending on how the roadway functions, the adopted TSP specifies design parameters (Table 3-3) as well as functional classifications (Figure 3-6).

TABLE 3-3: Street Design Parameters

Classification	Pavement Width	Right-of-Way Width	Minimum Posted Speed
Local Residential	20-34 ft	50-60 ft	None
Collector	34 ft	60 ft	25 mph
Arterial	36-50 ft	62-74 ft	30 mph
Commercial/Industrial Downtown	27-42 ft	40-70 ft	20 mph

Local Residential Streets
The design of a residential street affects its traffic operation, safety, and livability. The residential street should be designed to enhance the livability of the neighborhood, as well as to generally accommodate less than 1,200 vehicles per day. Speeds are normally not posted, with a statutory 25-mph applying. A well-connected grid system of relatively short blocks can minimize excessive volumes of motor vehicles by providing a series of equally attractive or restrictive travel options. This street pattern is also beneficial to pedestrians and bicyclist.

Urban Collector Streets
Urban collectors are intended to carry between 1,200 and 10,000 vehicles per day, including limited through traffic, at a minimum posted speed of 25 mph. A collector can serve residential, commercial, industrial, or mixed land uses. Major collectors focus on connecting arterials, typically in high volume commercial areas. If traffic volume forecasts exceed 5,000 vehicles per day on a collector, new driveways serving single- or multi-family houses should not be permitted.

Urban Major/Minor Arterial
Arterial streets form the primary roadway network within and through a region. They provide a continuous roadway system that distributes traffic between different neighborhoods and districts. Generally, arterial streets are high capacity roadways that carry high traffic volumes with minimal localized activity. A minimum posted speed should be 30mph. Minor arterials provide service between collectors and major arterials. They generally provide high volume connections, but still serve adjacent land uses. The streets are often the “main street” in a neighborhood-shopping district. To maintain capacity and reduce conflicts, where feasible primary access to the arterials should be via local streets, rather than private driveways.

Urban Downtown Commercial and Industrial Streets
Streets that serve the downtown core of Hood River must meet special demands for on-street parking and pedestrian comfort and accessibility. If possible, sidewalks should be at least ten feet wide for commercial streets (six feet wide for industrial streets), and such details as clearly marked crossings, curb extensions, street furniture and landscaping should be considered. Diagonal parking is to be avoided. A utility easement, ranging from zero to ten feet on each side of the road may be required.

It is recommended that the City's functional classification system designations be revisited during the TSP update process to clarify intended functions for some streets and to address some uncertainties related to the current application of designations to City streets. In addition the signing, striping, and maintenance of private roadways should also be addressed during the update process.

The *Oregon Highway Plan (OHP)* classifies all state highways according to their intended function. It identifies four state highways within the Hood River UGB (Table 3-4). I-84 is an Interstate highway and is a state Freight Route as well as truck route. US 30, also known as the Historic Columbia River Highway (HCRH), is a District highway and is also an Oregon and National Scenic Byway and All-American Road. OR 281 is a District highway. In addition, OR 35, which has only a very small portion inside of the UGB, is a designated Freight route, a truck route, and part of the Mt. Hood National Scenic Byway. A Freight Route is designated by the State of Oregon, whereas a Truck Route is designated by the Federal Highway Administration (FHWA). In addition, several routes within the City are designated by ODOT as Motor Carrier routes, where over-dimensional vehicles may traverse if permitted by ODOT. The state highway classification system is described below Table 3-4.

TABLE 3-4: Oregon Highway Plan Roadway Classification

Route Number	State Classification System	NHS	Freight Route	Truck Route	Scenic Byway
I-84 US30 Common w/Hwy 100	Interstate	NHS	FR	TR	-
US30	District	-	-	-	SB
OR281	District	-	-	-	-
OR35	Statewide	NHS	FR	TR	SB

Source: 1999 Oregon Highway Plan.

Interstate Highways

Interstate Highways (NHS) provide connections to major cities, regions of the state, and other states. A secondary function in urban areas is to provide connections for regional trips within the metropolitan area. The Interstate Highways are major freight routes and their objective is to provide mobility. The management objective is to provide for safe and efficient high-speed continuous-flow operation in urban and rural areas.

Statewide Highways

Statewide Highways (NHS) typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation, in constrained and urban areas, interruptions to flow should be minimal.

Access Management Standards

Access management standards exist for both the City of Hood River and State roadways. The standards call for a minimum distance between access points on the same side of the street. The City of Hood River access management standards can be found in the Hood River Municipal Code (HRMC) and the 2006 Amended Hood River TSP. For local streets the HRMC calls for a minimum of 22 feet separation (as measured by straight curb) required between driveways.[3] For arterial and collector streets and intersections, the HRMC refers to the Adopted TSP for access management guidance. The Hood River TSP provides Table 3-5, which per street classification and posted speed gives minimum allowable driveway spacing.

TABLE 3-5: City of Hood River Access Management Standards

Street Classification	Minimum Posted Speed	Minimum Spacing Between Driveways and/or Streets[a]	Minimum Spacing Between Intersections (Min-Max)	Appropriate Adjacent Land Use Type
Arterial	35-45 mph	300 feet	660-1000 feet	Light industry/office and buffered medium or low density residential.
Collector Street	25-35 mph	100 feet Access to each lot permitted.	220-440 feet	Neighborhood commercial near some major intersections.
Local Street	25 mph	Access to each lot permitted. See Municipal Code 13.28.040.	200 feet	Primary residential.
OR 35 from I-84 to Historic Columbia River Highway	25 mph	1,320 feet	500 feet	Commercial.

[a]Desirable design spacing (existing spacing will vary).

Source: Pg. 64, General Access Management Guidelines, City of Hood River TSP, 2006.

The *Oregon Highway Plan* access management standards are followed by ODOT and implemented through OAR 734-051, the state access management rule. Highway access spacing standards are contingent on highway classification and posted speed. The standards applicable to highways within the Hood River UGB are summarized in Table 3-6.

[3] The City of Hood River *2001 Municipal Code*, 13.28.040 Access Spacing for Streets.

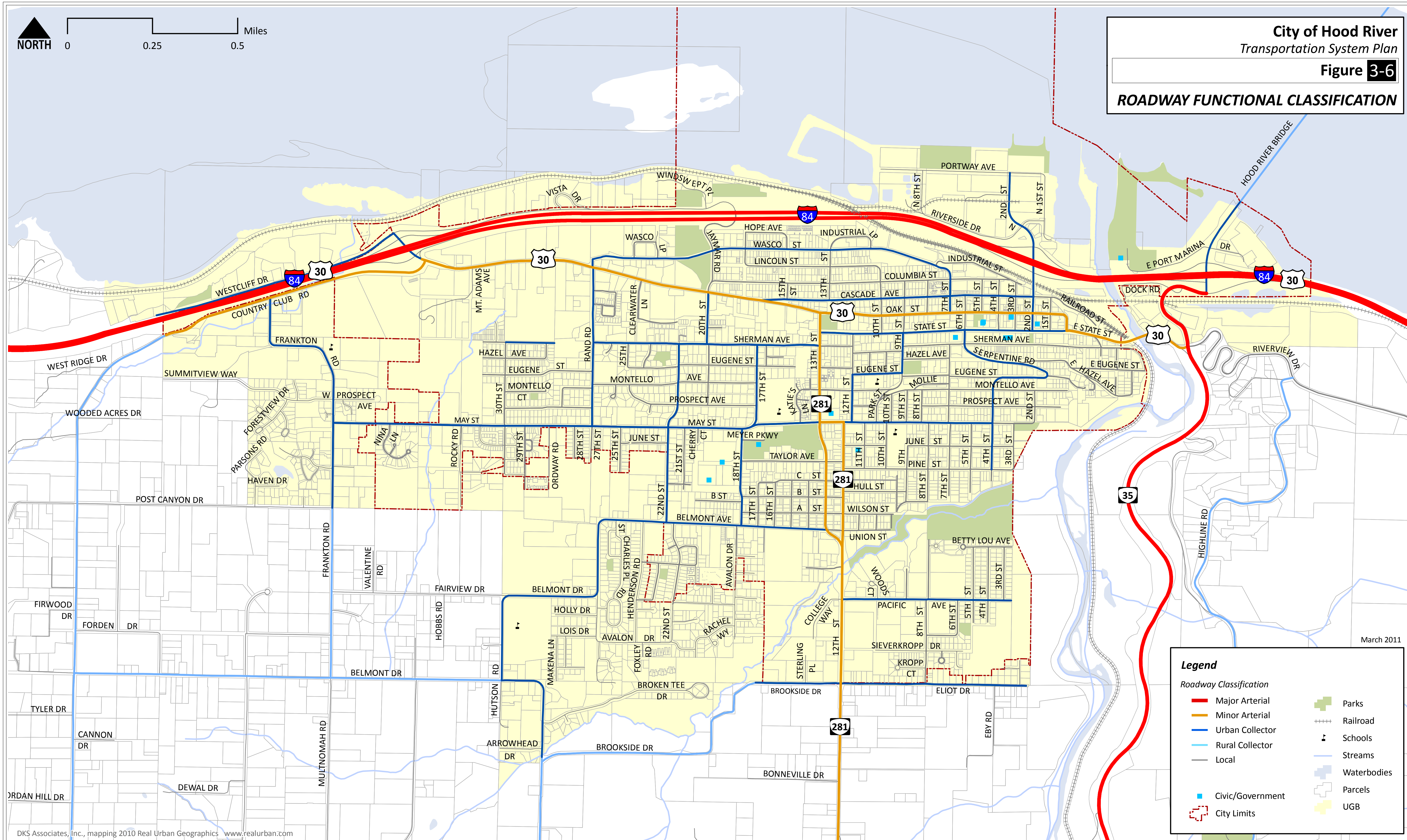
TABLE 3-6: *Oregon Highway Plan* Access Management Standards

Facility	Spacing Standard[a] per Posted Speed (Urban Area[b])				
	≥55 mph	50 mph	40 & 45 mph	30 & 35 mph	≤25 mph
Statewide Highway	1,320 feet	1,100 feet	990 feet	720 feet	520 feet
District Highway	700 feet	550 feet	500 feet	350 feet	350 feet

[a] Measurement of the approach road spacing is from center to center on the same side of the roadway.
[b] The Urban standard applies in UBGs unless a management plan agreed to by ODOT and the local government(s) establishes a different standard.

Source: 1999 Oregon Highway Plan.

The *Oregon Highway Plan* includes standards for interchange spacing. On I-84, three interchanges serve the City of Hood River. Currently, Exit 62 on I-84 is approximately 1.9 miles from Exit 63, and Exit 63 is 0.5 miles from Exit 64. According to the OHP access management standards, interchange spacing in urban areas should be a minimum 3 miles and in rural areas spacing should not be less than 6 miles. The I-84 interchanges in the City of Hood River are closer than the urban minimum access spacing standards; therefore no additional interchanges should be considered for I-84 within the City.


City of Hood River
Transportation System Plan
Figure 3-6
ROADWAY FUNCTIONAL CLASSIFICATION
NORTH
0
0.25
0.5
Miles
March 2011
Legend
Roadway Classification
Major Arterial
Minor Arterial
Urban Collector
Rural Collector
Local
Civic/Government
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com

Pavement Conditions

The pavement conditions of State Highways within the Hood River UGB are shown in Table 3-7. Pavement condition classifications are: very good, good, fair, poor, and very poor. Two methodologies exist for surveying the pavements.

The Distress Survey Procedure is typically used for the Interstate and National Highway System (NHS) and is a detailed visual evaluation of the pavement with identification and quantification of specific pavement distresses and defects.[4] These distresses use camera and laser imaging technology to capture data while driving at highway speeds.

The GFP (Good-Fair-Poor) rating procedure is used for non-NHS highways and is a windshield survey conducted visually by experienced raters at highways speeds to determine an overall pavement condition score. Both surveying methodologies use the same rating system and the roadways are scored in a variety of categories that can sum to 100 points on an established scale. The rating system is as follows: Very Good (100-96), Good (95-76), Fair (75-46), Poor (45-21), and Very Poor (20-0). As Table 3-7 indicates, OR 281 is in poor condition and is in need of pavement improvements.

TABLE 3-7: ODOT Pavement Condition Report – State Highways in Hood River UGB

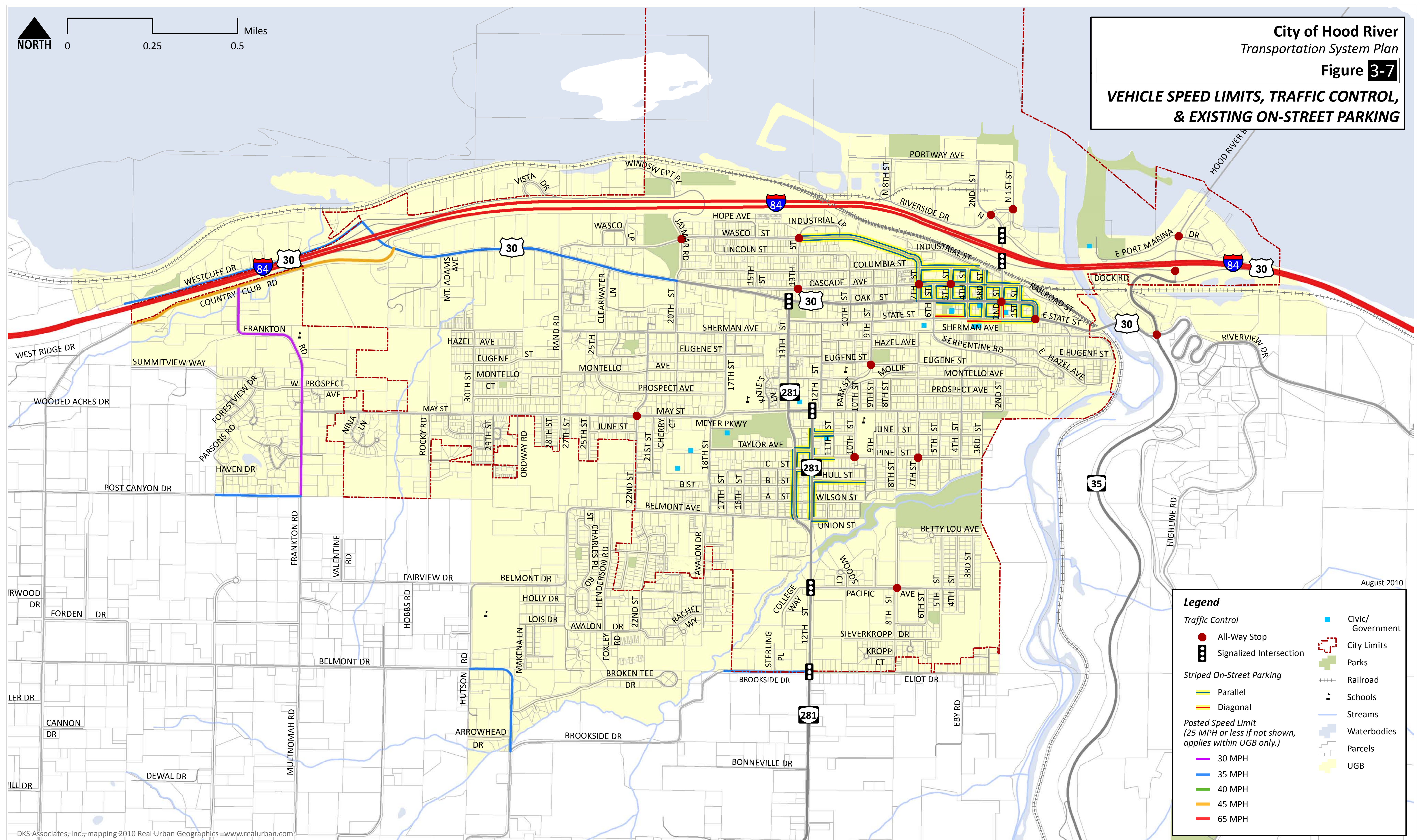
Route	Section Name	Rating	
		2006	2008
I-84	Mitchell Point-Hood River	Good	Good (85)
US30	Hood River Section	Good	Good (90)
OR35	Neal Creek-Hood Riv/UPRR O-XING	Good	Fair (65)
OR281	Jct Hwy 100 – Brookside Dr	Poor	Poor (35)

Source: 2008 ODOT Pavement Condition Report

Posted Speeds

An inventory of the posted speeds in the Hood River UGB is shown in Figure 3-7. The majority of streets within the UGB have posted speed limits of 25 miles per hour (mph). Arterial roadways outside of downtown have higher speeds, ranging from 35 mph to 45 mph, and the main downtown streets (State Street, Cascade Avenue, and Oak Street (HCRH)) have speeds of 25 mph or lower. I-84 has a posted passenger car speed of 65 mph and truck speed of 55 mph.

[4] *2008 Pavement Condition Report*, ODOT Pavement Management.



DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com

On-Street Parking

Existing locations of striped on-street parking (Exhibit 3-10) are concentrated in downtown and in the Heights neighborhood. All on-street parking in Hood River is parallel parking except for in three locations; diagonal parking is present on the north side of State Street from 6th Street to 4th Street, on the south side of State Street from 4th Street to 2nd Street, and on the east and west sides of 2nd Street between Oak Street (HCRH) and State Street. Outside of downtown, Hood River and the Heights neighborhood, on-street parking is available but is not striped to designate stalls. Typically, striped parking is accompanied by parking meters.

Exhibit 3-10. Parallel and Diagonal Parking along State Street in Downtown Hood River.

Intersection Control

Hood River has six traffic signals located within the UGB. The placement of these traffic signals along with the locations for all-way stop controlled intersections are shown in Figure 3-7. In addition to these, three new traffic signals are under construction as part of the I-84 Exit 64 interchange improvements. The new signals will be located on Button Bridge Road at its intersections with I-84 eastbound ramps, I-84 westbound ramps, and Marina Way. Also, the City is working with ODOT to develop a project that would realign Country Club Road that may include a signal at a new intersection on Cascade Avenue with Mt. Adams Avenue.

Snow Removal

The City of Hood River has an existing plan for snow removal. Roads within the City have been given a priority rating from one to four based on overall traffic circulation, emergency access needs, terrain slope, and business and residential needs.[5] Priority 1 streets in downtown Hood River include the following: Oak Street (HCRH) between Front Street and 7th Street; Front Street; 1st, 2nd, 3rd, 4th, 5th, 6th, and 7th Streets between State Street and Columbia Street. In addition, no parking is allowed on either side of the street between 3 a.m. and 6 a.m. in these areas and vehicles are subject to being towed at the owner's expense.

Priority 1 streets in the Heights neighborhood include the following: 13th Street (OR281) between Oak Street (HCRH) and Belmont Avenue; 12th Street between May Street and Belmont Avenue; Belmont Avenue, A, B, C Streets, and Taylor Avenue between 12th and 13th Streets (OR281). Parking is not allowed on either side of the street between 12 a.m. and 6 a.m. in this area and are subject to tow at the owner's expense.

Priority 2 streets include industrial streets, selected collectors, and bus routes. Priority 3 streets are those associated with entering schools, and Priority 4 streets include all other local residential streets.

[5] The City of Hood River. Streets and Sidewalks. http://ci.hood-river.or.us/pageview.aspx?id=19167, accessed June 15, 2010.

Motor Vehicle Volumes

To help evaluate current travel patterns and the adequacy of the roadway network, weekday p.m. peak hour (4-6 pm) motor vehicle turn movement counts at study intersections in Hood River were obtained in mid May 2010. Adjustments to this count data to account for seasonal variations in traffic volumes were applied as described below.

30th Highest Hourly Volumes (30 HV)

ODOT Transportation Planning Analysis Unit's (TPAU) *Analysis Procedures Manual (AMP)* specifies that the 30th Highest Hourly Volumes (30 HV), as measured from yearly count data, should be used for design and analysis purposes as this factor has been shown to represent the typical peak hour during the peak month of the year. [6] Different methods can be used to obtain yearly count data and seasonal factors including the On-Site ATR (Automatic Traffic Recorder) Method, the ATR Characteristic Table Method, and the Seasonal Trend Table Method. As traffic volume characteristics differ for locations along I-84 versus those located on the surface street network of Hood River, two methods were used to develop traffic volumes for analysis as part of the TSP update.

Interchange Area Intersections

For the intersections surrounding the I-84 interchanges that were analyzed as part of the Hood River I-84 Interchange Area Management Plans (IAMP)s, a seasonal factor was calculated by combining the results of the ODOT ATR data and the ODOT *2007 Seasonal Trend Table* methodologies. The ATRs considered were on I-84 at Rowena (ATR 33-001) and on OR 35 south of Hood River (ATR 14-003), with the Rowena ATR representing functional classification and traffic characteristics for the freeway and the OR 35 ATR representing variations in local and recreational traffic in the vicinity of Hood River. A comparison of five count years (2001-2005) of ATR data from June (count month) and August (peak month) resulted in the calculation of a seasonal factor of 1.07 for the Rowena ATR and 1.26 for the OR 35 ATR.

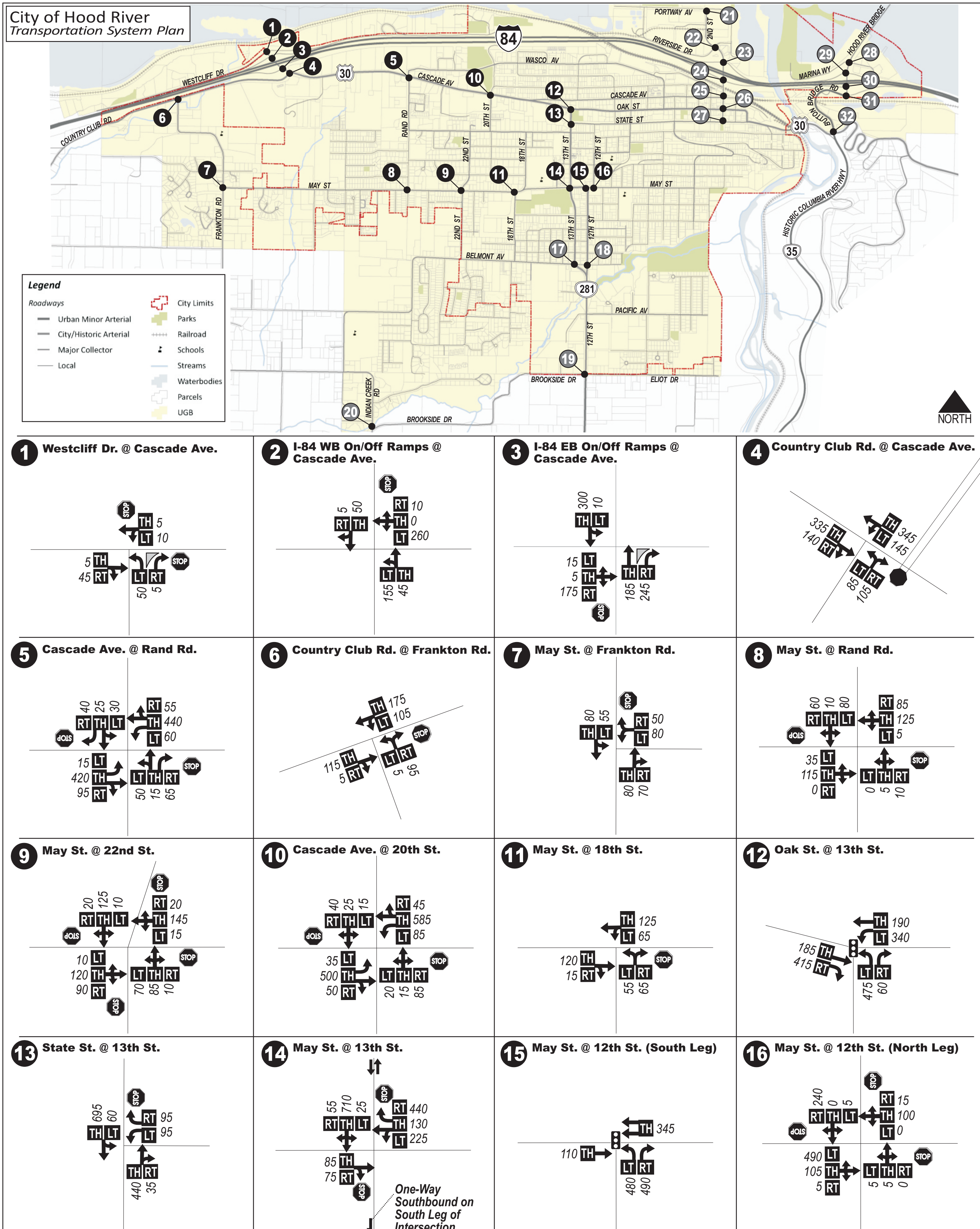
In calculating the seasonal factor using the Seasonal Trend Table, two categories were considered: Recreational Summer and Recreational Summer/Winter. For the Recreational Summer category, the seasonal factor was 1.15 and for the Recreational Summer/Winter category, the seasonal factor was 1.23. When combing the results of ATR and Seasonal Trend Table methodologies, a seasonal adjustment factor of 1.25 was calculated and applied to all June traffic volumes, increasing those volumes by 25% to represent those taken in the peak month of August.

Counts taken for the interchange area intersections were obtained in 2007 and 2008 as described above. In addition to seasonal factors, a growth rate of 2.6% was applied to the 2007 counts to adjust them to reflect the 2008 counts. However, due to the economic down turn, statewide decreases in traffic volumes have occurred which was confirmed by recent traffic studies in the City. Therefore, a growth factor was not applied to the 2008 counts. The 2008 counts instead will be taken as comparable to the counts taken at the surface street intersections in 2010.

[6] *Developing Design Hour Volumes*, ODOT Analysis Procedure Manual, Chapter 4, May 2010.

Hood River Surface Street Intersections

Since no ATR's are present on the surface street network and a representative area was not found by filtering the ATR Characteristics Table, the 30 HV volume calculations were determined by using the Seasonal Trend Table. Due to local characteristics in Hood River, the most appropriate trend is the Summer trend, which assumes traffic volumes have the greatest degree of seasonal change due to summer recreation. The *2009 Season Trend Table* was used to get a seasonal factor and adjust the count volumes. Balancing of intersection volumes was then completed and the results of the 30 HV adjustments for both the interchange area and surface street network intersections can be seen in Figure 3-8a and Figure 3-8b.

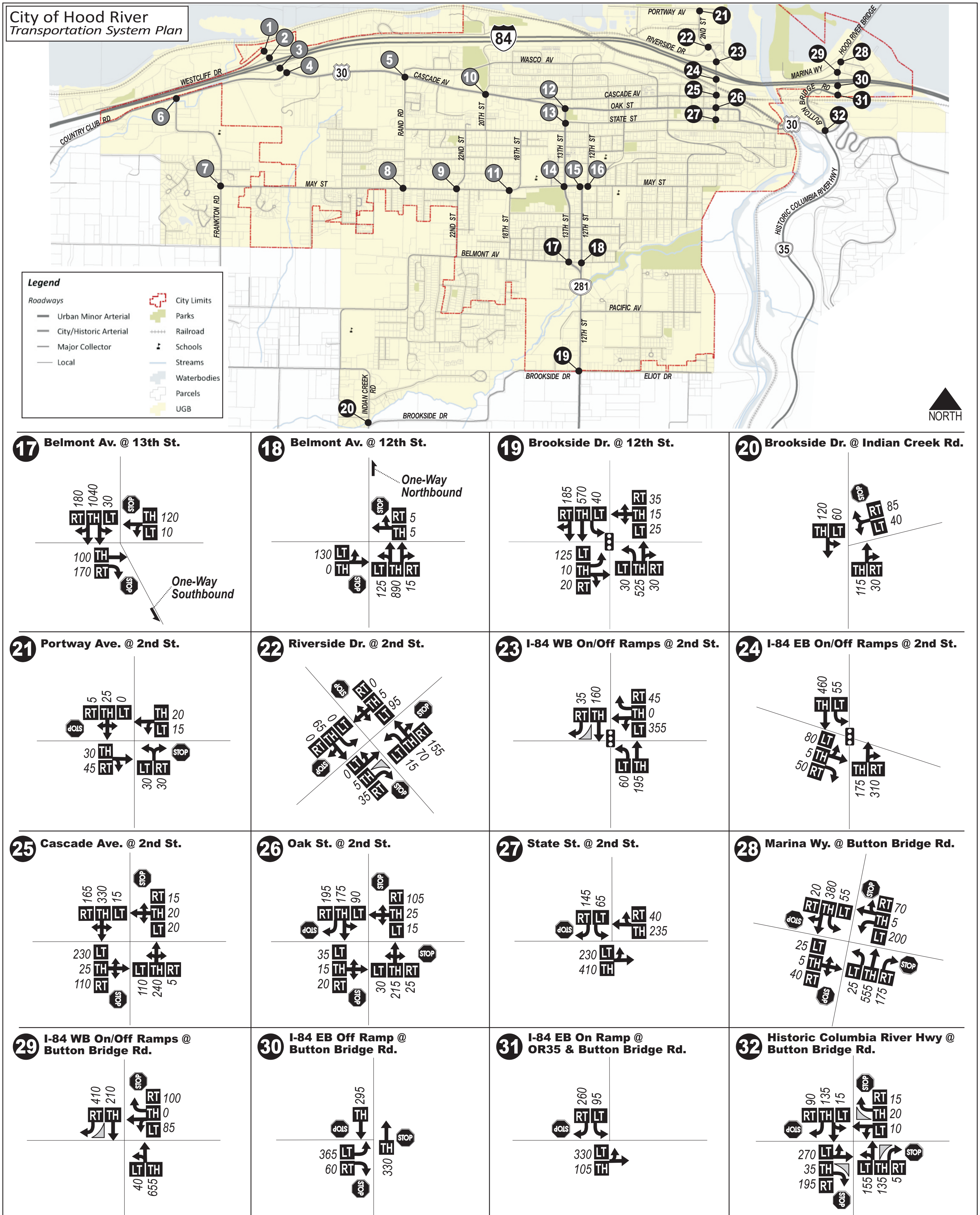


Legend

- Study Intersection & Number (this page)
- Study Intersection & Number (previous page)
- Stop Sign
- Traffic Signal
- Lane Configuration
- 00 30th Highest Hour Traffic Volume
- LT TH RT Left•Thru•Right Volume Turn Movement

Figure 3-8a

EXISTING (2010) WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES



Legend

- Study Intersection & Number (this page)
- Study Intersection & Number (previous page)
- Stop Sign
- Traffic Signal
- Lane Configuration
- 00 30th Highest Hour Traffic Volume
- LT TH RT Volume Turn Movement (Left•Thru•Right)

Figure 3-8b

EXISTING (2010) WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

Traffic Operations

Existing traffic operations were analyzed at the 32 study intersections using Synchro 7, which employs the *2000 Highway Capacity Manual* methodology[7] for signalized and unsignalized intersections. These intersections were selected because they are controlling traffic flow on the major corridors in Hood River and affect how efficiently the roadway system operates.

Intersection Performance Measures

The level of service (LOS) is a performance measure that is similar to a "report card" rating and is based on average vehicle delay. Level of service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. Level of service D and E are progressively worse operating conditions. Level of service F represents conditions where average vehicle delay has become excessive and demand is near capacity; a condition is typically evident in long queues and delays, with intersection delays often being difficult to measure because congestion may extend into and be affected by adjacent intersections. The average delay value (in seconds) corresponding to each level of service designation, along with additional level of service descriptions, are provided in the Appendix under Level of Service Descriptions.

The unsignalized intersection level of service calculation evaluates each movement separately to identify problems (typically left turns from side streets). The calculation is based on the average total delay per vehicle for stop-controlled movements (typically on the minor side street or left turn movements). Level of service (LOS) F indicates that there are insufficient gaps of suitable size to allow minor street traffic to safely enter or cross the major street. This is generally evident by long delays and queuing on the minor street. Level of service F may also result in more aggressive driving, with side street vehicles accepting shorter gaps. It should be noted that the major street traffic moves without delay and the LOS F is for side-street or left turns, which may be only a small percentage of the total intersection volume. It is for these reasons that level of service results must be interpreted differently for signalized and unsignalized locations.

ODOT employs the volume-to-capacity (V/C) ratio, which is another performance measure for intersection operations and represents the level of saturation (i.e., what proportion of capacity is being used). It is given as a decimal (typically between 0.00 and 1.00) and is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the intersection, lane, or movement is oversaturated and usually results in excessive queues and long delays.

Mobility Standards

Mobility standards are established to delineate the maximum level of congestion that will be accepted on a given facility or within a specified area. They are agency-specific and apply to intersections under the road authority's jurisdiction. Within the City of Hood River, ODOT standards apply to intersections along state highways and City standards apply to the remaining

[7] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

intersections. Where a facility is maintained by the County or ODOT, the more restrictive of the standards applies.

The City of Hood River has mobility standards for City roads, which are included in the *Hood River TSP (2006 Update)*. Under Goal 4, Policy No. 3 states, "A minimum level of service (LOS) C on transportation systems serving new developments is desired on streets and signalized and unsignalized intersections. Level of service shall be based on the most recent edition of the *Highway Capacity Manual*. Where a facility is maintained by the County or ODOT, the more restrictive of the standards should apply.[8]"

ODOT V/C ratio operating standards are based on roadway classification, designations, and posted speed limits.[9] As described above, there are both Statewide and District highways in the City of Hood River as well as freight routes and speed limits vary between 25 mph and 65 mph. The ODOT V/C standards can be seen in Table 3-8.

TABLE 3-8: *Oregon Highway Plan* Maximum Volume to Capacity Ratios Outside Metro

Highway Category	Inside Urban Growth Boundary			Outside Urban Growth Boundary
	Non-MPO outside of STA's where non-freeway speed ≤ 35 mph	Non-MPO outside of STAs where non-freeway speed > 35 mph	Non-MPO where non-freeway speed limit ≥ 45mph	Rural Lands
Interstate Highways	-	0.70	0.70	0.70
Freight Route on a Statewide Highway	0.80	0.75	0.70	0.70
District/ Local Interest Roads	0.90	0.85	0.80	0.75

In addition to the Table 3-8 mobility standards, special conditions apply at some locations. The maximum V/C ratio for ramp terminals of interchange ramps shall be the smaller of the values of the volume to capacity ratio for the crossroads or 0.85. Also, at unsignalized intersections and road approaches, the volume to capacity ratios shall not be exceeded for either of the state highway approaches that are not stopped. Approaches at which traffic must stop, or otherwise yield the right of way, shall be operated to maintain safe operation of the intersection and all of its approaches and shall not exceed the volume capacity ratios for District/Local Interest Roads in Table 3-8 within the urban growth boundaries. The mobility standard for each study intersection is given in Table 3-9, along with operational analysis results.

[8] City of Hood River Transportation System Plan, Amended June 2006, Kittelson and Associates, Inc. June 2006.
[9] *1999 Oregon Highway Plan - Amendment*, The Oregon Department of Transportation, July 2005.

Existing Operating Conditions

Existing traffic operations were analyzed at the 32 study intersections using the *2000 Highway Capacity Manual* methodology[10] for signalized and unsignalized intersections. The 30th Highest Hourly Volumes (30 HV) previously calculated were used to determine the delay, level of service, and the V/C ratio at each intersection. Table 3-9 summarizes the existing 30 HV operating conditions at the Hood River TSP study intersections.

[10] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

TABLE 3-9: Existing (2010) Weekday PM Peak Hour Intersection Operations

Intersection (North-South / East-West)	**Jurisdiction**	**Mobility Standard**	**Intersection Performance**		
			Delay	*LOS*	*V/C*
Cascade Ave. / Westcliff Dr.	City of Hood River	C	9.1	A/A	0.04
Cascade Ave. / I-84 WB On/Off Ramps	ODOT	0.85	30.6	A/D	0.71
Cascade Ave. / I-84 EB On/Off Ramps	ODOT	0.85	12.8	A/B	0.31
Cascade Ave. / Country Club Rd.	ODOT	0.90	33.8	A/D	0.63
Cascade Ave. / Rand Rd.	ODOT	0.90	29.6	A/D	0.45
Frankton Rd. / Country Club Rd.	City of Hood River	C	9.7	A/A	0.12
Frankton Rd. / May St.	City of Hood River	C	10.7	A/B	0.18
Rand Rd. / May St.	City of Hood River	C	12.8	A/B	0.26
22nd St. / May St.	City of Hood River	C	10.2	A/B	0.32
20th St. / Cascade Ave.	ODOT	0.90	81.7	A/F	0.73
18th St. / May St.	City of Hood River	C	11.4	A/B	0.19
13th St. / Oak St.	ODOT	0.90	30.9	C	0.73
13th St. / State St.	ODOT	0.90	71.7	A/F	0.70
13th St. / May St.	ODOT	0.90	29.5	A/D	**0.95**
12th St. (South Leg) / May St.	ODOT	0.90	7.4	A	0.61
12th St. (North Leg) / May St.	ODOT	0.90	20.5	A/C	0.37
13th St. / Belmont Ave.	ODOT	0.90	120.4	A/F	**0.94**
12th St. / Belmont Ave.	ODOT	0.90	36.0	A/E	0.56
12th St. / Brookside Dr.	ODOT	0.85	6.8	A	0.55
Indian Creek Rd. / Brookside Dr.	City of Hood River	C	10.6	A/B	0.17
2nd St. / Portway Ave.	City of Hood River	C	9.8	A/A	0.08
2nd St. / Riverside Dr.	ODOT	0.90	8.8	A/A	0.31
2nd St. / I-84 WB On/Off Ramps	ODOT	0.85	19.7	B	0.39
2nd St. / I-84 EB On/Off Ramps	ODOT	0.85	8.4	A	0.51
2nd St. / Cascade Ave.	ODOT	0.90	>200	A/F	**1.87**
2nd St. / Oak St.	ODOT	0.90	12.2	A/B	0.47
2nd St. / State St.	City of Hood River	C	27.3	**A/D**	0.56
Button Bridge Rd. / Marina Wy.	ODOT	0.80	60.8	B/F	**1.06**
Button Bridge Rd. / I-84 WB On/Off Ramps	ODOT	0.80	40.4	A/E	0.66
Button Bridge Rd. / I-84 EB Off Ramp	ODOT	0.85	22.8	C/C	0.73
OR35 & Button Bridge Rd. / I-84 EB On Ramp	ODOT	0.80	31.2	A/D	0.44
Button Bridge Rd. / Historic Columbia River Hwy.	ODOT	0.80	13.9	A/B	0.51

Signalized Intersection:
Delay = Average Intersection Delay (sec.)
LOS = Level of Service
V/C = Volume to Capacity Ratio
Shaded values do not meet standards

Unsignalized Intersection:
Delay = Critical Movement Approach Delay (sec.)
LOS = Major Street LOS / Minor Street LOS
V/C = Critical Movement Volume-to-Capacity Ratio
Note: LOS for all-way stop intersection reported for entire intersection

As shown, 13 of the study intersections are currently failing to meet either City or ODOT mobility standards, with most of these intersections being on the state highway system. Key findings include:

- All of the major side streets along Cascade Avenue (HCRH) between the I-84 Exit 62 interchange and OR 281 (Country Club Road, Rand Road, and 20th Street) are meeting ODOT's mobility standard, but not the City standard.

- At the I-84 Exit 62 interchange, the westbound ramp terminal is failing to meet the City's LOS C standard. In addition, the close proximity of the nearby intersection on Cascade Avenue (HCRH) at Country Club Road to the I-84 eastbound ramp terminal (approximately 75 feet) creates confusion among drivers and often results in turning conflicts.

- Crossing 13th Street (OR281) on the north approach to Oak Street (HCRH) can be difficult for pedestrians due to heavy eastbound to southbound traffic flow and limited visibility of pedestrians waiting on the southwest corner.

Exhibit 3-11. Motor vehicles experiencing delay on the westbound approach at 13th Street (OR281) and May Street.

- Although classified as a Collector street in the TSP, congestion at the intersections on 13th Street (OR281) at State and May Streets (Exhibit 3-11) often results in traffic cutting through the neighborhood to the east via 12th Street, Eugene Street, and 9th Street.

- The intersections on 13th Street (OR281) and 12th Street (OR281) at Belmont Avenue both fail to meet the City's mobility standard. However, only the intersection on 13th Street (OR281) at Belmont Avenue fails to meet ODOT's mobility standard.

- The intersection on Button Bridge Road at Marina Way is shown to operate poorly, however improvements including additional turn lanes and a traffic signal will be made as part of the current I-84 Exit 64 reconstruction project.

Traffic Safety

To analyze the safety of the transportation network in the City of Hood River, the most recent three years of collision data available within the City UGB was obtained from the Oregon Department of Transportation (ODOT). It includes collision records from January 1, 2006 to December 31, 2008. Crash rates at study intersections were calculated to identify problem areas in need of mitigation and ODOT's Safety Priority Index System (SPIS) was also review to identify potentially hazardous locations.

Figure 3-9 shows locations where collisions were reported. Table 3-10 reports the collision data for the top eight highest total crash intersections in the City of Hood River during the three years. The top seven intersections have six or more accidents, with collisions broken down by severity, with a calculated collision rate provided for each intersection. Due to the proportionality of the number of vehicles entering an intersection and the total number of crashes experienced, a crash rate describing the frequency of crashes per million entering vehicles (MEV) is used to determine if the number of crashes is significant. A crash rate of 1.0 MEV or greater typically warrants further investigation. None of the top seven intersections have a crash rate that exceeds the 1.0 threshold and there are no top 10% ODOT Safety Priority Index System (SPIS) sites located inside of the Hood River UGB. However, the intersection of Cascade Avenue (HCRH) at Rand Road is a top 15% SPIS location.

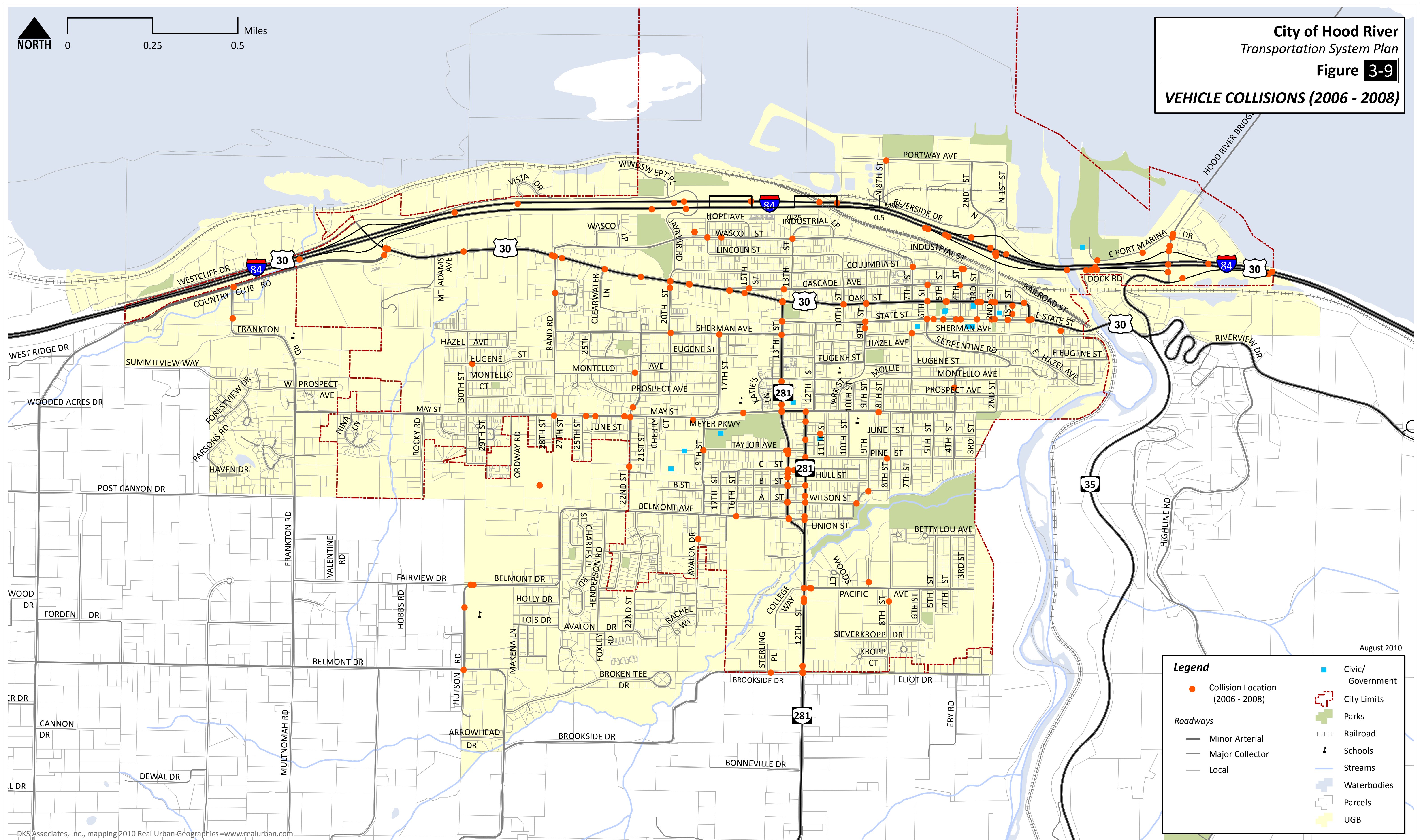
TABLE 3-10: Intersection Collision Summary (2006-2008)

Intersection	**Collision Severity**			**Total**	**Collision Rate**[b]
	Fatal	Injury	PDO[a]		
20th Street / Cascade Avenue	0	2	7	9	0.55
Rand Road / Cascade Avenue	0	6	3	9	0.62
6th Street / State Street	0	1	6	7	0.57
12th Street / Pacific Avenue	0	0	7	7	0.35
13th Street / May Street	0	3	3	6	0.31
13th Street / Oak Street	0	0	6	6	0.33
2nd Street / I-84 EB ramps	0	2	4	6	0.48

[a]PDO = Property damage only.
[b]Average annual crashes per million entering vehicles (MEV); MEV estimates based on 30 HV

Source: ODOT Collision Data for 2006, 2007, 2008.

The two intersections in the City of Hood River with the highest frequency of crashes are on Cascade Avenue (HCRH) at Rand Road and at 20th Street. Both of these intersections are side street stop-controlled. Cascade Avenue (HCRH) and Rand Road has the highest collision rate within the city, although it is still well below 1.0 MEV. Seven out of the nine collisions involved turning or crossing maneuvers and may have been preventable had a signal been present. A bicyclist was also involved in one of the collisions, being hit by a vehicle from the side street at Rand Road.



City of Hood River
Transportation System Plan
Figure 3-9
VEHICLE COLLISIONS (2006 - 2008)
NORTH
0
0.25
0.5
Miles
August 2010
Legend
Collision Location (2006 - 2008)
Roadways
Minor Arterial
Major Collector
Local
Civic/ Government
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
DKS Associates, Inc., mapping 2010 Real Urban Geographics - www.realurban.com
84
30
281
35
WESTCLIFF DR
COUNTRY CLUB RD
WEST RIDGE DR
SUMMITVIEW WAY
WOODED ACRES DR
FRANKTON RD
W PROSPECT AVE
FORESTVIEW DR
PARSONS RD
HAVEN DR
POST CANYON DR
VISTA DR
WINDSWEPT PL
WASCO LP
HOPE AVE
INDUSTRIAL LP
JAYMAR RD
WASCO ST
LINCOLN ST
MT. ADAMS AVE
CLEARWATER LN
RAND RD
HAZEL AVE
EUGENE ST
MONTELLO CT
30TH ST
MAY ST
NINA LN
ROCKY RD
29TH ST
ORDWAY RD
28TH ST
27TH ST
25TH ST
JUNE ST
21ST ST
CHERRY CT
22ND ST
20TH ST
SHERMAN AVE
EUGENE ST
MONTELLO AVE
PROSPECT AVE
MEYER PKWY
TAYLOR AVE
18TH ST
17TH ST
16TH ST
15TH ST
13TH ST
12TH ST
11TH ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
4TH ST
3RD ST
2ND ST
1ST ST
B ST
C ST
A ST
BELMONT AVE
KATIE'S LN
PARK ST
HULL ST
WILSON ST
UNION ST
CASCADE AVE
COLUMBIA ST
OAK ST
STATE ST
SERPENTINE RD
MOLLIE
PINE ST
PORTWAY AVE
N 8TH ST
N 2ND
N 1ST ST
RIVERSIDE DR
INDUSTRIAL ST
E PORT MARINA DR
DOCK RD
RAILROAD ST
E STATE ST
E EUGENE ST
E HAZEL AVE
HOOD RIVER BRIDGE
RIVERVIEW DR
HIGHLINE RD
BETTY LOU AVE
WOODS CT
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
EBY RD
COLLEGE WAY
STERLING PL
BROOKSIDE DR
BONNEVILLE DR
AVALON DR
RACHEL WY
ST CHARLES PL
HENDERSON RD
FOXLEY RD
BROKEN TEE DR
BELMONT DR
HOLLY DR
LOIS DR
MAKENA LN
FAIRVIEW DR
VALENTINE RD
HOBBS RD
HUTSON RD
ARROWHEAD DR
MULTNOMAH RD
FORDEN DR
WOOD DR
CANNON DR
DEWAL DR

The location with the highest number of collisions was on I-84 eastbound near Exit 63. These crashes were located on I-84 between mile point 62.50 and 63.71. This location also had the only fatality in the Hood River UGB from 2006-2008. The fatality was a rear-end collision were two truck tractors with a trailer/mobile home in tow collided and the passenger died after falling, jumping or being ejected from the moving vehicle in the collision. The driver at fault was driving too fast for the conditions (speeding) and failed to avoid a stopped or parked vehicle ahead.

Corridor Section Crash Rates

Providing segment crash rates allows for a comparison of specific state highway segments to statewide averages of comparable roadways. Crash rates identify the number of crashes per million vehicle-miles traveled for specified sections along state highways. The segment crash rates were obtained from ODOT's *2008 State Highway Crash Rate Tables*. State highway sections analyzed in these tables are categorized by area type and functional classification. For the comparison to statewide averages, I-84 is classified as an interstate freeway in an urban city area, and both US 30 and OR 281 are classified as minor arterials in an urban city area. Predetermined highway sections with assumed area types are provided in the crash rate tables with crash rates calculated for groups of contiguous sections within the same area type. Table3-11 reports section crash rates along state highways in Hood River.

TABLE 3-11: Segment Crash Rates on State Highways (2006-2008)

Section Limits (Milepoints)	Section Description	Crashes per Million Vehicles		
		2008	2007	2006
	Statewide Average Rate (Interstate Freeways)	0.46	0.48	0.48
MP 61.30 – 64.70	I-84: WCL to Mt Hood HY26/ORE 35 – ECL/End UA	0.34	0.34	0.21
	Statewide Average Rate (Minor Arterials)	2.28	2.60	2.60
MP 0.00 – 1.12	OR 281: Jct HY 26/US26 –SCL	2.76	1.56	1.79
MP 48.68 – 51.05	US 30: End Com Align – Hood RVR BR/ECL	2.10	1.13	2.37

Source: 2008 State Highway Crash Rate Tables

Crash rates along I-84 in Hood River are well below the statewide averages. Crash rates on US 30 (HCRH) are also below the statewide averages. On OR 281 the crash rates in 2006 and 2007 were below the state averages, however in 2008 there was an increase in crashes with the resulting crash rate being above the state average. The increased crash rate results from the increase in collisions, which jumped from 11 collisions in 2007 to 19 collisions in 2008. No general trend could be derived for the additional collisions. This segment of state highway should continue to be monitored to see if the crash rate returns to previous levels or if the rate continues to remain above the state average.

Observed Safety Concerns

Through field surveys and discussions with local stakeholders, the following observed safety concerns were identified. These concerns are important and will considered when final recommendations are made.

- At the intersection of 13th Street and Belmont Avenue, the westbound movement has limited sight distance looking north due to the curvature of the roadway and landscaping on the adjacent property.

- At the intersection of 12th Street and Sherman Avenue, the eastbound movement has limited sight distance looking south due to adjacent landscaping and terrain.

- At several intersection in downtown Hood River along State Street and Oak Street, on-street parking can create sight distance problems when making turns off of the side streets.

Downtown Circulation

Issues raised related to downtown motor vehicle circulation have primarily involved truck access to and from the industrial area to the northwest, truck parking and deliveries within the downtown core, and a lack of parking for customers.

Many trucks destined to the industrial area north of Columbia Street currently enter downtown from the I-84 Exit 63 interchange and turn right on Cascade Avenue (HCRH). However, the narrow streets and tight corners downtown can be difficult for large vehicles to navigate. Trucks continue to use this route despite these constraints because of the limited number of route choices in this area.

Trucks have also been observed parking in the roadway while making deliveries to area businesses. This practice can have significant impacts on congestion downtown and may be related to a lack of designated truck loading zones.

The provision of adequate parking in the downtown has also been a concern for area businesses. In response, the City commissioned a downtown parking study, which was completed in 2006. Key findings include:

- The parking system in downtown Hood River is operating at a high level of efficiency, occupancy, and turnover.

- The current parking system will become more constrained, leading to a deficit of 66 to 139 stalls by 2011 if new parking resources are not developed.

- Encouraging employees and visitors to park in off-street surplus areas will mitigate this condition for two to three years.

- The east sector of downtown is more challenging in that on-street occupancies are very high and off-street locations are not readily available.

- Employee parking should be moved from the constrained east sector to other areas downtown.

In response, a recommended set of policies were developed in addition to near-term, medium-term, and long-term actions. These focused on management of off-street parking areas to ensure visitors have access to on-street parking, protection and development of future off-street parking areas, and regulations to ensure future development provides adequate parking or otherwise pays a fee, which could be used to fund construction of an additional parking area.

Truck Freight

Heavy vehicles play an important role in delivering goods within and through the City of Hood River. Designated freight routes encourage efficient movement of vehicles as well as directing truck traffic away from neighborhoods and infrastructure not meant to carry large volumes of heavy vehicles. As noted in Table 3-4, both I-84 and OR 35 are designated as state Freight routes and national truck routes.

While no other routes within the City have been officially designated for freight use, Country Club Road and OR 281 have historically been preferred routes for trucks, many of which are traveling to and from agricultural businesses to the south. However, many of these trucks have recently diverted to Country Club Road due to the enforcement of truck length restrictions that have been placed on OR 281, limiting trucks to 40-foot trailers with a 60-foot overall length. These length restrictions were applied primarily in response to the inability of large trucks to safely pass through a set of sharp curves in the highway between mile points 2.13 and 3.13 (approximately Experiment Station Drive to Barrett Drive) which is located outside of the City UGB. However, even if these curves were realigned to allow for large truck passage, other sharp turns at the intersections of 12th and 13th Street (OR281) and May Street, and Oak Street (HCRH) and 13th Street (OR281) may continue to warrant the restrictions.

The use of Country Club Road by heavy vehicles as an alternative to OR 281 has been problematic at times. Steep grades on Country Club Road can be difficult to navigate for heavy vehicles, especially in the winter when snow and ice are present, despite maintenance efforts by the County. Furthermore, many large vehicles are destined for the Heights or the transfer station, which require travel on OR 281.

Truck traffic is generally higher in the weekday morning and midday hours. As an example, heavy vehicle traffic along Country Club Road has been observed to be as high as 11% of the total traffic during the a.m. peak hour, but drops to approximately 2% during the p.m. peak hour.

The Downtown Circulation section (above), discusses issues with truck circulation through the downtown.

Existing Issues

Based on the existing motor vehicle facilities inventory and operational analysis, the following issues were identified:

- I-84 interchange spacing exceeds ODOT’s access management standards, therefore no additional interchanges should be added along I-84 in Hood River.
- OR 281 is in need of pavement improvements.
- All key findings from the Intersection Operational Analysis need to be addressed.

- The collision rate at Cascade Avenue (HCRH) at Rand Road needs to be monitored and may be improve with signalization of the intersection.

- The OR 281 corridor segment needs to be monitored in the future to see if the crash rate returns to the previous levels or if the rate continues to remain above average.

- Truck routing through the City of Hood River needs to be addressed.

- Truck circulation in downtown Hood River needs to be addressed in regards to congestion caused while loading and unloading, in addition to access to the industrial area north of Columbia Street.

- The need for consistent signing and striping, as well as adequate maintenance, on private roadways within the City of Hood River needs to be addressed.

RAIL FACILITIES

Hood River is provided freight rail service by a Union Pacific Rail Road (UPRR) main line, which follows I-84 though the Columbia River gorge. Typically 20-30 trains a day pass through Hood River on the UP main line. Passenger service along the UPRR mainline in Hood River is not provided. AMTRAK the federally subsidized passenger rail service had a passenger rail station in Hood River until May 10, 1997 when the Pioneer Route was discontinued due to lack of federal funding. However, the train station remains and is currently utilized as administrative offices for the Hood River Rail Road. If federal funding for AMTRAK were to be reinstated, it would be easy to once again supply service to the City of Hood River. However, at this time no plans for reinstating passenger service exist. [11]

The nearest AMTRAK rail service is located in Bingen-White Salmon, Washington, directly north of the City. This station is part of the Empire Builder route which goes east to Spokane and Chicago, or west to Portland or Seattle.

The Mount Hood Railroad is a short line railroad (approximately 21.1 miles) that spurs off of the UPRR mainline in Hood River. The Mount Hood Railroad is mainly used for tourism with active passenger service from April through December.[12] The line also operates year round service when chartered and services 60,000 passengers annually. The rail line runs from Hood River south to Parkdale through the cities of Pine Grove, Odell, and Dee. The line also carries 500 freight loads annually, mainly fruit and forest products.[13] OR 35 crosses the Hood River rail line at two grade-separated locations. The route then moves west and follows OR 281 south. There are two at-grade crossings of OR 281.

[11] Meriwether, Pat. Telephone Interview. 7 June 2010.
[12] Mount Hood Railroad. http://www.mthoodrr.com/, accessed June 2, 2010.
[13] Kaufman, Ron. Telephone Interview. 7 June 2010.

Existing Issues

Based on the existing rail facilities inventory and operational analysis, the following issues were identified:

- Addition of passenger rail service along the Union Pacific Rail Road main line would increase mobility for City residents and provide another option for tourists and recreationists visiting Hood River and Mt. Hood from Portland. Improving the commute between Portland and Hood River could support additional growth of Hood River residents.

AIR FACILITIES

The Ken Jernstedt Airfield is located approximately four miles south of downtown Hood River outside of the UGB. The airport is owned and operated by the Port of Hood River and is classified as a Category 4 airport in the *Oregon Aviation Plan* and is one of Oregon's Core System Airports[14]. Category 4 airports are characterized as a Community General Aviation Airport and accommodate general aviation users and local business activities. These airports typically have 2,500 or more annual operations and more than 10 based aircraft. The Ken Jernstedt Airfield is open to the public and has 91 aircraft based on the field and averages 39 flights a day. [15, 16] In addition, the runway has basic markings and is in good condition.[10]

Per the *Oregon Aviation Plan* as of January 1999, the Ken Jernstedt Airfield meets the minimum acceptable facility standards in the following categories: Primary Runway Length/Width, Runway Pavement Strength, Taxiway Access, Runway Lighting, Aviation Services, Airfield Capacity, Runway Safety Area, Runway Object Free Area, and Parallel Taxiway Separation. However the airfield is recognized as deficient in the following categories: Taxiway Lighting, Visual Guidance Indicator, Instrument Approach, 24-hour Weather, and the Runway Protection Zone. In particular, the Ken Jernstedt Airfield is the third highest priority category 4 airfield to receive instrument approach equipment.

The Ken Jernstedt Airfield has one 3,040-foot paved runway. When approaching from the east it is referred to as Runway 25 and when approaching from the west it is referred to as Runway 7. In May of 2009, the Port of Hood River adopted the *Ken Jernstedt Airfield Airport Master Plan*, which developed a preferred alternative that among other things includes closing Orchard Road near the end of Runway 25 to accommodate a runway shift. The plan calls for shifting runway 7/25 550 feet east to improve obstruction clearance. The plan also called for continuing to work toward upgrading the airport to B-II design standards. Currently, vacation of Orchard Road is awaiting approval before the recommended alterative can move forward.[17] The list of the adopted improvement elements follows.

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[14] *Oregon Aviation Plan*, Oregon Department of Transportation Aeronautics Division, February 2000.
[15] The flight operations averaging 39 flights per day is for a 12-month period ending July 10, 2007.
[16] Information obtained from http://www.airnav.com/airport/4S2 on June 5, 2010
[17] Doke, Mike, Telephone Interview. 6 June 2010.

Planned Airport Improvements

Based on the existing air field facilities inventory, the following issues were identified:

- Runway 7/25 is shifted 550 ft east; existing length maintained
- Orchard Road is closed near the Runway 25 end
- Property acquisition is identified for aviation-related development on the north side of the airport and the southeast corner of the airport to provide adequate runway clear areas; The Port has indicated that property acquisition will be limited to willing sellers only
- The north parallel taxiway is relocated to provide B-II runway separation (240ft)
- North side land improvement within existing airport property and on property to be acquired include: apron expansions, hangar sites, FBO site, and relocated aircraft fuel facilities
- Improvements to the south parallel taxiway will be made based on B-II runway separation with additional connections to the runway provided
- A new internal airport access road is provided beyond the west end of the runway to connect north and south side development and eliminate vehicle crossings near end of Runway 7.

PIPELINE

Hood River is provided with natural gas service via a Northwest Pipeline Corporation transmission pipeline that extends south from Washington and crosses the Columbia River near the I-5 Interstate Bridge.

WATERBORNE TRANSPORTATION

The Port of Hood River has extensive property holdings along the waterfront, in downtown Hood River, and west of Odell. The waterfront property consists of 75 acres along the Columbia River in the northeastern portion of the City of Hood River. This property is used for recreational, industrial, and commercial activities, including serving of barges and other large commercial vessels. It includes an extensive marina park and an industrial park. The Marina Park is the regional center for sailing, boating, and swimming. The industrial park is largely undeveloped, but plans call for building mixed-use development with a public park. Other Port of Hood River holdings include a 21-acre site in downtown Hood River and a 29-acre industrial park immediately west of Odell. The Port has improved both of these sites and its Hood River property is included in the city's urban renewal district. The Port also owns and operates the Hood River/White Salmon Bridge and the Hood River Airport.

The Port's capacity to handle commercial shipping may increase depending on the source of development decided upon in the waterfront planning process currently being done. An increase in passenger travel could be accommodated by the marina. Any new passenger travel is likely to serve tourism since the City of Hood River's tourism economy has increased dramatically and the trend should continue.

Appendix

Traffic Counts - P.M. Peak Hour

Level of Service Descriptions

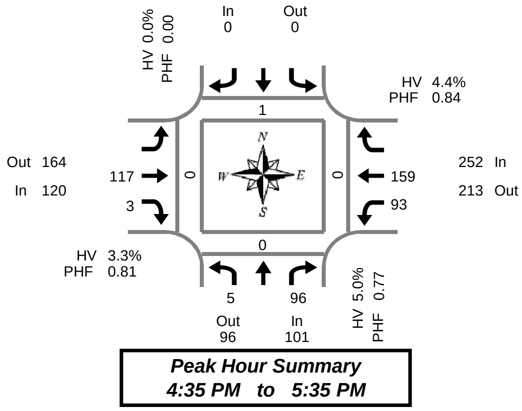
Synchro 7 Reports

Traffic Counts – P.M. Peak Hour

Total Vehicle Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740



Frankton Rd & Country Club Rd

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd L		R	Bikes	Southbound Frankton Rd			Bikes	Eastbound Country Club Rd	T	R	Bikes	Westbound Country Club Rd L	T		Bikes	Interval Total	Pedestrians Crosswalk North	South	East	West
4:00 PM	0		10	0				0		9	1	0	8	9		0	37	0	0	0	0
4:05 PM	0		9	0				0		9	0	0	3	14		0	35	0	0	0	0
4:10 PM	0		7	0				0		10	2	0	14	12		0	45	0	0	0	0
4:15 PM	0		7	0				0		7	0	0	10	11		0	35	0	0	0	0
4:20 PM	0		14	0				0		8	1	0	9	10		0	42	0	0	0	0
4:25 PM	0		8	0				0		10	0	0	5	11		0	34	0	0	0	0
4:30 PM	1		4	0				0		7	0	0	7	7		0	26	0	0	0	0
4:35 PM	0		10	0				0		8	0	0	7	20		0	45	0	0	0	0
4:40 PM	0		15	0				0		10	0	0	6	14		0	45	0	0	0	0
4:45 PM	3		5	0				0		15	0	0	5	14		0	42	1	0	0	0
4:50 PM	0		8	0				0		10	0	0	8	12		0	38	0	0	0	0
4:55 PM	0		8	0				0		11	1	0	12	11		0	43	0	0	0	0
5:00 PM	0		5	0				0		10	0	0	7	8		0	30	0	0	0	0
5:05 PM	0		4	0				0		9	1	0	3	15		0	32	0	0	0	0
5:10 PM	2		5	0				0		12	0	0	11	11		0	41	0	0	0	0
5:15 PM	0		6	0				0		8	1	0	7	10		0	32	0	0	0	0
5:20 PM	0		14	0				0		11	0	0	11	25		0	61	0	0	0	0
5:25 PM	0		6	0				0		6	0	0	9	11		0	32	0	0	0	0
5:30 PM	0		10	0				0		7	0	0	7	8		0	32	0	0	0	0
5:35 PM	0		5	0				0		12	0	0	8	14		0	39	0	0	0	0
5:40 PM	0		7	0				0		8	0	0	5	14		0	34	0	0	0	0
5:45 PM	0		5	0				0		10	0	0	6	13		0	34	0	0	0	0
5:50 PM	0		7	0				0		9	0	0	7	11		0	34	0	0	0	0
5:55 PM	0		13	0				0		6	0	0	5	8		0	32	0	0	0	0
Total Survey	6		192	0				0		222	7	0	180	293		0	900	1	0	0	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd L		R	Bikes	Southbound Frankton Rd			Bikes	Eastbound Country Club Rd	T	R	Bikes	Westbound Country Club Rd L	T		Bikes	Interval Total	Pedestrians Crosswalk North	South	East	West
4:00 PM	0		26	0				0		28	3	0	25	35		0	117	0	0	0	0
4:15 PM	0		29	0				0		25	1	0	24	32		0	111	0	0	0	0
4:30 PM	1		29	0				0		25	0	0	20	41		0	116	0	0	0	0
4:45 PM	3		21	0				0		36	1	0	25	37		0	123	1	0	0	0
5:00 PM	2		14	0				0		31	1	0	21	34		0	103	0	0	0	0
5:15 PM	0		26	0				0		25	1	0	27	46		0	125	0	0	0	0
5:30 PM	0		22	0				0		27	0	0	20	36		0	105	0	0	0	0
5:45 PM	0		25	0				0		25	0	0	18	32		0	100	0	0	0	0
Total Survey	6		192	0				0		222	7	0	180	293		0	900	1	0	0	0

Peak Hour Summary
4:35 PM to 5:35 PM

By Approach	Northbound Frankton Rd In	Out	Total	Bikes	Southbound Frankton Rd In	Out	Total	Bikes	Eastbound Country Club Rd In	Out	Total	Bikes	Westbound Country Club Rd In	Out	Total	Bikes	Total	Pedestrians Crosswalk North	South	East	West
Volume	101	96	197	0	0	0	0	0	120	164	284	0	252	213	465	0	473	1	0	0	0
%HV	5.0%				0.0%				3.3%				4.4%				4.2%				
PHF	0.77				0.00				0.81				0.84				0.88				

By Movement	Northbound Frankton Rd L		R	Total	Southbound Frankton Rd			Total	Eastbound Country Club Rd	T	R	Total	Westbound Country Club Rd L	T		Total	Total
Volume	5		96	101				0		117	3	120	93	159		252	473
%HV	20.0%	NA	4.2%	5.0%	NA	NA	NA	0.0%	NA	3.4%	0.0%	3.3%	0.0%	6.9%	NA	4.4%	4.2%
PHF	0.42		0.80	0.77				0.00		0.81	0.38	0.81	0.80	0.83		0.84	0.88

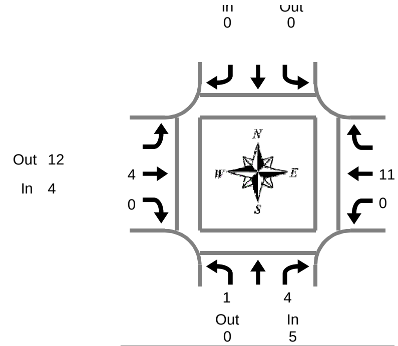
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd L		R	Bikes	Southbound Frankton Rd			Bikes	Eastbound Country Club Rd	T	R	Bikes	Westbound Country Club Rd L	T		Bikes	Interval Total	Pedestrians Crosswalk North	South	East	West
4:00 PM	4		105	0				0		114	5	0	94	145		0	467	1	0	0	0
4:15 PM	6		93	0				0		117	3	0	90	144		0	453	1	0	0	0
4:30 PM	6		90	0				0		117	3	0	93	158		0	467	1	0	0	0
4:45 PM	5		83	0				0		119	3	0	93	153		0	456	1	0	0	0
5:00 PM	2		87	0				0		108	2	0	86	148		0	433	0	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:35 PM to 5:35 PM

Frankton Rd & Country Club Rd

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound Country Club Rd				Westbound Country Club Rd				Interval
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
4:00 PM	0		0	0				0		0	0	0	0	1		1	1
4:05 PM	0		1	1				0		0	0	0	0	0		0	1
4:10 PM	0		0	0				0		0	0	0	0	0		0	0
4:15 PM	0		0	0				0		2	0	2	1	0		1	3
4:20 PM	0		1	1				0		1	0	1	0	1		1	3
4:25 PM	0		0	0				0		0	0	0	0	0		0	0
4:30 PM	0		0	0				0		2	0	2	1	0		1	3
4:35 PM	0		0	0				0		1	0	1	0	1		1	2
4:40 PM	0		1	1				0		0	0	0	0	3		3	4
4:45 PM	1		0	1				0		0	0	0	0	1		1	2
4:50 PM	0		0	0				0		0	0	0	0	1		1	1
4:55 PM	0		0	0				0		0	0	0	0	0		0	0
5:00 PM	0		0	0				0		0	0	0	0	0		0	0
5:05 PM	0		0	0				0		2	0	2	0	0		0	2
5:10 PM	0		0	0				0		1	0	1	0	3		3	4
5:15 PM	0		1	1				0		0	0	0	0	1		1	2
5:20 PM	0		2	2				0		0	0	0	0	1		1	3
5:25 PM	0		0	0				0		0	0	0	0	0		0	0
5:30 PM	0		0	0				0		0	0	0	0	0		0	0
5:35 PM	0		0	0				0		0	0	0	0	0		0	0
5:40 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		0	0	0	0	1		1	1
5:50 PM	0		0	0				0		1	0	1	1	0		1	2
5:55 PM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	1		6	7				0		10	0	10	3	14		17	34

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound Country Club Rd				Westbound Country Club Rd				Interval
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
4:00 PM	0		1	1				0		0	0	0	0	1		1	2
4:15 PM	0		1	1				0		3	0	3	1	1		2	6
4:30 PM	0		1	1				0		3	0	3	1	4		5	9
4:45 PM	1		0	1				0		0	0	0	0	2		2	3
5:00 PM	0		0	0				0		3	0	3	0	3		3	6
5:15 PM	0		3	3				0		0	0	0	0	2		2	5
5:30 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		1	0	1	1	1		2	3
Total Survey	1		6	7				0		10	0	10	3	14		17	34

Heavy Vehicle Peak Hour Summary
4:35 PM to 5:35 PM

By Approach	Northbound Frankton Rd			Southbound Frankton Rd			Eastbound Country Club Rd			Westbound Country Club Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	5	0	5	0	0	0	4	12	16	11	8	19	20
PHF	0.42			0.00			0.33			0.55			0.56

By Movement	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound Country Club Rd				Westbound Country Club Rd				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	1		4	5				0		4	0	4	0	11		11	20
PHF	0.25		0.33	0.42				0.00		0.33	0.00	0.33	0.00	0.55		0.55	0.56

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

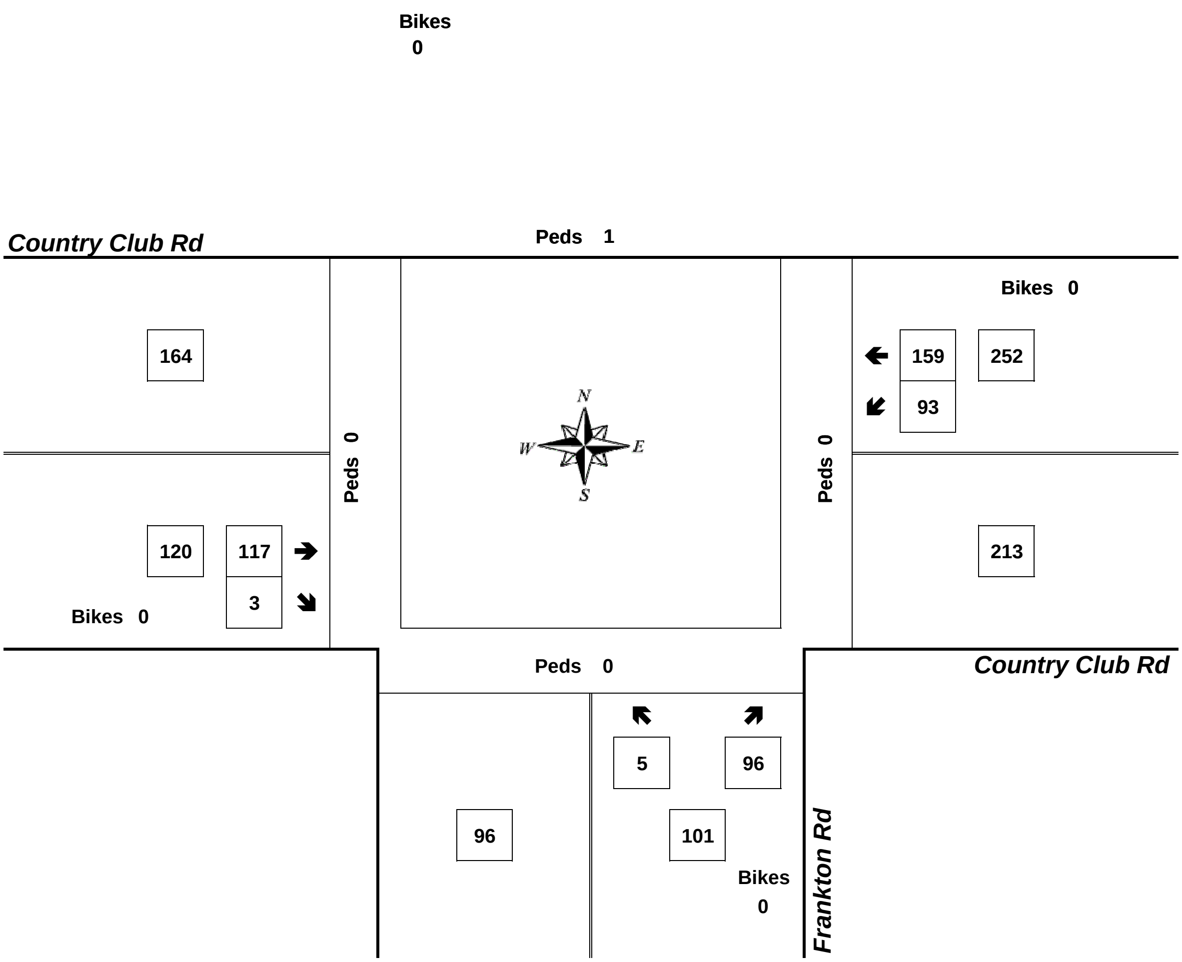
Interval Start	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound Country Club Rd				Westbound Country Club Rd				Interval
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
4:00 PM	1		3	4				0		6	0	6	2	8		10	20
4:15 PM	1		2	3				0		9	0	9	2	10		12	24
4:30 PM	1		4	5				0		6	0	6	1	11		12	23
4:45 PM	1		3	4				0		3	0	3	0	7		7	14
5:00 PM	0		3	3				0		4	0	4	1	6		7	14

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Frankton Rd & Country Club Rd

4:35 PM to 5:35 PM
Tuesday, May 18, 2010

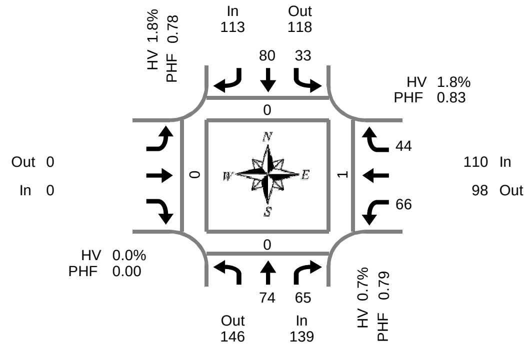


Approach	PHF	HV%	Volume
EB	0.81	3.3%	120
WB	0.84	4.4%	252
NB	0.77	5.0%	101
SB	0.00	0.0%	0
Intersection	0.88	4.2%	473

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:05 PM to 5:05 PM

Frankton Rd & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		8	3	0	2	5		0				0	4		2	0	24	0	0	0	0
4:05 PM		7	5	0	4	4		0				0	4		3	0	27	0	0	0	0
4:10 PM		5	5	0	4	6		0				0	5		6	0	31	0	0	0	0
4:15 PM		5	3	0	3	15		0				0	5		4	0	35	0	0	0	0
4:20 PM		9	7	0	0	7		0				0	2		4	0	29	0	0	0	0
4:25 PM		2	2	0	3	5		0				0	8		5	0	25	0	0	0	0
4:30 PM		6	3	0	2	3		0				0	6		4	0	24	0	0	0	0
4:35 PM		9	7	0	2	7		0				0	6		0	0	31	0	0	0	0
4:40 PM		10	8	0	1	5		0				0	6		6	0	36	0	0	0	0
4:45 PM		6	4	0	3	4		0				0	8		1	0	26	0	0	1	0
4:50 PM		6	2	0	3	8		0				0	7		5	0	31	0	0	0	0
4:55 PM		5	12	0	4	3		0				0	6		1	0	31	0	0	0	0
5:00 PM		4	7	0	4	13		0				0	3		5	0	36	0	0	0	0
5:05 PM		3	4	0	0	2		0				0	3		2	0	14	0	0	0	0
5:10 PM		3	4	0	3	8		0				0	4		4	0	26	0	0	0	0
5:15 PM		4	4	0	3	6		0				0	3		4	0	24	0	0	0	0
5:20 PM		3	1	0	4	8		0				0	8		6	0	30	0	0	0	0
5:25 PM		12	7	0	3	6		0				0	5		4	0	37	0	0	0	0
5:30 PM		7	8	0	1	6		0				0	11		1	0	34	0	0	0	0
5:35 PM		5	6	0	3	3		0				0	3		3	0	23	0	0	0	0
5:40 PM		4	7	0	1	6		0				0	8		4	0	30	0	0	0	0
5:45 PM		6	8	0	2	3		0				0	7		2	0	28	0	0	0	0
5:50 PM		5	4	0	3	3		0				0	11		2	0	28	0	0	0	0
5:55 PM		5	8	0	2	6		0				0	5		2	0	28	0	0	0	0
Total Survey		139	129	0	60	142		0				0	138		80	0	688	0	0	1	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		20	13	0	10	15		0				0	13		11	0	82	0	0	0	0
4:15 PM		16	12	0	6	27		0				0	15		13	0	89	0	0	0	0
4:30 PM		25	18	0	5	15		0				0	18		10	0	91	0	0	0	0
4:45 PM		17	18	0	10	15		0				0	21		7	0	88	0	0	1	0
5:00 PM		10	15	0	7	23		0				0	10		11	0	76	0	0	0	0
5:15 PM		19	12	0	10	20		0				0	16		14	0	91	0	0	0	0
5:30 PM		16	21	0	5	15		0				0	22		8	0	87	0	0	0	0
5:45 PM		16	20	0	7	12		0				0	23		6	0	84	0	0	0	0
Total Survey		139	129	0	60	142		0				0	138		80	0	688	0	0	1	0

Peak Hour Summary
4:05 PM to 5:05 PM

By Approach	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	139	146	285	0	113	118	231	0	0	0	0	0	110	98	208	0	362	0	0	1	0
%HV	0.7%				1.8%				0.0%				1.8%				1.4%				
PHF	0.79				0.78				0.00				0.83				0.92				

By Movement	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		74	65	139	33	80		113				0	66		44	110	362
%HV	NA	1.4%	0.0%	0.7%	0.0%	2.5%	NA	1.8%	NA	NA	NA	0.0%	1.5%	NA	2.3%	1.8%	1.4%
PHF		0.74	0.77	0.79	0.75	0.71		0.78				0.00	0.79		0.79	0.83	0.92

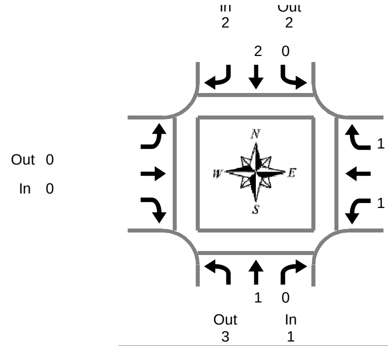
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		78	61	0	31	72		0				0	67		41	0	350	0	0	1	0
4:15 PM		68	63	0	28	80		0				0	64		41	0	344	0	0	1	0
4:30 PM		71	63	0	32	73		0				0	65		42	0	346	0	0	1	0
4:45 PM		62	66	0	32	73		0				0	69		40	0	342	0	0	1	0
5:00 PM		61	68	0	29	70		0				0	71		39	0	338	0	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Frankton Rd & May Ave

Tuesday, May 18, 2010

4:00 PM to 6:00 PM

Peak Hour Summary
4:05 PM to 5:05 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		1	0	1	0	0		0				0	0		0	0	1
4:05 PM		0	0	0	0	0		0				0	0		0	0	0
4:10 PM		0	0	0	0	0		0				0	0		0	0	0
4:15 PM		0	0	0	0	1		1				0	0		1	1	2
4:20 PM		0	0	0	0	0		0				0	0		0	0	0
4:25 PM		0	0	0	0	1		1				0	0		0	0	1
4:30 PM		0	0	0	0	0		0				0	1		0	1	1
4:35 PM		1	0	1	0	0		0				0	0		0	0	1
4:40 PM		0	0	0	0	0		0				0	0		0	0	0
4:45 PM		0	0	0	0	0		0				0	0		0	0	0
4:50 PM		0	0	0	0	0		0				0	0		0	0	0
4:55 PM		0	0	0	0	0		0				0	0		0	0	0
5:00 PM		0	0	0	0	0		0				0	0		0	0	0
5:05 PM		0	0	0	0	1		1				0	0		0	0	1
5:10 PM		0	0	0	0	0		0				0	0		0	0	0
5:15 PM		0	0	0	0	0		0				0	0		0	0	0
5:20 PM		0	0	0	0	0		0				0	0		0	0	0
5:25 PM		0	1	1	0	0		0				0	0		0	0	1
5:30 PM		0	0	0	0	0		0				0	0		0	0	0
5:35 PM		1	0	1	0	0		0				0	0		0	0	1
5:40 PM		0	0	0	0	0		0				0	0		0	0	0
5:45 PM		0	0	0	0	0		0				0	0		0	0	0
5:50 PM		0	0	0	0	0		0				0	0		0	0	0
5:55 PM		0	0	0	0	1		1				0	0		0	0	1
Total Survey		3	1	4	0	4		4				0	1		1	2	10

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		1	0	1	0	0		0				0	0		0	0	1
4:15 PM		0	0	0	0	2		2				0	0		1	1	3
4:30 PM		1	0	1	0	0		0				0	1		0	1	2
4:45 PM		0	0	0	0	0		0				0	0		0	0	0
5:00 PM		0	0	0	0	1		1				0	0		0	0	1
5:15 PM		0	1	1	0	0		0				0	0		0	0	1
5:30 PM		1	0	1	0	0		0				0	0		0	0	1
5:45 PM		0	0	0	0	1		1				0	0		0	0	1
Total Survey		3	1	4	0	4		4				0	1		1	2	10

Heavy Vehicle Peak Hour Summary
4:05 PM to 5:05 PM

By Approach	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Total
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	1	3	4		2	2	4		0	0	0		2	0	2		5
PHF	0.25				0.25				0.00				0.50				0.42

By Movement	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		1	0	1	0	2		2				0	1		1	2	5
PHF		0.25	0.00	0.25	0.00	0.25		0.25				0.00	0.25		0.25	0.50	0.42

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

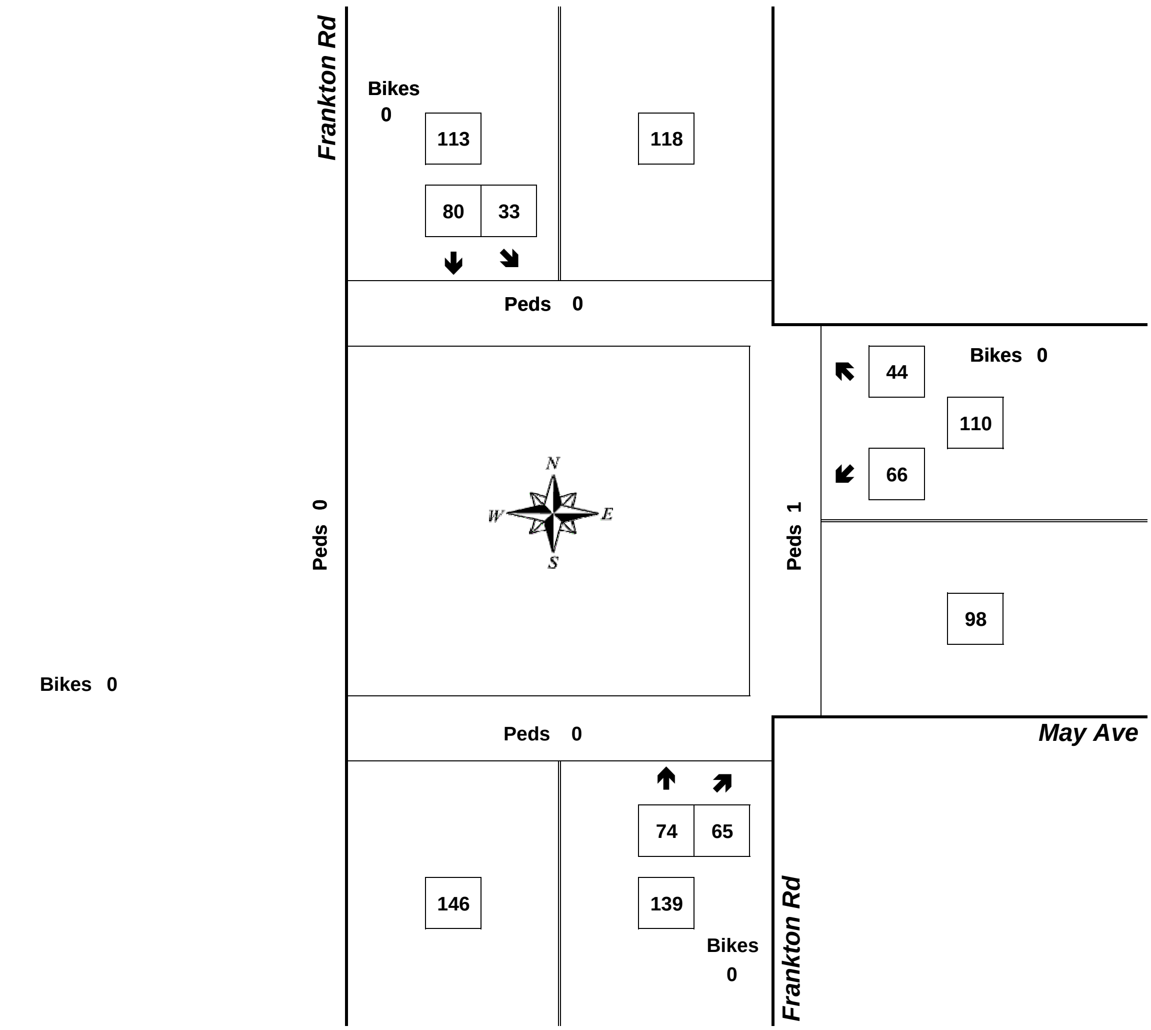
Interval Start Time	Northbound Frankton Rd				Southbound Frankton Rd				Eastbound May Ave				Westbound May Ave				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		2	0	2	0	2		2				0	1		1	2	6
4:15 PM		1	0	1	0	3		3				0	1		1	2	6
4:30 PM		1	1	2	0	1		1				0	1		0	1	4
4:45 PM		1	1	2	0	1		1				0	0		0	0	3
5:00 PM		1	1	2	0	2		2				0	0		0	0	4

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Frankton Rd & May Ave

4:05 PM to 5:05 PM
Tuesday, May 18, 2010

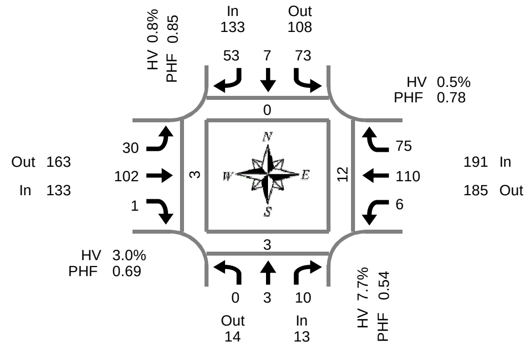


Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.83	1.8%	110
NB	0.79	0.7%	139
SB	0.78	1.8%	113
Intersection	0.92	1.4%	362

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

Rand Rd & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	0	10	0	1	0	4	5	0	0	3	9	9	0	41	0	0	1	0
4:05 PM	0	0	0	0	4	0	6	0	1	5	1	0	0	7	10	0	34	1	1	0	1
4:10 PM	0	0	1	0	11	0	3	0	1	7	0	0	1	6	6	0	36	0	1	2	0
4:15 PM	1	2	0	0	5	2	2	0	4	9	0	0	0	15	7	0	47	0	0	2	0
4:20 PM	0	1	1	0	11	0	6	0	2	6	0	0	0	9	5	0	41	0	1	2	0
4:25 PM	0	0	0	0	6	0	2	0	0	6	0	1	0	8	3	0	25	0	0	3	0
4:30 PM	0	1	0	0	5	0	6	0	1	4	1	1	0	7	6	1	31	0	0	2	0
4:35 PM	0	0	1	0	7	1	2	0	6	7	0	0	2	11	5	0	42	0	0	1	0
4:40 PM	0	0	0	0	5	0	5	0	4	10	0	0	0	9	6	0	39	0	0	1	0
4:45 PM	0	0	1	0	6	0	5	0	1	6	0	0	1	7	11	0	38	0	0	3	0
4:50 PM	0	0	1	0	9	1	6	0	1	7	0	0	0	9	8	0	42	0	0	0	0
4:55 PM	0	0	1	0	3	0	4	0	1	15	0	0	0	5	7	0	36	0	0	2	0
5:00 PM	0	1	2	0	5	0	6	0	6	18	0	0	1	7	2	0	48	0	0	1	1
5:05 PM	0	0	1	0	5	1	3	0	1	6	0	1	1	7	5	0	30	0	0	0	0
5:10 PM	0	0	2	0	13	1	5	0	0	3	0	0	0	9	4	1	37	0	2	1	1
5:15 PM	0	1	0	0	3	1	5	0	5	7	0	0	0	14	6	0	42	0	1	0	1
5:20 PM	0	0	0	0	4	1	3	0	3	11	0	1	0	15	8	0	45	0	0	1	0
5:25 PM	0	0	1	1	8	1	3	0	1	8	0	0	1	10	7	0	40	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:40 PM	0	1	1	0	8	0	3	0	2	11	0	0	1	16	7	0	50	1	0	1	0
5:45 PM	1	0	2	0	8	0	4	0	4	6	0	0	1	7	4	0	37	0	0	0	1
5:50 PM	0	0	1	0	9	1	5	0	4	8	0	0	0	11	3	0	42	0	0	1	0
5:55 PM	0	0	0	0	8	0	5	0	2	8	0	0	0	10	11	0	44	0	0	5	1
Total Survey	2	7	16	1	153	10	90	0	54	173	2	4	12	208	140	2	867	2	6	29	6

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	1	0	25	0	10	0	6	17	1	0	4	22	25	0	111	1	2	3	1
4:15 PM	1	3	1	0	22	2	10	0	6	21	0	1	0	32	15	0	113	0	1	7	0
4:30 PM	0	1	1	0	17	1	13	0	11	21	1	1	2	27	17	1	112	0	0	4	0
4:45 PM	0	0	3	0	18	1	15	0	3	28	0	0	1	21	26	0	116	0	0	5	0
5:00 PM	0	1	5	0	23	2	14	0	7	27	0	1	2	23	11	1	115	0	2	2	2
5:15 PM	0	1	1	1	15	3	11	0	9	26	0	1	1	39	21	0	127	0	1	1	1
5:30 PM	0	1	1	0	8	0	3	0	2	11	0	0	1	16	7	0	50	1	0	1	0
5:45 PM	1	0	3	0	25	1	14	0	10	22	0	0	1	28	18	0	123	0	0	6	2
Total Survey	2	7	16	1	153	10	90	0	54	173	2	4	12	208	140	2	867	2	6	29	6

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	13	14	27	1	133	108	241	0	133	163	296	3	191	185	376	2	470	0	3	12	3
%HV	7.7%				0.8%				3.0%				0.5%				1.5%				
PHF	0.54				0.85				0.69				0.78				0.93				

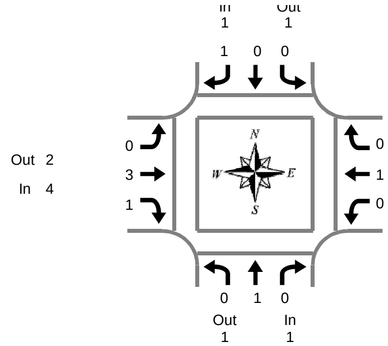
By Movement	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	3	10	13	73	7	53	133	30	102	1	133	6	110	75	191	470
%HV	0.0%	33.3%	0.0%	7.7%	0.0%	0.0%	1.9%	0.8%	0.0%	2.9%	#####	3.0%	0.0%	0.9%	0.0%	0.5%	1.5%
PHF	0.00	0.75	0.50	0.54	0.79	0.58	0.83	0.85	0.68	0.64	0.25	0.69	0.50	0.71	0.72	0.78	0.93

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	1	4	6	0	82	4	48	0	26	87	2	2	7	102	83	1	452	1	3	19	1
4:15 PM	1	5	10	0	80	6	52	0	27	97	1	3	5	103	69	2	456	0	3	18	2
4:30 PM	0	3	10	1	73	7	53	0	30	102	1	3	6	110	75	2	470	0	3	12	3
4:45 PM	0	3	10	1	64	6	43	0	21	92	0	2	5	99	65	1	408	1	3	9	3
5:00 PM	1	3	10	1	71	6	42	0	28	86	0	2	5	106	57	1	415	1	3	10	5

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

Rand Rd & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:05 PM	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2
4:10 PM	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:20 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	1	0	1	0	0	0	0	0	0	1	1	0	1	0	1	3
4:35 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
4:40 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:05 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	1	1	2	2	0	3	5	0	3	1	4	1	1	0	2	13

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
4:00 PM	0	0	1	1	1	0	2	3	0	0	0	0	1	0	0	1	5
4:15 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
4:30 PM	0	1	0	1	0	0	1	1	0	1	1	2	0	1	0	1	5
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	1	1	2	2	0	3	5	0	3	1	4	1	1	0	2	13

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound Rand Rd			Southbound Rand Rd			Eastbound May Ave			Westbound May Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	1	1	2	1	1	2	4	2	6	1	3	4	7
PHF	0.25			0.25			0.50			0.25			0.35

By Movement	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	1	0	1	0	0	1	1	0	3	1	4	0	1	0	1	7
PHF	0.00	0.25	0.00	0.25	0.00	0.00	0.25	0.25	0.00	0.38	0.25	0.50	0.00	0.25	0.00	0.25	0.35

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

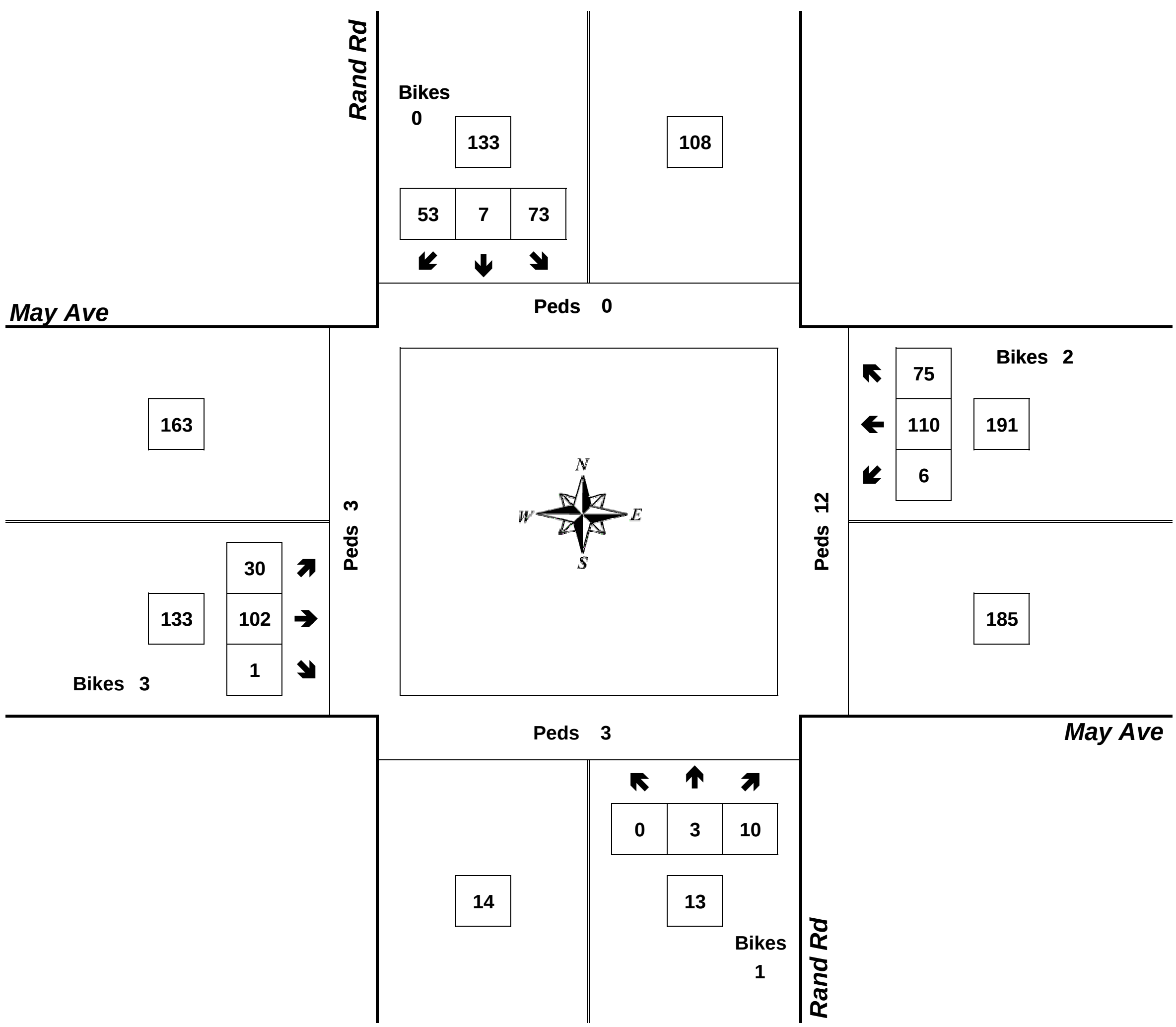
Interval Start	Northbound Rand Rd				Southbound Rand Rd				Eastbound May Ave				Westbound May Ave				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
4:00 PM	0	1	1	2	2	0	3	5	0	1	1	2	1	1	0	2	11
4:15 PM	0	1	0	1	1	0	1	2	0	3	1	4	0	1	0	1	8
4:30 PM	0	1	0	1	0	0	1	1	0	3	1	4	0	1	0	1	7
4:45 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Rand Rd & May Ave

4:30 PM to 5:30 PM
Tuesday, May 18, 2010



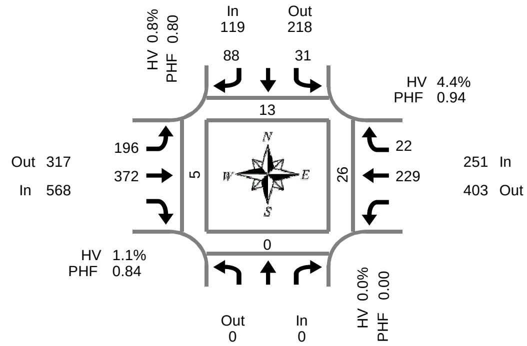
Approach	PHF	HV%	Volume
EB	0.69	3.0%	133
WB	0.78	0.5%	191
NB	0.54	7.7%	13
SB	0.85	0.8%	133
Intersection	0.93	1.5%	470

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:20 PM to 5:20 PM

2nd St & State St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Interval Total	Pedestrians Crosswalk			
				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes		North	South	East	West
4:00 PM				0	4		9	0	19	24		0		21	5	0	82	1	0	2	2
4:05 PM				0	1		5	0	13	21		0		14	1	0	55	1	0	2	0
4:10 PM				0	0		3	0	21	19		0		17	1	0	61	1	0	3	0
4:15 PM				0	2		6	0	14	21		0		11	3	0	57	2	0	0	1
4:20 PM				0	2		11	0	11	29		0		20	2	0	75	2	0	1	2
4:25 PM				0	1		7	0	16	34		0		22	4	0	84	0	0	1	0
4:30 PM				0	1		2	0	8	25		0		18	0	0	54	2	0	0	0
4:35 PM				0	0		7	0	15	30		0		21	2	0	75	1	0	4	0
4:40 PM				0	0		8	0	23	32		0		18	2	0	83	0	0	0	1
4:45 PM				0	4		9	0	23	25		0		21	1	0	83	1	0	0	1
4:50 PM				0	3		6	0	17	25		0		14	1	0	66	1	0	0	1
4:55 PM				0	2		11	0	8	29		0		19	3	0	72	0	0	2	0
5:00 PM				0	5		10	0	14	34		0		21	3	0	87	2	0	2	0
5:05 PM				0	4		4	0	24	47		0		17	1	0	97	2	0	5	0
5:10 PM				0	7		6	0	17	28		0		22	1	0	81	1	0	5	0
5:15 PM				0	2		7	0	20	34		0		16	2	0	81	1	0	6	0
5:20 PM				0	5		5	0	15	29		0		16	2	0	72	0	0	3	0
5:25 PM				0	1		6	0	18	28		0		8	7	0	68	5	0	1	1
5:30 PM				0	3		10	0	15	20		0		9	1	0	58	8	0	0	0
5:35 PM				0	2		3	0	12	18		0		13	1	0	49	2	0	4	1
5:40 PM				0	5		5	0	14	26		0		17	3	0	70	1	0	0	0
5:45 PM				0	0		14	0	19	24		0		10	0	0	67	3	0	1	1
5:50 PM				0	1		13	0	14	22		0		12	1	0	63	2	0	0	0
5:55 PM				0	2		9	0	16	17		0		11	1	0	56	3	0	1	0
Total Survey				0	57		176	0	386	641		0		388	48	0	1,696	42	0	43	11

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Interval Total	Pedestrians Crosswalk			
				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes		North	South	East	West
4:00 PM				0	5		17	0	53	64		0		52	7	0	198	3	0	7	2
4:15 PM				0	5		24	0	41	84		0		53	9	0	216	4	0	2	3
4:30 PM				0	1		17	0	46	87		0		57	4	0	212	3	0	4	1
4:45 PM				0	9		26	0	48	79		0		54	5	0	221	2	0	2	2
5:00 PM				0	16		20	0	55	109		0		60	5	0	265	5	0	12	0
5:15 PM				0	8		18	0	53	91		0		40	11	0	221	6	0	10	1
5:30 PM				0	10		18	0	41	64		0		39	5	0	177	11	0	4	1
5:45 PM				0	3		36	0	49	63		0		33	2	0	186	8	0	2	1
Total Survey				0	57		176	0	386	641		0		388	48	0	1,696	42	0	43	11

Peak Hour Summary
4:20 PM to 5:20 PM

By Approach	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	0	0	0	0	119	218	337	0	568	317	885	0	251	403	654	0	938	13	0	26	5
%HV	0.0%				0.8%				1.1%				4.4%				1.9%				
PHF	0.00				0.80				0.84				0.94				0.88				

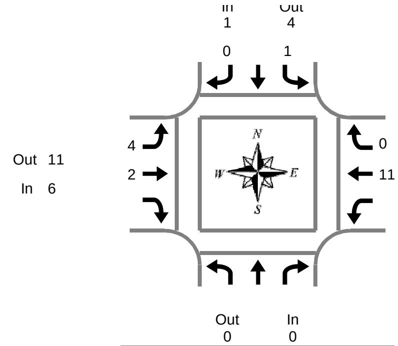
By Movement	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Total
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	31		88	119	196	372		568		229	22	251	938
%HV	NA	NA	NA	0.0%	3.2%	NA	0.0%	0.8%	2.0%	0.5%	NA	1.1%	NA	4.8%	0.0%	4.4%	1.9%
PHF				0.00	0.48		0.81	0.80	0.78	0.85		0.84		0.94	0.79	0.94	0.88

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Interval Total	Pedestrians Crosswalk			
				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes		North	South	East	West
4:00 PM				0	20		84	0	188	314		0		216	25	0	847	12	0	15	8
4:15 PM				0	31		87	0	190	359		0		224	23	0	914	14	0	20	6
4:30 PM				0	34		81	0	202	366		0		211	25	0	919	16	0	28	4
4:45 PM				0	43		82	0	197	343		0		193	26	0	884	24	0	28	4
5:00 PM				0	37		92	0	198	327		0		172	23	0	849	30	0	28	3

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:20 PM to 5:20 PM

2nd St & State St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Interval Total
				Total	L		R	Total	L	T		Total		T	R	Total	
4:00 PM				0	0		0	0	0	0		0		1	0	1	1
4:05 PM				0	0		0	0	0	0		0		0	0	0	0
4:10 PM				0	0		1	1	0	1		1		0	0	0	2
4:15 PM				0	0		0	0	0	1		1		1	0	1	2
4:20 PM				0	0		0	0	1	0		1		0	0	0	1
4:25 PM				0	0		0	0	0	0		0		1	0	1	1
4:30 PM				0	0		0	0	0	0		0		2	0	2	2
4:35 PM				0	0		0	0	1	2		3		2	0	2	5
4:40 PM				0	0		0	0	0	0		0		2	0	2	2
4:45 PM				0	0		0	0	2	0		2		2	0	2	4
4:50 PM				0	1		0	1	0	0		0		1	0	1	2
4:55 PM				0	0		0	0	0	0		0		0	0	0	0
5:00 PM				0	0		0	0	0	0		0		0	0	0	0
5:05 PM				0	0		0	0	0	0		0		0	0	0	0
5:10 PM				0	0		0	0	0	0		0		1	0	1	1
5:15 PM				0	0		0	0	0	0		0		0	0	0	0
5:20 PM				0	0		0	0	0	0		0		0	0	0	0
5:25 PM				0	0		0	0	0	0		0		0	1	1	1
5:30 PM				0	0		0	0	0	0		0		0	0	0	0
5:35 PM				0	0		0	0	1	0		1		0	0	0	1
5:40 PM				0	0		0	0	1	0		1		0	0	0	1
5:45 PM				0	0		0	0	1	0		1		0	0	0	1
5:50 PM				0	0		1	1	0	0		0		0	0	0	1
5:55 PM				0	0		0	0	0	2		2		0	0	0	2
Total Survey				0	1		2	3	7	6		13		13	1	14	30

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Interval Total
				Total	L		R	Total	L	T		Total		T	R	Total	
4:00 PM				0	0		1	1	0	1		1		1	0	1	3
4:15 PM				0	0		0	0	1	1		2		2	0	2	4
4:30 PM				0	0		0	0	1	2		3		6	0	6	9
4:45 PM				0	1		0	1	2	0		2		3	0	3	6
5:00 PM				0	0		0	0	0	0		0		1	0	1	1
5:15 PM				0	0		0	0	0	0		0		0	1	1	1
5:30 PM				0	0		0	0	2	0		2		0	0	0	2
5:45 PM				0	0		1	1	1	2		3		0	0	0	4
Total Survey				0	1		2	3	7	6		13		13	1	14	30

Heavy Vehicle Peak Hour Summary
4:20 PM to 5:20 PM

By Approach	Northbound 2nd St			Southbound 2nd St			Eastbound State St			Westbound State St			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	0	0	1	4	5	6	11	17	11	3	14	18
PHF	0.00			0.25			0.30			0.46			0.41

By Movement	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Total
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	1		0	1	4	2		6		11	0	11	18
PHF				0.00	0.25		0.00	0.25	0.33	0.25		0.30		0.46	0.00	0.46	0.41

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

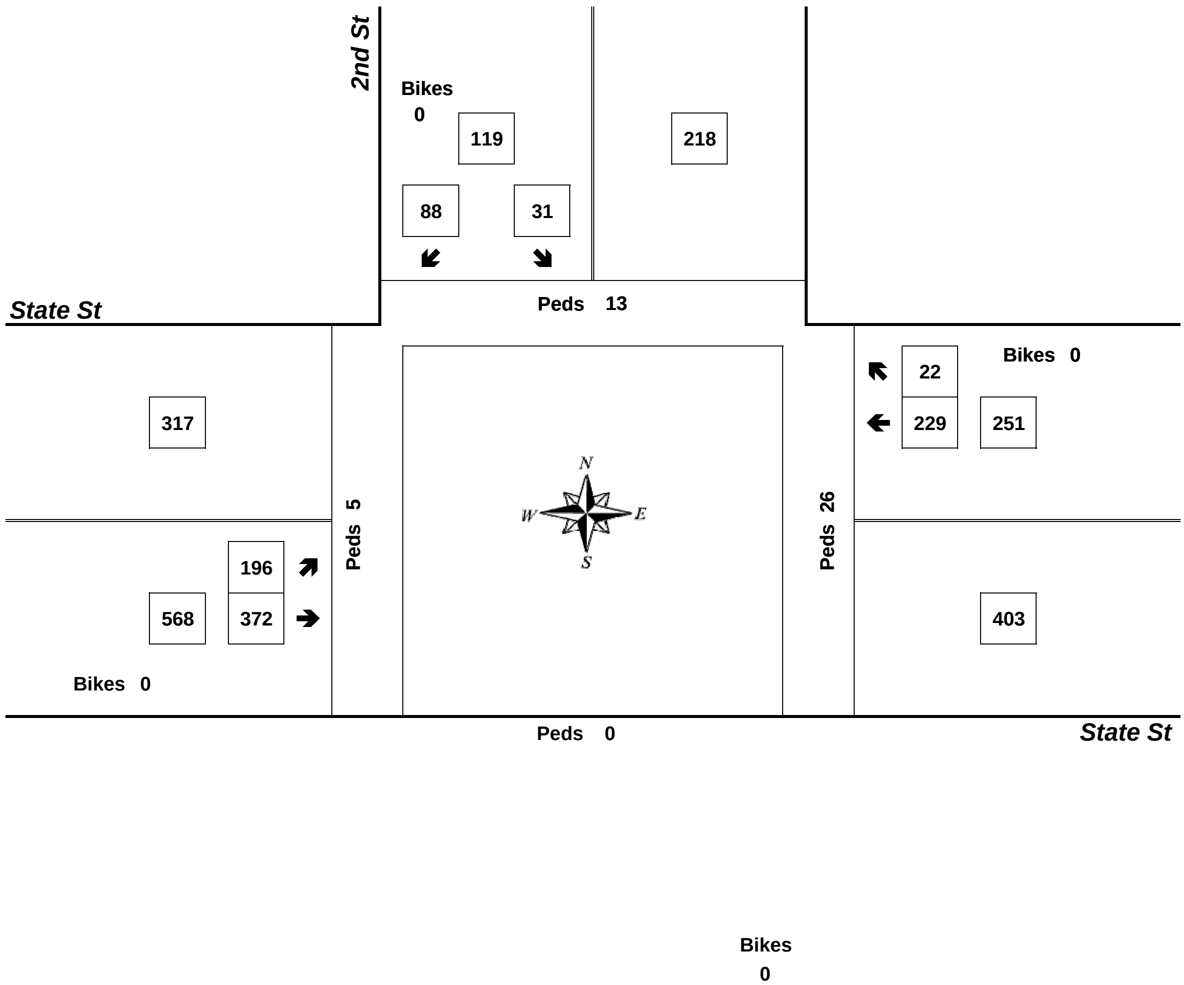
Interval Start Time	Northbound 2nd St				Southbound 2nd St				Eastbound State St				Westbound State St				Interval Total
				Total	L		R	Total	L	T		Total		T	R	Total	
4:00 PM				0	1		1	2	4	4		8		12	0	12	22
4:15 PM				0	1		0	1	4	3		7		12	0	12	20
4:30 PM				0	1		0	1	3	2		5		10	1	11	17
4:45 PM				0	1		0	1	4	0		4		4	1	5	10
5:00 PM				0	0		1	1	3	2		5		1	1	2	8

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

2nd St & State St

4:20 PM to 5:20 PM
Tuesday, May 18, 2010

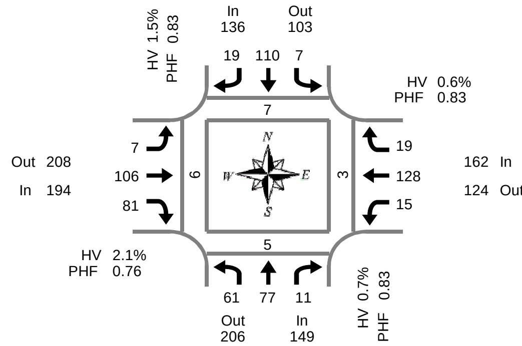


Approach	PHF	HV%	Volume
EB	0.84	1.1%	568
WB	0.94	4.4%	251
NB	0.00	0.0%	0
SB	0.80	0.8%	119
Intersection	0.88	1.9%	938

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



22nd St & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Peak Hour Summary
4:30 PM to 5:30 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	8	7	1	0	1	4	1	0	2	8	9	0	1	12	4	0	58	0	1	0	0
4:05 PM	5	9	0	0	1	9	1	0	0	5	3	0	0	12	4	0	49	2	0	1	0
4:10 PM	3	6	0	0	2	7	2	0	0	7	9	1	3	11	0	1	50	1	0	0	1
4:15 PM	2	4	1	0	2	8	1	0	0	7	2	0	2	10	0	0	39	0	3	0	0
4:20 PM	5	7	0	0	0	3	2	0	1	11	11	0	1	11	1	0	53	0	0	0	1
4:25 PM	1	4	1	0	0	7	2	0	0	7	5	0	2	8	0	0	37	0	0	0	0
4:30 PM	5	3	3	0	0	14	0	0	1	4	7	0	2	11	2	0	52	0	0	2	0
4:35 PM	6	9	1	0	1	8	3	0	0	7	8	0	0	7	1	0	51	0	1	0	0
4:40 PM	10	7	1	0	1	8	2	0	1	11	3	0	3	14	0	0	61	1	0	0	1
4:45 PM	3	7	1	0	0	5	3	0	1	6	6	0	1	10	1	0	44	0	0	0	0
4:50 PM	5	9	1	0	0	8	0	0	2	10	3	0	4	10	0	0	52	1	0	0	0
4:55 PM	3	7	0	0	0	5	1	0	1	11	9	0	1	10	0	0	48	2	1	1	0
5:00 PM	1	6	0	0	2	11	0	0	0	16	10	0	2	10	4	0	62	0	0	0	2
5:05 PM	5	2	0	0	0	10	2	0	0	10	7	0	0	8	3	0	47	0	1	0	0
5:10 PM	4	4	2	0	2	9	0	0	1	8	9	0	0	12	3	0	54	1	0	0	1
5:15 PM	4	7	0	0	1	7	2	0	0	8	5	0	0	14	2	2	50	0	2	0	2
5:20 PM	8	8	2	0	0	15	2	0	0	8	6	0	1	15	2	0	67	1	0	0	0
5:25 PM	7	8	0	0	0	10	4	0	0	7	8	1	1	7	1	0	53	1	0	0	0
5:30 PM	10	5	0	0	0	2	1	0	1	13	5	0	1	11	2	0	51	1	0	0	1
5:35 PM	3	6	1	0	0	5	1	0	0	9	6	0	0	7	3	0	41	0	0	0	1
5:40 PM	5	8	1	0	0	5	1	0	0	6	4	1	0	15	3	0	48	2	1	0	0
5:45 PM	8	4	0	0	0	9	2	0	0	12	7	0	2	11	0	0	55	2	0	2	1
5:50 PM	3	3	1	0	1	2	1	0	1	8	4	0	1	11	2	0	38	1	0	0	0
5:55 PM	5	14	1	0	0	3	1	0	1	5	8	0	0	4	2	0	44	2	0	0	0
Total Survey	119	154	18	0	14	174	35	0	13	204	154	3	28	251	40	3	1,204	18	10	6	11

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	16	22	1	0	4	20	4	0	2	20	21	1	4	35	8	1	157	3	1	1	1
4:15 PM	8	15	2	0	2	18	5	0	1	25	18	0	5	29	1	0	129	0	3	0	1
4:30 PM	21	19	5	0	2	30	5	0	2	22	18	0	5	32	3	0	164	1	1	2	1
4:45 PM	11	23	2	0	0	18	4	0	4	27	18	0	6	30	1	0	144	3	1	1	0
5:00 PM	10	12	2	0	4	30	2	0	1	34	26	0	2	30	10	0	163	1	1	0	3
5:15 PM	19	23	2	0	1	32	8	0	0	23	19	1	2	36	5	2	170	2	2	0	2
5:30 PM	18	19	2	0	0	12	3	0	1	28	15	1	1	33	8	0	140	3	1	0	2
5:45 PM	16	21	2	0	1	14	4	0	2	25	19	0	3	26	4	0	137	5	0	2	1
Total Survey	119	154	18	0	14	174	35	0	13	204	154	3	28	251	40	3	1,204	18	10	6	11

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	149	206	355	0	136	103	239	0	194	208	402	1	162	124	286	2	641	7	5	3	6
%HV	0.7%				1.5%				2.1%				0.6%				1.2%				
PHF	0.83				0.83				0.76				0.83				0.94				

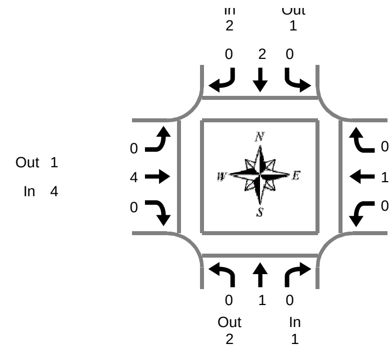
By Movement	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	61	77	11	149	7	110	19	136	7	106	81	194	15	128	19	162	641
%HV	0.0%	1.3%	0.0%	0.7%	0.0%	1.8%	0.0%	1.5%	0.0%	3.8%	0.0%	2.1%	0.0%	0.8%	0.0%	0.6%	1.2%
PHF	0.73	0.84	0.55	0.83	0.44	0.86	0.59	0.83	0.44	0.72	0.78	0.76	0.47	0.78	0.48	0.83	0.94

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	56	79	10	0	8	86	18	0	9	94	75	1	20	126	13	1	594	7	6	4	3
4:15 PM	50	69	11	0	8	96	16	0	8	108	80	0	18	121	15	0	600	5	6	3	5
4:30 PM	61	77	11	0	7	110	19	0	7	106	81	1	15	128	19	2	641	7	5	3	6
4:45 PM	58	77	8	0	5	92	17	0	6	112	78	2	11	129	24	2	617	9	5	1	7
5:00 PM	63	75	8	0	6	88	17	0	4	110	79	2	8	125	27	2	610	11	4	2	8

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

22nd St & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	1	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
4:10 PM	0	0	0	0	0	1	0	1	0	0	2	2	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
4:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:25 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
4:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
4:35 PM	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	3
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:05 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	1	0	2	0	3	0	3	0	6	2	8	0	2	1	3	16

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	1	0	0	1	0	1	0	1	0	1	2	3	0	0	1	1	6
4:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
4:30 PM	0	1	0	1	0	2	0	2	0	1	0	1	0	0	0	0	4
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	1	3
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	1	0	2	0	3	0	3	0	6	2	8	0	2	1	3	16

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 22nd St			Southbound 22nd St			Eastbound May Ave			Westbound May Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	1	2	3	2	1	3	4	1	5	1	4	5	8
PHF	0.25			0.25			0.50			0.25			0.50

By Movement	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	1	0	1	0	2	0	2	0	4	0	4	0	1	0	1	8
PHF	0.00	0.25	0.00	0.25	0.00	0.25	0.00	0.25	0.00	0.50	0.00	0.50	0.00	0.25	0.00	0.25	0.50

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

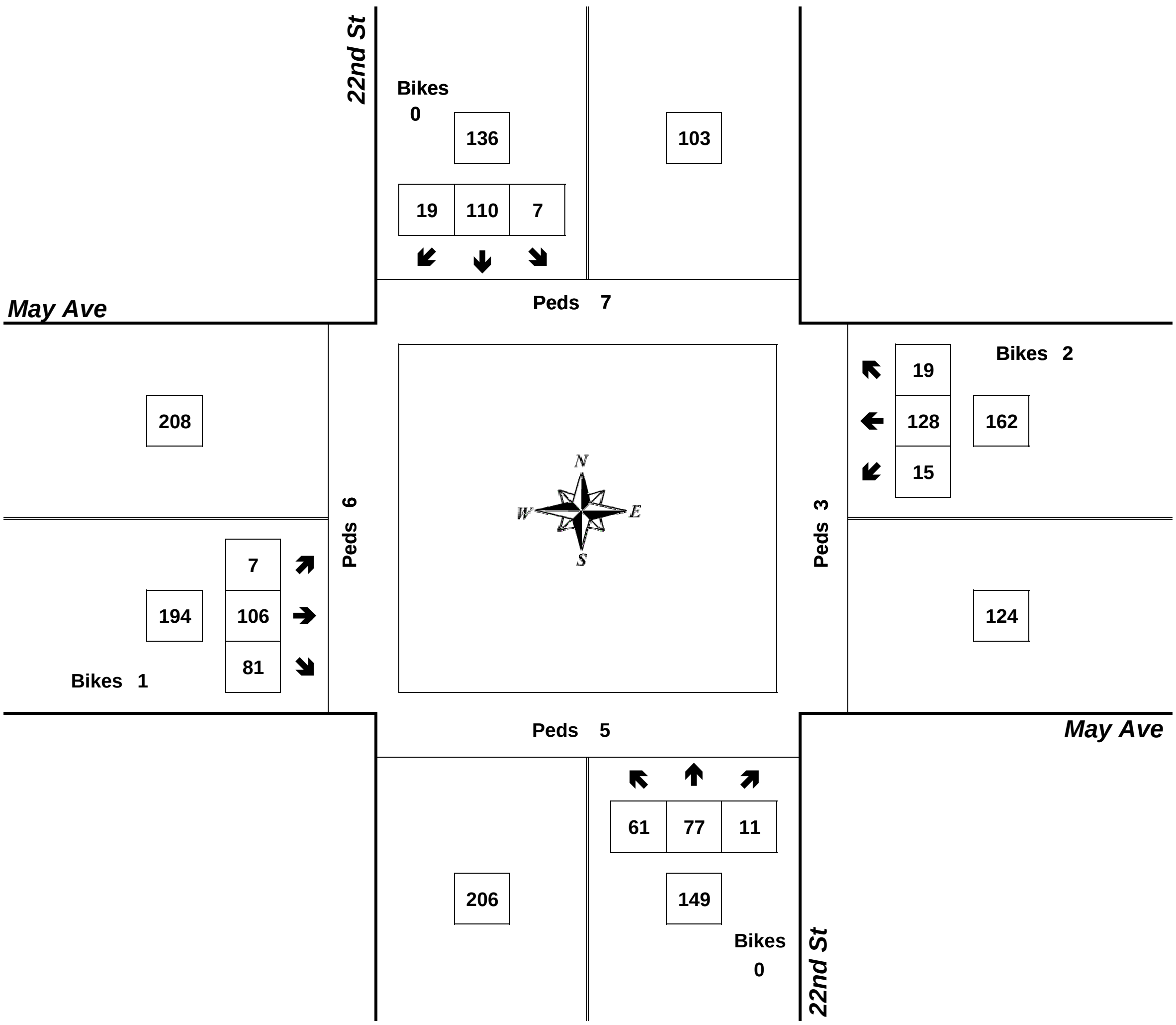
Interval Start Time	Northbound 22nd St				Southbound 22nd St				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	1	1	0	2	0	3	0	3	0	3	2	5	0	1	1	2	12
4:15 PM	0	1	0	1	0	2	0	2	0	4	0	4	0	2	0	2	9
4:30 PM	0	1	0	1	0	2	0	2	0	4	0	4	0	1	0	1	8
4:45 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4
5:00 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4

Peak Hour Summary

Clay Carney
(503) 833-2740

22nd St & May Ave

4:30 PM to 5:30 PM
Tuesday, May 18, 2010

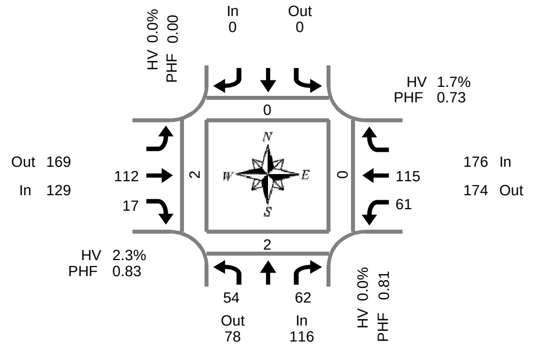


Approach	PHF	HV%	Volume
EB	0.76	2.1%	194
WB	0.83	0.6%	162
NB	0.83	0.7%	149
SB	0.83	1.5%	136
Intersection	0.94	1.2%	641

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:40 PM to 5:40 PM

18th St & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes		North	South	East	West
4:00 PM	7		2	0				0		6	4	0	2	12		0	33	0	0	0	0
4:05 PM	4		7	0				0		3	3	0	5	10		0	32	0	0	0	0
4:10 PM	2		8	0				0		7	1	0	2	8		0	28	0	0	0	0
4:15 PM	3		4	0				0		8	4	0	2	9		0	30	0	0	1	0
4:20 PM	4		3	0				0		6	3	0	0	8		0	24	0	0	0	0
4:25 PM	3		3	0				0		5	3	0	1	5		1	20	0	0	0	0
4:30 PM	1		4	0				0		7	0	0	5	8		0	25	0	0	0	0
4:35 PM	3		2	0				0		8	2	0	1	6		0	22	0	0	0	0
4:40 PM	6		5	0				0		7	2	0	5	13		0	38	0	0	0	0
4:45 PM	5		4	0				0		6	2	0	3	9		0	29	0	0	0	0
4:50 PM	3		2	0				0		9	3	0	5	10		0	32	0	0	0	0
4:55 PM	5		4	0				0		10	0	0	8	6		0	33	0	1	0	0
5:00 PM	10		7	0				0		16	1	0	4	4		0	42	0	0	0	0
5:05 PM	4		5	0				0		11	0	0	7	9		0	36	0	0	0	0
5:10 PM	5		5	0				0		7	1	0	8	9		0	35	0	0	0	2
5:15 PM	4		6	1				0		10	1	0	6	14		0	41	0	1	0	0
5:20 PM	4		8	0				0		7	1	1	6	17		0	43	0	0	0	0
5:25 PM	1		5	0				0		10	1	0	2	8		0	27	0	0	0	0
5:30 PM	4		8	0				0		9	2	1	3	9		0	35	0	0	0	0
5:35 PM	3		3	0				0		10	3	0	4	7		0	30	0	0	0	0
5:40 PM	6		5	0				0		5	3	0	3	10		0	32	0	0	0	0
5:45 PM	5		2	0				0		10	2	0	4	9		0	32	0	0	0	0
5:50 PM	1		2	0				0		8	1	0	5	10		0	27	0	0	0	0
5:55 PM	3		1	0				0		4	1	0	2	2		0	13	0	0	0	0
Total Survey	96		105	1				0		189	44	2	93	212		1	739	0	2	1	2

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes		North	South	East	West
4:00 PM	13		17	0				0		16	8	0	9	30		0	93	0	0	0	0
4:15 PM	10		10	0				0		19	10	0	3	22		1	74	0	0	1	0
4:30 PM	10		11	0				0		22	4	0	11	27		0	85	0	0	0	0
4:45 PM	13		10	0				0		25	5	0	16	25		0	94	0	1	0	0
5:00 PM	19		17	0				0		34	2	0	19	22		0	113	0	0	0	2
5:15 PM	9		19	1				0		27	3	1	14	39		0	111	0	1	0	0
5:30 PM	13		16	0				0		24	8	1	10	26		0	97	0	0	0	0
5:45 PM	9		5	0				0		22	4	0	11	21		0	72	0	0	0	0
Total Survey	96		105	1				0		189	44	2	93	212		1	739	0	2	1	2

Peak Hour Summary
4:40 PM to 5:40 PM

By Approach	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	116	78	194	1	0	0	0	0	129	169	298	2	176	174	350	0	421	0	2	0	2
%HV	0.0%				0.0%				2.3%				1.7%				1.4%				
PHF	0.81				0.00				0.83				0.73				0.88				

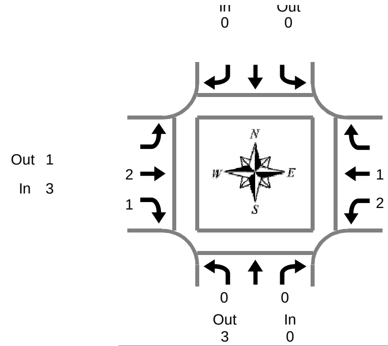
By Movement	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	54		62	116				0		112	17	129	61	115		176	421
%HV	0.0%	NA	0.0%	0.0%	NA	NA	NA	0.0%	NA	1.8%	5.9%	2.3%	3.3%	0.9%	NA	1.7%	1.4%
PHF	0.71		0.74	0.81				0.00		0.76	0.61	0.83	0.73	0.72		0.73	0.88

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes		North	South	East	West
4:00 PM	46		48	0				0		82	27	0	39	104		1	346	0	1	1	0
4:15 PM	52		48	0				0		100	21	0	49	96		1	366	0	1	1	2
4:30 PM	51		57	1				0		108	14	1	60	113		0	403	0	2	0	2
4:45 PM	54		62	1				0		110	18	2	59	112		0	415	0	2	0	2
5:00 PM	50		57	1				0		107	17	2	54	108		0	393	0	1	0	2

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



18th St & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Peak Hour Summary
4:40 PM to 5:40 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
4:00 PM	0		0	0				0		1	0	1	0	0		0	1
4:05 PM	0		1	1				0		0	0	0	0	0		0	1
4:10 PM	0		0	0				0		0	0	0	0	0		0	0
4:15 PM	1		0	1				0		0	0	0	0	0		0	1
4:20 PM	0		0	0				0		0	0	0	0	0		0	0
4:25 PM	0		0	0				0		0	0	0	0	1		1	1
4:30 PM	0		0	0				0		0	0	0	0	0		0	0
4:35 PM	0		1	1				0		1	0	1	0	0		0	2
4:40 PM	0		0	0				0		0	0	0	0	1		1	1
4:45 PM	0		0	0				0		0	0	0	1	0		1	1
4:50 PM	0		0	0				0		0	0	0	0	0		0	0
4:55 PM	0		0	0				0		0	0	0	0	0		0	0
5:00 PM	0		0	0				0		0	1	1	0	0		0	1
5:05 PM	0		0	0				0		1	0	1	0	0		0	1
5:10 PM	0		0	0				0		0	0	0	0	0		0	0
5:15 PM	0		0	0				0		1	0	1	0	0		0	1
5:20 PM	0		0	0				0		0	0	0	1	0		1	1
5:25 PM	0		0	0				0		0	0	0	0	0		0	0
5:30 PM	0		0	0				0		0	0	0	0	0		0	0
5:35 PM	0		0	0				0		0	0	0	0	0		0	0
5:40 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		0	0	0	0	0		0	0
5:50 PM	0		0	0				0		0	0	0	0	0		0	0
5:55 PM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	1		2	3				0		4	1	5	2	2		4	12

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
4:00 PM	0		1	1				0		1	0	1	0	0		0	2
4:15 PM	1		0	1				0		0	0	0	0	1		1	2
4:30 PM	0		1	1				0		1	0	1	0	1		1	3
4:45 PM	0		0	0				0		0	0	0	1	0		1	1
5:00 PM	0		0	0				0		1	1	2	0	0		0	2
5:15 PM	0		0	0				0		1	0	1	1	0		1	2
5:30 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	1		2	3				0		4	1	5	2	2		4	12

Heavy Vehicle Peak Hour Summary
4:40 PM to 5:40 PM

By Approach	Northbound 18th St			Southbound 18th St			Eastbound May Ave			Westbound May Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	3	3	0	0	0	3	1	4	3	2	5	6
PHF	0.00			0.00			0.38			0.38			0.75

By Movement	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	0		0	0				0		2	1	3	2	1		3	6
PHF	0.00		0.00	0.00				0.00		0.25	0.25	0.38	0.50	0.25		0.38	0.75

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 18th St				Southbound 18th St				Eastbound May Ave				Westbound May Ave				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
4:00 PM	1		2	3				0		2	0	2	1	2		3	8
4:15 PM	1		1	2				0		2	1	3	1	2		3	8
4:30 PM	0		1	1				0		3	1	4	2	1		3	8
4:45 PM	0		0	0				0		2	1	3	2	0		2	5
5:00 PM	0		0	0				0		2	1	3	1	0		1	4

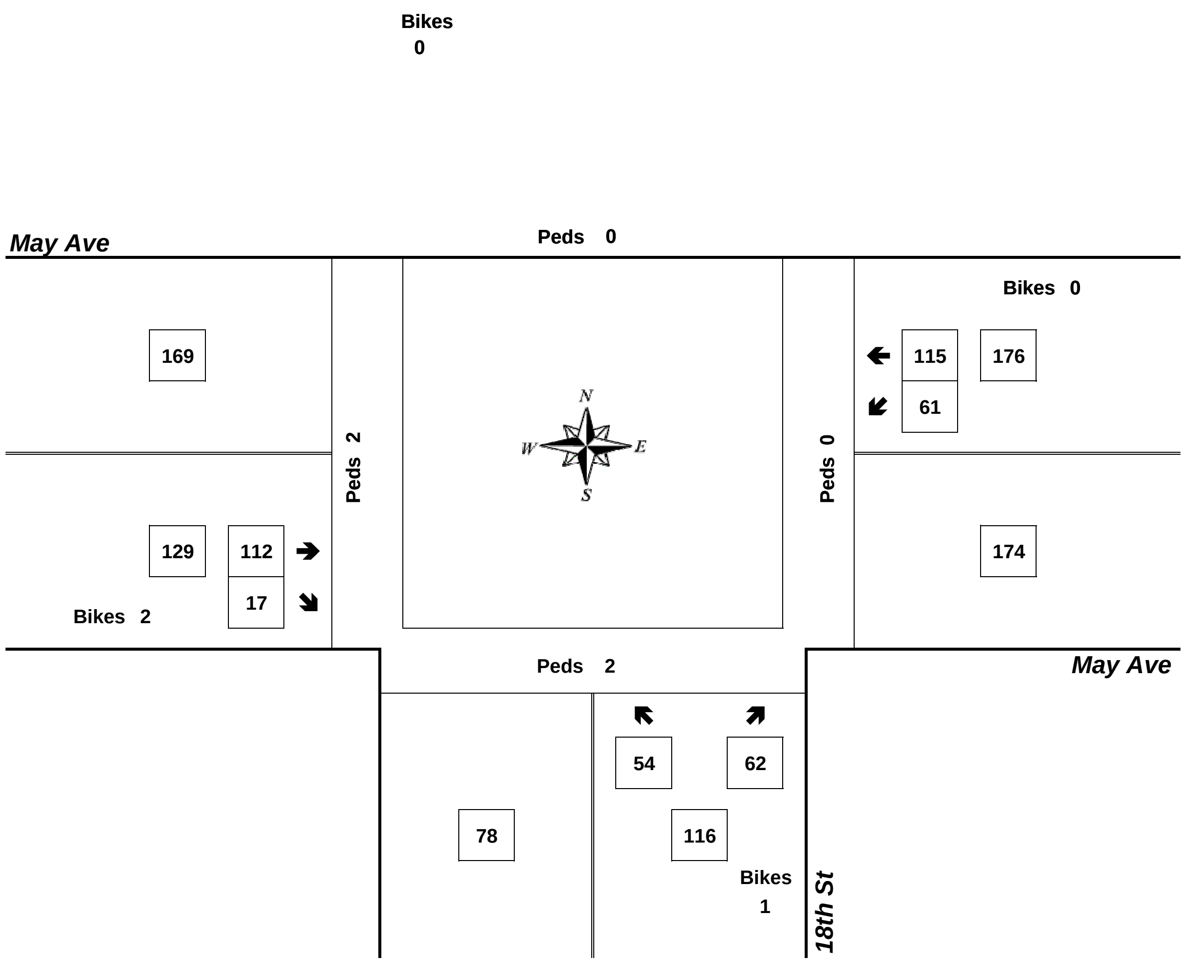
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

18th St & May Ave

4:40 PM to 5:40 PM
Tuesday, May 18, 2010



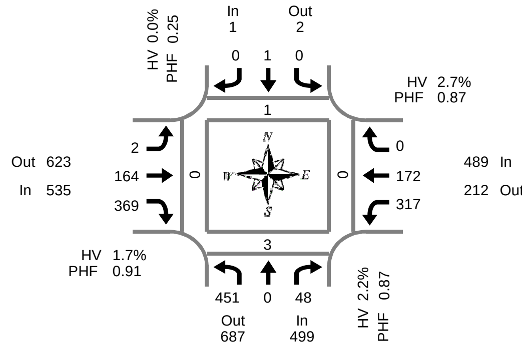
Approach	PHF	HV%	Volume
EB	0.83	2.3%	129
WB	0.73	1.7%	176
NB	0.81	0.0%	116
SB	0.00	0.0%	0
Intersection	0.88	1.4%	421

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:25 PM to 5:25 PM

13th St & Oak St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	29	0	5	0	0	0	0	0	0	13	31	0	19	14	0	0	111	0	2	0	0
4:05 PM	33	0	5	0	0	0	0	0	0	8	24	0	24	12	0	0	106	0	0	0	0
4:10 PM	35	0	6	0	1	0	0	0	0	10	35	0	24	22	0	0	133	0	0	0	0
4:15 PM	33	0	5	0	0	0	0	0	0	13	26	0	19	9	0	0	105	0	0	0	0
4:20 PM	24	0	7	0	0	0	0	0	0	10	24	0	30	15	0	0	110	0	0	0	0
4:25 PM	31	0	5	0	0	0	0	0	0	11	33	0	35	20	0	0	135	0	0	0	0
4:30 PM	36	0	3	0	0	0	0	0	0	19	27	1	28	9	0	0	122	0	2	0	0
4:35 PM	35	0	4	0	0	0	0	0	0	18	26	0	19	17	0	0	119	0	0	0	0
4:40 PM	44	0	4	0	0	0	0	0	0	7	23	0	28	14	0	0	120	0	0	0	0
4:45 PM	32	0	2	0	0	0	0	0	0	19	22	0	21	12	0	0	108	1	0	0	0
4:50 PM	36	0	5	0	0	0	0	0	0	13	30	1	29	17	0	0	130	0	0	0	0
4:55 PM	35	0	2	0	0	0	0	0	0	16	47	0	16	8	0	0	124	0	0	0	0
5:00 PM	39	0	7	0	0	1	0	0	1	12	28	0	23	15	0	0	126	0	0	0	0
5:05 PM	29	0	6	0	0	0	0	0	1	6	29	1	28	15	0	0	114	0	0	0	0
5:10 PM	46	0	2	0	0	0	0	0	0	18	37	0	42	18	0	0	163	0	0	0	0
5:15 PM	49	0	5	1	0	0	0	0	0	13	32	0	25	12	0	0	136	0	0	0	0
5:20 PM	39	0	3	0	0	0	0	0	0	12	35	2	23	15	0	0	127	0	1	0	0
5:25 PM	19	0	6	0	1	0	0	0	0	13	34	0	23	16	0	0	112	0	0	0	0
5:30 PM	23	0	4	0	0	0	0	0	0	6	17	0	28	11	0	0	89	0	0	0	0
5:35 PM	34	0	4	0	0	0	0	0	0	12	28	0	13	16	0	0	107	0	0	0	0
5:40 PM	22	0	4	0	0	0	0	0	0	20	27	0	21	12	0	0	106	0	0	0	0
5:45 PM	23	0	4	0	0	0	0	0	0	10	30	0	13	19	0	0	99	1	0	1	0
5:50 PM	25	0	4	0	0	0	0	0	1	8	29	0	21	15	0	0	103	0	0	0	0
5:55 PM	21	0	2	0	0	0	0	0	0	7	22	0	13	5	0	0	70	0	0	0	0
Total Survey	772	0	104	1	2	1	0	0	3	294	696	5	565	338	0	0	2,775	2	5	1	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	97	0	16	0	1	0	0	0	0	31	90	0	67	48	0	0	350	0	2	0	0
4:15 PM	88	0	17	0	0	0	0	0	0	34	83	0	84	44	0	0	350	0	0	0	0
4:30 PM	115	0	11	0	0	0	0	0	0	44	76	1	75	40	0	0	361	0	2	0	0
4:45 PM	103	0	9	0	0	0	0	0	0	48	99	1	66	37	0	0	362	1	0	0	0
5:00 PM	114	0	15	0	0	1	0	0	2	36	94	1	93	48	0	0	403	0	0	0	0
5:15 PM	107	0	14	1	1	0	0	0	0	38	101	2	71	43	0	0	375	0	1	0	0
5:30 PM	79	0	12	0	0	0	0	0	0	38	72	0	62	39	0	0	302	0	0	0	0
5:45 PM	69	0	10	0	0	0	0	0	1	25	81	0	47	39	0	0	272	1	0	1	0
Total Survey	772	0	104	1	2	1	0	0	3	294	696	5	565	338	0	0	2,775	2	5	1	0

Peak Hour Summary
4:25 PM to 5:25 PM

By Approach	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	499	687	1,186	1	1	2	3	0	535	623	1,158	5	489	212	701	0	1,524	1	3	0	0
%HV	2.2%				0.0%				1.7%				2.7%				2.2%				
PHF	0.87				0.25				0.91				0.87				0.89				

By Movement	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	451	0	48	499	0	1	0	1	2	164	369	535	317	172	0	489	1,524
%HV	2.0%	0.0%	4.2%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	1.6%	1.7%	2.8%	2.3%	0.0%	2.7%	2.2%
PHF	0.84	0.00	0.80	0.87	0.00	0.25	0.00	0.25	0.25	0.85	0.88	0.91	0.83	0.90	0.00	0.87	0.89

Rolling Hour Summary
4:00 PM to 6:00 PM

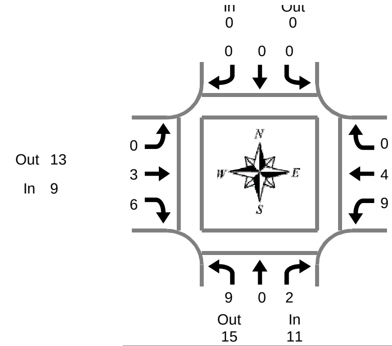
Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	403	0	53	0	1	0	0	0	0	157	348	2	292	169	0	0	1,423	1	4	0	0
4:15 PM	420	0	52	0	0	1	0	0	2	162	352	3	318	169	0	0	1,476	1	2	0	0
4:30 PM	439	0	49	1	1	1	0	0	2	166	370	5	305	168	0	0	1,501	1	3	0	0
4:45 PM	403	0	50	1	1	1	0	0	2	160	366	4	292	167	0	0	1,442	1	1	0	0
5:00 PM	369	0	51	1	1	1	0	0	3	137	348	3	273	169	0	0	1,352	1	1	1	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740

13th St & Oak St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM



Peak Hour Summary
4:25 PM to 5:25 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:05 PM	1	0	1	2	0	0	0	0	0	0	0	0	0	1	0	1	3
4:10 PM	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:20 PM	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	2
4:25 PM	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
4:35 PM	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	2
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	3
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	2	3
4:50 PM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:55 PM	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	2	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:05 PM	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	2
5:10 PM	3	0	0	3	0	0	0	0	0	1	0	1	1	0	0	1	5
5:15 PM	2	0	0	2	0	0	0	0	0	0	2	2	0	1	0	1	5
5:20 PM	2	0	0	2	0	0	0	0	0	1	1	2	0	0	0	0	4
5:25 PM	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	11	0	4	15	0	0	0	0	0	5	7	12	14	5	0	19	46

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	1	0	1	2	0	0	0	0	0	0	1	1	1	1	0	2	5
4:15 PM	1	0	0	1	0	0	0	0	0	1	0	1	4	0	0	4	6
4:30 PM	0	0	1	1	0	0	0	0	0	0	1	1	4	1	0	5	7
4:45 PM	1	0	0	1	0	0	0	0	0	1	1	2	2	2	0	4	7
5:00 PM	3	0	1	4	0	0	0	0	0	1	1	2	1	0	0	1	7
5:15 PM	4	0	1	5	0	0	0	0	0	1	3	4	1	1	0	2	11
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:45 PM	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
Total Survey	11	0	4	15	0	0	0	0	0	5	7	12	14	5	0	19	46

Heavy Vehicle Peak Hour Summary
4:25 PM to 5:25 PM

By Approach	Northbound 13th St			Southbound 13th St			Eastbound Oak St			Westbound Oak St			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	11	15	26	0	0	0	9	13	22	13	5	18	33
PHF	0.39			0.00			0.45			0.65			0.59

By Movement	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	9	0	2	11	0	0	0	0	0	3	6	9	9	4	0	13	33
PHF	0.32	0.00	0.50	0.39	0.00	0.00	0.00	0.00	0.00	0.38	0.50	0.45	0.56	0.50	0.00	0.65	0.59

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

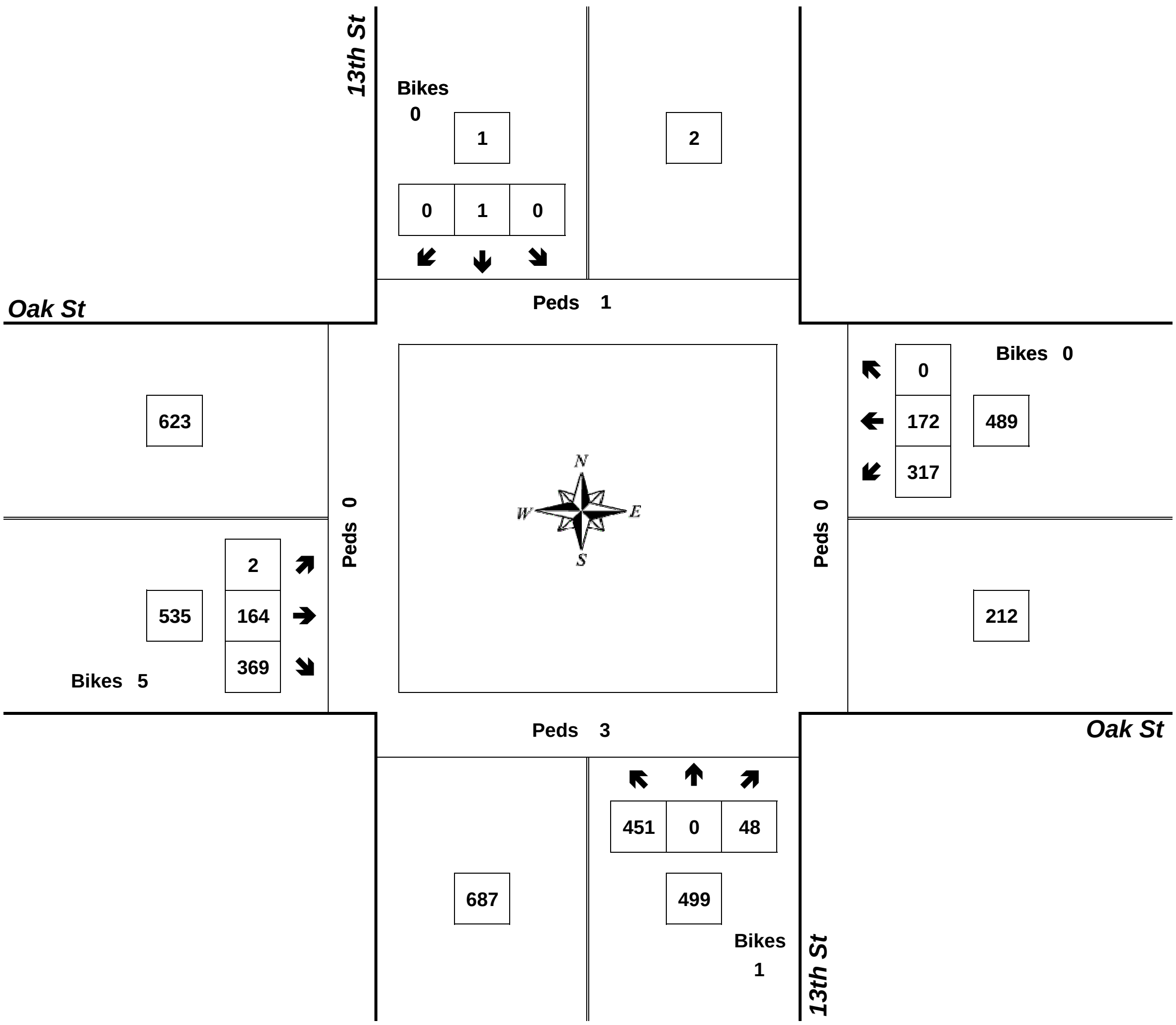
Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound Oak St				Westbound Oak St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	3	0	2	5	0	0	0	0	0	2	3	5	11	4	0	15	25
4:15 PM	5	0	2	7	0	0	0	0	0	3	3	6	11	3	0	14	27
4:30 PM	8	0	3	11	0	0	0	0	0	3	6	9	8	4	0	12	32
4:45 PM	8	0	2	10	0	0	0	0	0	4	5	9	4	3	0	7	26
5:00 PM	8	0	2	10	0	0	0	0	0	3	4	7	3	1	0	4	21

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

13th St & Oak St

4:25 PM to 5:25 PM
Tuesday, May 18, 2010

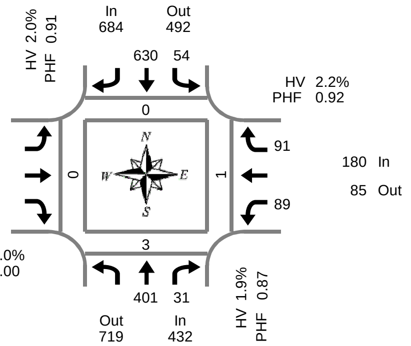


Approach	PHF	HV%	Volume
EB	0.91	1.7%	535
WB	0.87	2.7%	489
NB	0.87	2.2%	499
SB	0.25	0.0%	1
Intersection	0.89	2.2%	1,524

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:25 PM to 5:25 PM

13th St & State St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		25	1	0	6	47		0				0	5		5	0	89	0	0	0	0
4:05 PM		40	7	0	5	38		0				0	4		2	0	96	0	0	0	0
4:10 PM		33	2	0	7	55		0				0	6		9	0	112	0	3	0	0
4:15 PM		32	1	0	4	39		0				0	4		2	0	82	0	0	2	0
4:20 PM		36	0	0	8	47		0				0	7		4	0	102	0	0	0	0
4:25 PM		27	1	0	6	63		0				0	11		9	0	117	0	0	0	0
4:30 PM		31	1	0	5	48		0				0	5		5	0	95	0	0	0	0
4:35 PM		39	4	0	5	44		0				0	7		5	0	104	0	0	0	0
4:40 PM		36	4	0	9	38		0				0	10		9	0	106	0	0	0	0
4:45 PM		24	4	1	2	45		0				0	5		8	0	88	0	1	0	0
4:50 PM		34	1	0	5	55		0				0	9		5	0	109	0	0	0	0
4:55 PM		29	2	0	4	56		0				0	7		9	0	107	0	0	0	0
5:00 PM		46	2	0	5	49		0				0	8		6	0	116	0	0	0	0
5:05 PM		31	3	0	3	60		0				0	4		9	1	110	0	0	0	0
5:10 PM		39	3	0	5	61		0				0	6		5	0	119	0	1	0	0
5:15 PM		33	3	1	2	56		0				0	12		13	0	119	0	1	0	0
5:20 PM		32	3	0	3	55		0				0	5		8	0	106	0	0	1	0
5:25 PM		20	3	0	4	53		0				0	8		4	0	92	0	0	0	0
5:30 PM		22	2	0	3	39		0				0	5		4	0	75	1	1	0	0
5:35 PM		34	4	0	3	42		0				0	5		5	0	93	0	1	0	0
5:40 PM		19	1	0	6	40		0				0	7		6	0	79	0	1	1	0
5:45 PM		22	3	0	5	38		0				0	6		6	0	80	0	0	0	0
5:50 PM		24	0	0	4	47		0				0	5		4	0	84	0	2	0	0
5:55 PM		22	6	0	6	28		0				0	12		3	0	77	0	0	0	0
Total Survey		730	61	2	115	1,143		0				0	163		145	1	2,357	1	11	4	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		98	10	0	18	140		0				0	15		16	0	297	0	3	0	0
4:15 PM		95	2	0	18	149		0				0	22		15	0	301	0	0	2	0
4:30 PM		106	9	0	19	130		0				0	22		19	0	305	0	0	0	0
4:45 PM		87	7	1	11	156		0				0	21		22	0	304	0	1	0	0
5:00 PM		116	8	0	13	170		0				0	18		20	1	345	0	1	0	0
5:15 PM		85	9	1	9	164		0				0	25		25	0	317	0	1	1	0
5:30 PM		75	7	0	12	121		0				0	17		15	0	247	1	3	1	0
5:45 PM		68	9	0	15	113		0				0	23		13	0	241	0	2	0	0
Total Survey		730	61	2	115	1,143		0				0	163		145	1	2,357	1	11	4	0

Peak Hour Summary
4:25 PM to 5:25 PM

By Approach	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	432	719	1,151	2	684	492	1,176	0	0	0	0	0	180	85	265	1	1,296	0	3	1	0
%HV	1.9%				2.0%				0.0%				2.2%				2.0%				
PHF	0.87				0.91				0.00				0.92				0.93				

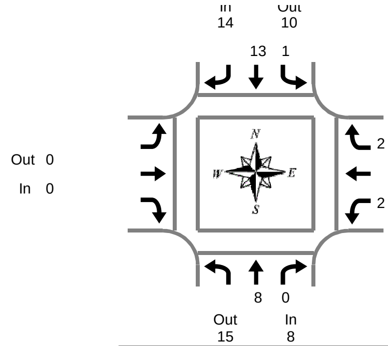
By Movement	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		401	31	432	54	630		684				0	89		91	180	1,296
%HV	NA	2.0%	0.0%	1.9%	1.9%	2.1%	NA	2.0%	NA	NA	NA	0.0%	2.2%	NA	2.2%	2.2%	2.0%
PHF		0.86	0.65	0.87	0.71	0.89		0.91				0.00	0.93		0.84	0.92	0.93

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		386	28	1	66	575		0				0	80		72	0	1,207	0	4	2	0
4:15 PM		404	26	1	61	605		0				0	83		76	1	1,255	0	2	2	0
4:30 PM		394	33	2	52	620		0				0	86		86	1	1,271	0	3	1	0
4:45 PM		363	31	2	45	611		0				0	81		82	1	1,213	1	6	2	0
5:00 PM		344	33	1	49	568		0				0	83		73	1	1,150	1	7	2	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:25 PM to 5:25 PM

13th St & State St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		0	0	0	0	0		0				0	0		0	0	0
4:05 PM		2	0	2	0	0		0				0	1		0	1	3
4:10 PM		0	0	0	0	2		2				0	0		0	0	2
4:15 PM		0	0	0	0	1		1				0	0		0	0	1
4:20 PM		0	0	0	0	1		1				0	0		0	0	1
4:25 PM		1	0	1	0	1		1				0	1		0	1	3
4:30 PM		0	0	0	1	1		2				0	0		0	0	2
4:35 PM		1	0	1	0	2		2				0	0		0	0	3
4:40 PM		0	0	0	0	2		2				0	0		0	0	2
4:45 PM		0	0	0	0	1		1				0	1		0	1	2
4:50 PM		1	0	1	0	0		0				0	0		0	0	1
4:55 PM		0	0	0	0	1		1				0	0		0	0	1
5:00 PM		1	0	1	0	0		0				0	0		0	0	1
5:05 PM		1	0	1	0	1		1				0	0		0	0	2
5:10 PM		1	0	1	0	1		1				0	0		0	0	2
5:15 PM		1	0	1	0	2		2				0	0		1	1	4
5:20 PM		1	0	1	0	1		1				0	0		1	1	3
5:25 PM		0	0	0	0	1		1				0	0		0	0	1
5:30 PM		0	0	0	0	0		0				0	0		0	0	0
5:35 PM		0	0	0	0	0		0				0	0		0	0	0
5:40 PM		0	0	0	0	0		0				0	0		0	0	0
5:45 PM		0	0	0	0	0		0				0	0		0	0	0
5:50 PM		1	0	1	0	1		1				0	0		0	0	2
5:55 PM		1	0	1	0	0		0				0	0		0	0	1
Total Survey		12	0	12	1	19		20				0	3		2	5	37

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		2	0	2	0	2		2				0	1		0	1	5
4:15 PM		1	0	1	0	3		3				0	1		0	1	5
4:30 PM		1	0	1	1	5		6				0	0		0	0	7
4:45 PM		1	0	1	0	2		2				0	1		0	1	4
5:00 PM		3	0	3	0	2		2				0	0		0	0	5
5:15 PM		2	0	2	0	4		4				0	0		2	2	8
5:30 PM		0	0	0	0	0		0				0	0		0	0	0
5:45 PM		2	0	2	0	1		1				0	0		0	0	3
Total Survey		12	0	12	1	19		20				0	3		2	5	37

Heavy Vehicle Peak Hour Summary
4:25 PM to 5:25 PM

By Approach	Northbound 13th St			Southbound 13th St			Eastbound State St			Westbound State St			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	8	15	23	14	10	24	0	0	0	4	1	5	26
PHF	0.67			0.58			0.00			0.50			0.72

By Movement	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		8	0	8	1	13		14				0	2		2	4	26
PHF		0.67	0.00	0.67	0.25	0.65		0.58				0.00	0.50		0.25	0.50	0.72

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

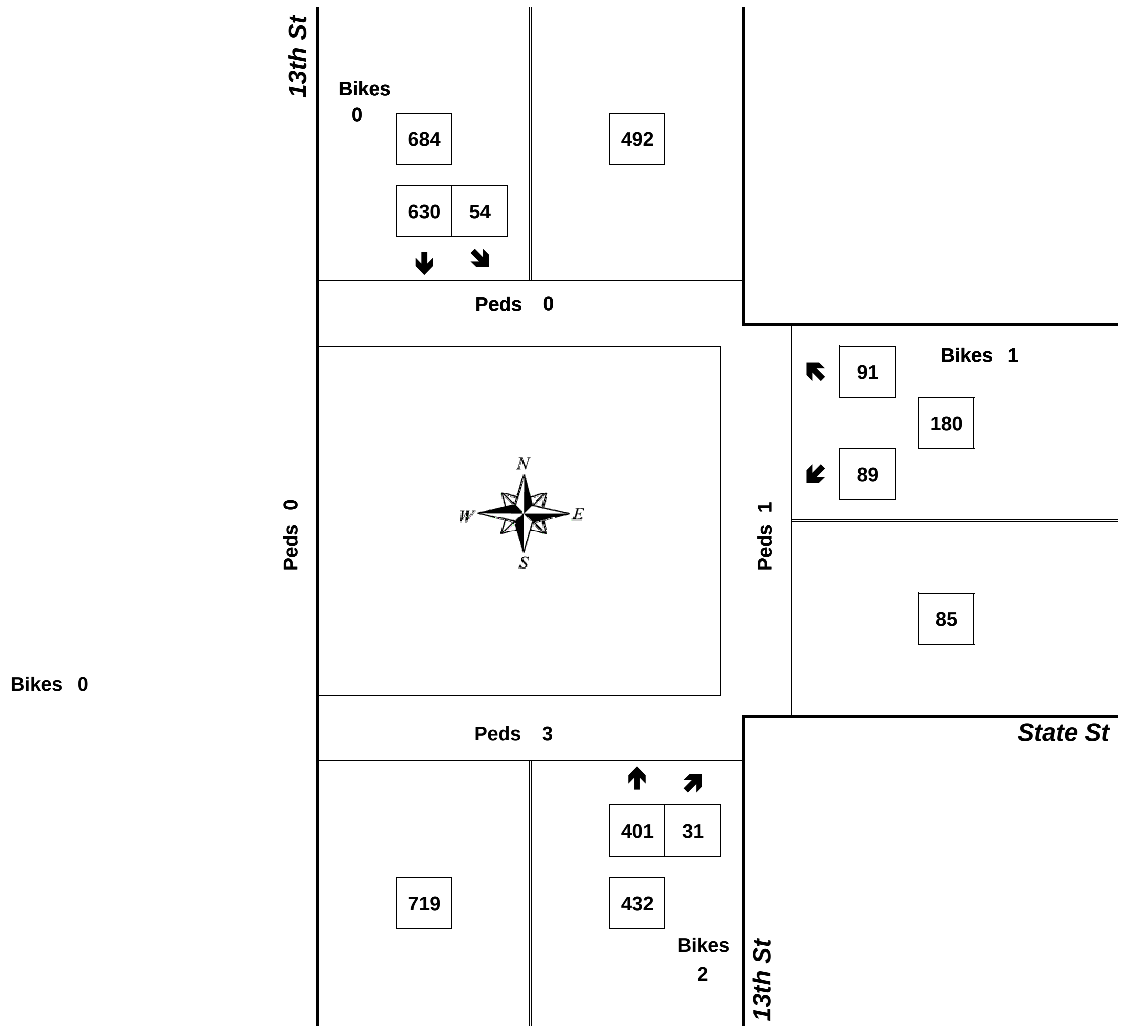
Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound State St				Westbound State St				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		5	0	5	1	12		13				0	3		0	3	21
4:15 PM		6	0	6	1	12		13				0	2		0	2	21
4:30 PM		7	0	7	1	13		14				0	1		2	3	24
4:45 PM		6	0	6	0	8		8				0	1		2	3	17
5:00 PM		7	0	7	0	7		7				0	0		2	2	16

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

13th St & State St

4:25 PM to 5:25 PM
Tuesday, May 18, 2010

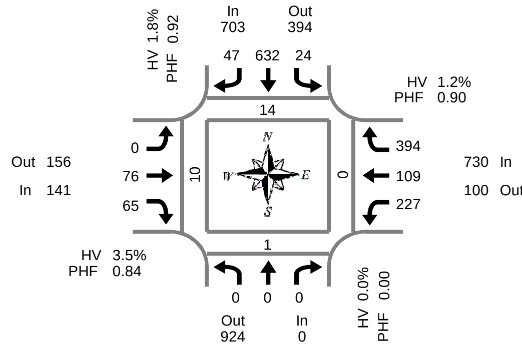


Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.92	2.2%	180
NB	0.87	1.9%	432
SB	0.91	2.0%	684
Intersection	0.93	2.0%	1,296

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

13th St & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	0	1	46	3	0	0	3	3	0	18	11	27	0	112	0	0	0	0
4:05 PM	0	0	0	0	1	37	1	0	0	4	3	0	20	11	42	0	119	0	0	0	1
4:10 PM	0	0	0	0	3	56	2	0	0	7	5	0	16	9	30	0	128	0	0	1	0
4:15 PM	0	0	0	0	2	41	1	0	0	5	7	0	6	11	31	0	104	2	0	0	0
4:20 PM	0	0	0	0	3	43	4	0	0	6	2	0	12	6	24	1	100	1	0	0	0
4:25 PM	0	1	0	0	6	57	3	0	0	3	7	0	5	5	31	0	118	1	0	1	0
4:30 PM	0	0	0	0	2	56	3	1	0	4	6	0	17	10	32	1	130	1	0	0	0
4:35 PM	0	0	0	0	3	44	2	0	0	6	3	1	21	8	39	0	126	2	0	0	2
4:40 PM	0	0	0	0	0	41	3	0	0	6	5	0	22	11	34	0	122	0	0	0	0
4:45 PM	0	0	0	0	2	51	5	0	0	10	7	0	23	6	27	0	131	0	0	0	3
4:50 PM	0	0	0	0	0	46	3	0	0	4	4	0	18	8	29	0	112	1	0	0	0
4:55 PM	0	0	0	0	4	62	3	0	0	6	8	0	23	7	34	1	147	2	0	0	0
5:00 PM	0	0	0	0	1	44	10	0	0	7	6	0	15	5	43	0	131	4	0	0	3
5:05 PM	0	0	0	0	6	62	0	0	0	6	9	0	22	9	32	0	146	1	0	0	0
5:10 PM	0	0	0	0	1	57	2	0	0	2	4	0	23	14	39	0	142	1	0	0	1
5:15 PM	0	0	0	0	2	53	9	0	0	6	4	0	13	13	35	0	135	0	1	0	0
5:20 PM	0	0	0	0	1	60	4	1	0	6	5	2	16	10	26	0	128	2	0	0	1
5:25 PM	0	0	0	0	2	56	3	0	0	13	4	0	14	8	24	0	124	0	0	0	0
5:30 PM	0	0	0	0	3	33	3	0	0	4	5	0	15	7	16	0	86	0	1	0	0
5:35 PM	0	0	0	0	2	43	1	0	0	4	8	0	15	10	30	0	113	2	1	0	0
5:40 PM	0	0	0	0	2	34	1	0	0	3	6	0	10	7	15	0	78	2	0	0	0
5:45 PM	0	0	0	0	6	28	1	0	0	6	4	0	6	6	21	0	78	0	0	0	0
5:50 PM	0	0	0	0	2	48	2	0	0	6	9	0	9	10	24	0	110	1	3	0	1
5:55 PM	0	0	0	0	1	36	0	0	0	4	7	0	11	7	18	0	84	0	1	0	0
Total Survey	0	1	0	0	56	1,134	69	2	0	131	131	3	370	209	703	3	2,804	23	7	2	12

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	0	5	139	6	0	0	14	11	0	54	31	99	0	359	0	0	1	1
4:15 PM	0	1	0	0	11	141	8	0	0	14	16	0	23	22	86	1	322	4	0	1	0
4:30 PM	0	0	0	0	5	141	8	1	0	16	14	1	60	29	105	1	378	3	0	0	2
4:45 PM	0	0	0	0	6	159	11	0	0	20	19	0	64	21	90	1	390	3	0	0	3
5:00 PM	0	0	0	0	8	163	12	0	0	15	19	0	60	28	114	0	419	6	0	0	4
5:15 PM	0	0	0	0	5	169	16	1	0	25	13	2	43	31	85	0	387	2	1	0	1
5:30 PM	0	0	0	0	7	110	5	0	0	11	19	0	40	24	61	0	277	4	2	0	0
5:45 PM	0	0	0	0	9	112	3	0	0	16	20	0	26	23	63	0	272	1	4	0	1
Total Survey	0	1	0	0	56	1,134	69	2	0	131	131	3	370	209	703	3	2,804	23	7	2	12

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	0	924	924	0	703	394	1,097	2	141	156	297	3	730	100	830	2	1,574	14	1	0	10
%HV	0.0%				1.8%				3.5%				1.2%				1.7%				
PHF	0.00				0.92				0.84				0.90				0.93				

By Movement	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	24	632	47	703	0	76	65	141	227	109	394	730	1,574
%HV	0.0%	0.0%	0.0%	0.0%	4.2%	1.7%	2.1%	1.8%	0.0%	5.3%	1.5%	3.5%	0.9%	0.9%	1.5%	1.2%	1.7%
PHF	0.00	0.00	0.00	0.00	0.55	0.92	0.73	0.92	0.00	0.76	0.71	0.84	0.86	0.74	0.86	0.90	0.93

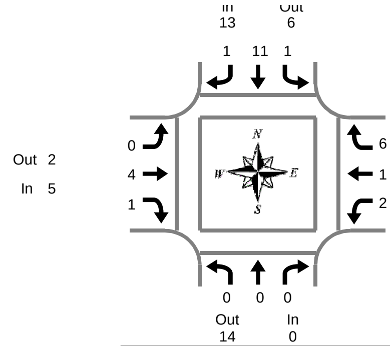
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	1	0	0	27	580	33	1	0	64	60	1	201	103	380	3	1,449	10	0	2	6
4:15 PM	0	1	0	0	30	604	39	1	0	65	68	1	207	100	395	3	1,509	16	0	1	9
4:30 PM	0	0	0	0	24	632	47	2	0	76	65	3	227	109	394	2	1,574	14	1	0	10
4:45 PM	0	0	0	0	26	601	44	1	0	71	70	2	207	104	350	1	1,473	15	3	0	8
5:00 PM	0	0	0	0	29	554	36	1	0	67	71	2	169	106	323	0	1,355	13	7	0	6

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

13th St & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	2
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
4:10 PM	0	0	0	0	0	1	0	1	0	1	0	1	1	0	0	1	3
4:15 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
4:20 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
4:25 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	2	3
4:30 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	1	1	3
4:35 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
4:40 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
4:45 PM	0	0	0	0	0	2	0	2	0	0	0	0	1	0	0	1	3
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	2
5:05 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	2	3
5:10 PM	0	0	0	0	0	2	0	2	0	0	1	1	0	0	0	0	3
5:15 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	1	1	3
5:20 PM	0	0	0	0	0	0	1	1	0	2	0	2	0	0	0	0	3
5:25 PM	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	2
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total Survey	0	0	0	0	1	18	1	20	0	6	1	7	4	2	11	17	44

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	1	0	1	0	2	0	2	1	0	2	3	6
4:15 PM	0	0	0	0	0	5	0	5	0	0	0	0	0	1	1	2	7
4:30 PM	0	0	0	0	0	3	0	3	0	1	0	1	0	0	1	1	5
4:45 PM	0	0	0	0	0	2	0	2	0	0	0	0	2	0	2	4	6
5:00 PM	0	0	0	0	0	4	0	4	0	0	1	1	0	1	2	3	8
5:15 PM	0	0	0	0	1	2	1	4	0	3	0	3	0	0	1	1	8
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:45 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	2	3
Total Survey	0	0	0	0	1	18	1	20	0	6	1	7	4	2	11	17	44

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 13th St			Southbound 13th St			Eastbound May Ave			Westbound May Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	14	14	13	6	19	5	2	7	9	5	14	27
PHF	0.00			0.65			0.42			0.56			0.75

By Movement	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	1	11	1	13	0	4	1	5	2	1	6	9	27
PHF	0.00	0.00	0.00	0.00	0.25	0.55	0.25	0.65	0.00	0.33	0.25	0.42	0.25	0.25	0.50	0.56	0.75

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 13th St				Southbound 13th St				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	11	0	11	0	3	0	3	3	1	6	10	24
4:15 PM	0	0	0	0	0	14	0	14	0	1	1	2	2	2	6	10	26
4:30 PM	0	0	0	0	1	11	1	13	0	4	1	5	2	1	6	9	27
4:45 PM	0	0	0	0	1	8	1	10	0	3	1	4	3	1	5	9	23
5:00 PM	0	0	0	0	1	7	1	9	0	3	1	4	1	1	5	7	20

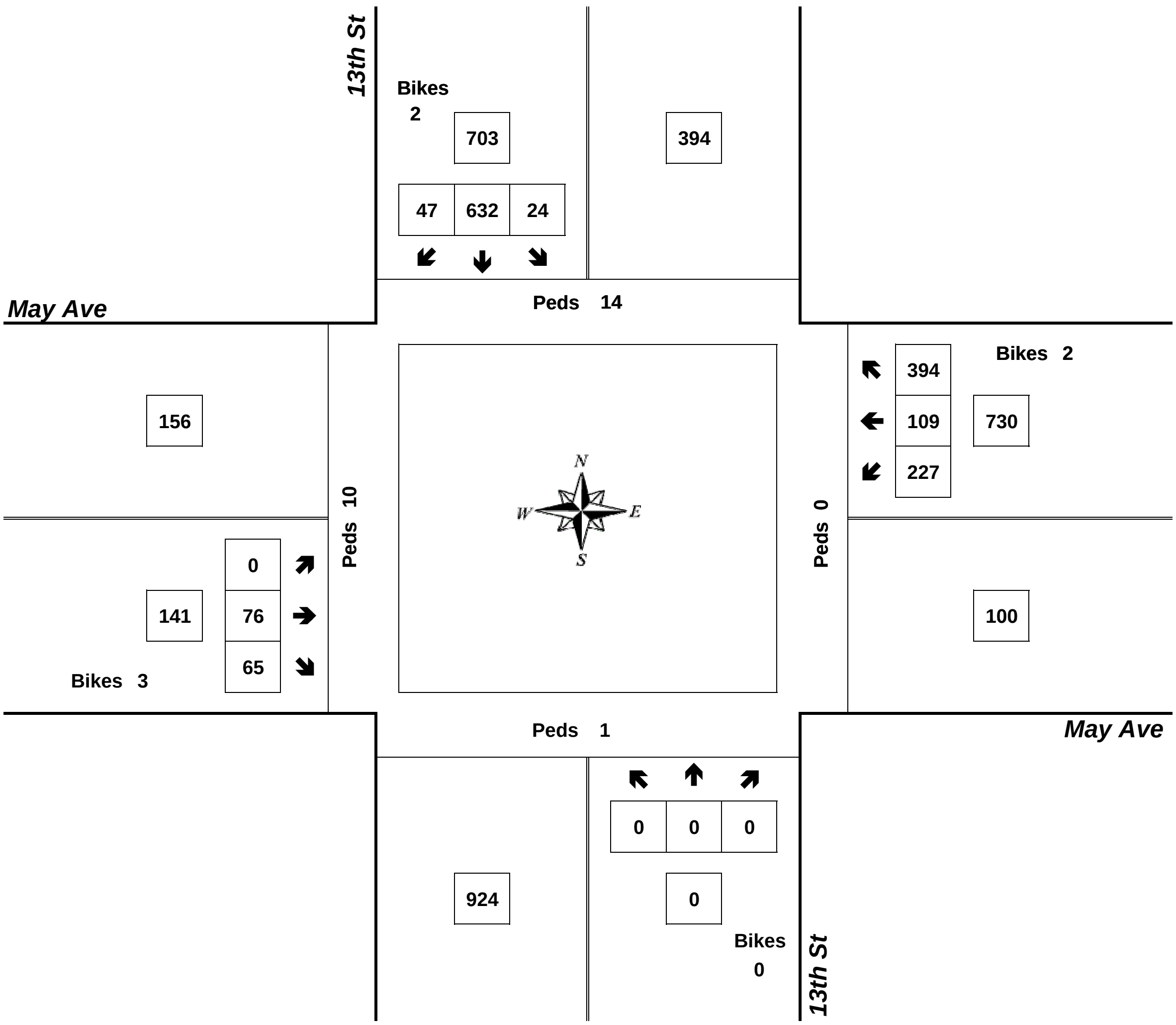
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

13th St & May Ave

4:30 PM to 5:30 PM
Tuesday, May 18, 2010

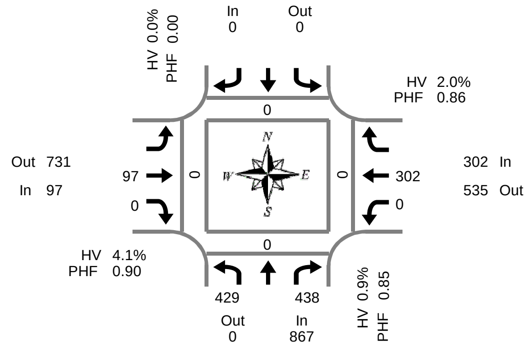


Approach	PHF	HV%	Volume
EB	0.84	3.5%	141
WB	0.90	1.2%	730
NB	0.00	0.0%	0
SB	0.92	1.8%	703
Intersection	0.93	1.7%	1,574

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

12th St South & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				Interval	Pedestrians			
Start	12th St South				12th St South				May Ave				May Ave					Crosswalk			
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	Total	North	South	East	West
4:00 PM	30		38	0				0		7	0	0	0	20		0	95	0	0	0	0
4:05 PM	42		35	0				0		6	0	0	0	34		0	117	0	0	0	0
4:10 PM	41		37	0				0		6	0	0	0	16		0	100	0	0	0	0
4:15 PM	30		37	0				0		10	0	0	0	19		0	96	0	0	0	0
4:20 PM	30		37	0				0		6	0	0	0	18		1	91	0	0	0	0
4:25 PM	24		30	0				0		8	0	0	0	13		0	75	0	0	0	0
4:30 PM	40		37	1				0		7	0	0	0	18		0	102	0	0	0	0
4:35 PM	44		33	0				0		11	0	1	0	28		0	116	0	0	0	0
4:40 PM	33		32	0				0		5	0	0	0	34		0	104	0	0	0	0
4:45 PM	29		42	0				0		10	0	0	0	26		0	107	0	0	0	0
4:50 PM	27		23	0				0		9	0	0	0	24		0	83	0	0	0	0
4:55 PM	37		37	0				0		6	0	0	0	28		0	108	0	0	0	0
5:00 PM	39		41	0				0		10	0	0	0	19		0	109	0	0	0	0
5:05 PM	36		38	0				0		9	0	0	0	26		0	109	0	0	0	0
5:10 PM	56		46	0				0		3	0	0	0	29		0	134	0	0	0	0
5:15 PM	30		39	0				0		9	0	0	0	28		0	106	0	0	0	0
5:20 PM	37		39	0				0		5	0	2	0	23		0	104	0	0	0	0
5:25 PM	21		31	0				0		13	0	0	0	19		0	84	0	0	0	0
5:30 PM	26		34	0				0		8	0	0	0	13		0	81	0	0	0	0
5:35 PM	24		22	0				0		2	0	0	0	14		0	62	0	0	0	0
5:40 PM	25		28	0				0		4	0	0	0	13		0	70	0	0	0	0
5:45 PM	22		38	0				0		10	0	0	0	10		0	80	0	0	0	0
5:50 PM	22		29	0				0		10	0	0	0	17		0	78	0	0	0	0
5:55 PM	25		30	0				0		4	0	0	0	15		0	74	0	0	0	0
Total Survey	770		833	1				0		178	0	3	0	504		1	2,285	0	0	0	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				Interval	Pedestrians			
Start	12th St South				12th St South				May Ave				May Ave					Crosswalk			
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	Total	North	South	East	West
4:00 PM	113		110	0				0		19	0	0	0	70		0	312	0	0	0	0
4:15 PM	84		104	0				0		24	0	0	0	50		1	262	0	0	0	0
4:30 PM	117		102	1				0		23	0	1	0	80		0	322	0	0	0	0
4:45 PM	93		102	0				0		25	0	0	0	78		0	298	0	0	0	0
5:00 PM	131		125	0				0		22	0	0	0	74		0	352	0	0	0	0
5:15 PM	88		109	0				0		27	0	2	0	70		0	294	0	0	0	0
5:30 PM	75		84	0				0		14	0	0	0	40		0	213	0	0	0	0
5:45 PM	69		97	0				0		24	0	0	0	42		0	232	0	0	0	0
Total Survey	770		833	1				0		178	0	3	0	504		1	2,285	0	0	0	0

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound				Southbound				Eastbound				Westbound				Total
	12th St South				12th St South				May Ave				May Ave				
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	867	0	867	1	0	0	0	0	97	731	828	3	302	535	837	0	1,266
%HV	0.9%				0.0%				4.1%				2.0%				1.4%
PHF	0.85				0.00				0.90				0.86				0.90

Pedestrians			
Crosswalk			
North	South	East	West
0	0	0	0

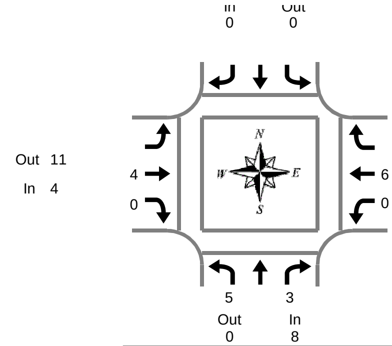
By Movement	Northbound				Southbound				Eastbound				Westbound				Total
	12th St South				12th St South				May Ave				May Ave				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	429		438	867				0		97	0	97	0	302		302	1,266
%HV	1.2%	NA	0.7%	0.9%	NA	NA	NA	0.0%	NA	4.1%	0.0%	4.1%	0.0%	2.0%	NA	2.0%	1.4%
PHF	0.82		0.88	0.85				0.00		0.90	0.00	0.90	0.00	0.86		0.86	0.90

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				Interval	Pedestrians			
Start	12th St South				12th St South				May Ave				May Ave					Crosswalk			
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	Total	North	South	East	West
4:00 PM	407		418	1				0		91	0	1	0	278		1	1,194	0	0	0	0
4:15 PM	425		433	1				0		94	0	1	0	282		1	1,234	0	0	0	0
4:30 PM	429		438	1				0		97	0	3	0	302		0	1,266	0	0	0	0
4:45 PM	387		420	0				0		88	0	2	0	262		0	1,157	0	0	0	0
5:00 PM	363		415	0				0		87	0	2	0	226		0	1,091	0	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

12th St South & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St South L		R	Total	Southbound 12th St South			Total	Eastbound May Ave	T	R	Total	Westbound May Ave L	T		Total	Interval Total
4:00 PM	0		0	0				0		1	0	1	0	0		0	1
4:05 PM	1		0	1				0		0	0	0	0	1		1	2
4:10 PM	0		0	0				0		1	0	1	0	1		1	2
4:15 PM	0		2	2				0		0	0	0	0	0		0	2
4:20 PM	0		0	0				0		0	0	0	0	0		0	0
4:25 PM	1		0	1				0		0	0	0	0	1		1	2
4:30 PM	1		1	2				0		0	0	0	0	1		1	3
4:35 PM	0		0	0				0		0	0	0	0	0		0	0
4:40 PM	0		1	1				0		1	0	1	0	1		1	3
4:45 PM	0		0	0				0		0	0	0	0	2		2	2
4:50 PM	1		0	1				0		0	0	0	0	0		0	1
4:55 PM	0		0	0				0		0	0	0	0	1		1	1
5:00 PM	1		1	2				0		0	0	0	0	0		0	2
5:05 PM	1		0	1				0		0	0	0	0	1		1	2
5:10 PM	0		0	0				0		0	0	0	0	0		0	0
5:15 PM	1		0	1				0		0	0	0	0	0		0	1
5:20 PM	0		0	0				0		2	0	2	0	0		0	2
5:25 PM	0		0	0				0		1	0	1	0	0		0	1
5:30 PM	0		0	0				0		1	0	1	0	0		0	1
5:35 PM	0		1	1				0		0	0	0	0	0		0	1
5:40 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		0	0	0	0	0		0	0
5:50 PM	0		0	0				0		0	0	0	0	1		1	1
5:55 PM	1		0	1				0		0	0	0	0	0		0	1
Total Survey	8		6	14				0		7	0	7	0	10		10	31

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St South L		R	Total	Southbound 12th St South			Total	Eastbound May Ave	T	R	Total	Westbound May Ave L	T		Total	Interval Total
4:00 PM	1		0	1				0		2	0	2	0	2		2	5
4:15 PM	1		2	3				0		0	0	0	0	1		1	4
4:30 PM	1		2	3				0		1	0	1	0	2		2	6
4:45 PM	1		0	1				0		0	0	0	0	3		3	4
5:00 PM	2		1	3				0		0	0	0	0	1		1	4
5:15 PM	1		0	1				0		3	0	3	0	0		0	4
5:30 PM	0		1	1				0		1	0	1	0	0		0	2
5:45 PM	1		0	1				0		0	0	0	0	1		1	2
Total Survey	8		6	14				0		7	0	7	0	10		10	31

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 12th St South In	Out	Total	Southbound 12th St South In	Out	Total	Eastbound May Ave In	Out	Total	Westbound May Ave In	Out	Total	Total
Volume	8	0	8	0	0	0	4	11	15	6	7	13	18
PHF	0.67			0.00			0.33			0.50			0.75

By Movement	Northbound 12th St South L		R	Total	Southbound 12th St South			Total	Eastbound May Ave	T	R	Total	Westbound May Ave L	T		Total	Total
Volume	5		3	8				0		4	0	4	0	6		6	18
PHF	0.63		0.38	0.67				0.00		0.33	0.00	0.33	0.00	0.50		0.50	0.75

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

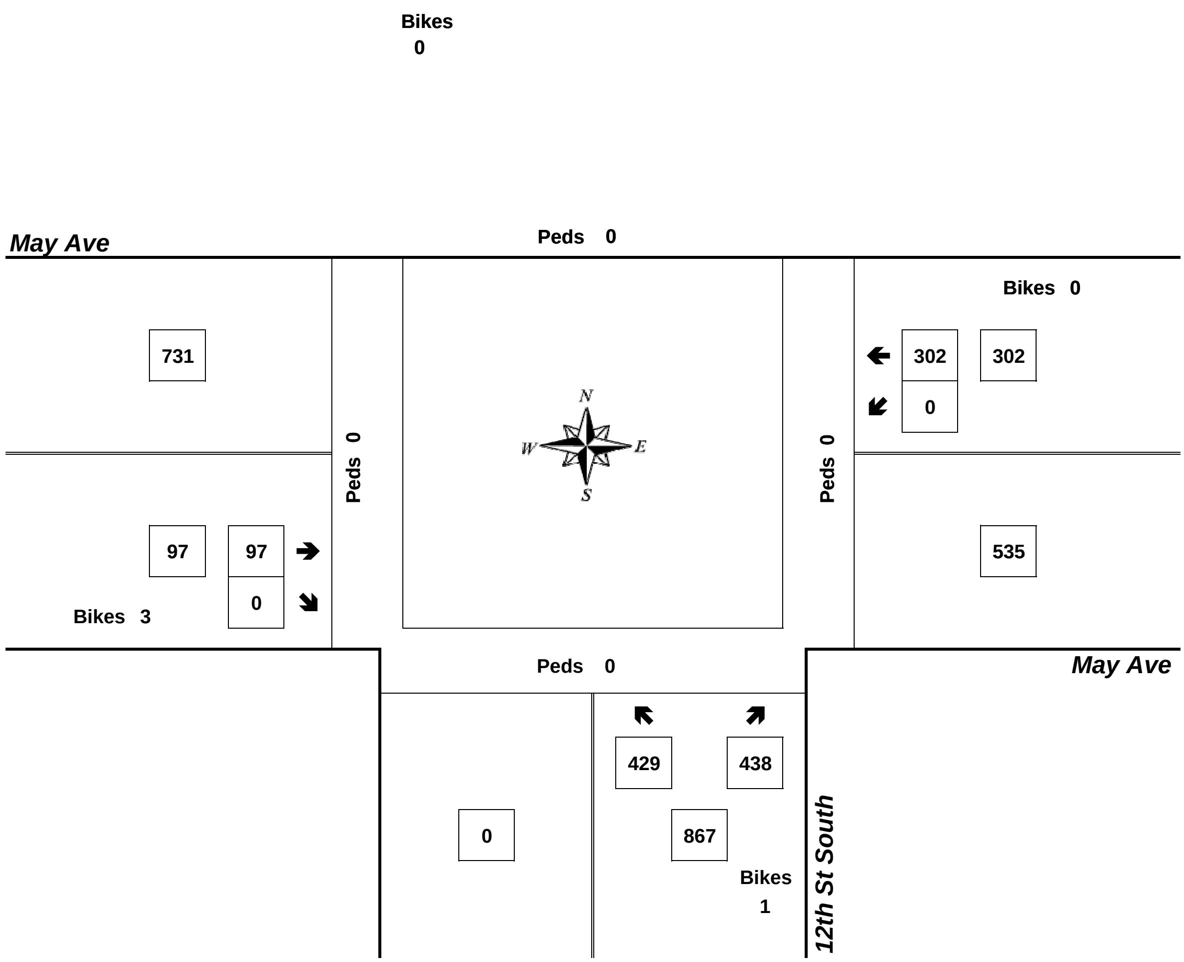
Interval Start Time	Northbound 12th St South L		R	Total	Southbound 12th St South			Total	Eastbound May Ave	T	R	Total	Westbound May Ave L	T		Total	Interval Total
4:00 PM	4		4	8				0		3	0	3	0	8		8	19
4:15 PM	5		5	10				0		1	0	1	0	7		7	18
4:30 PM	5		3	8				0		4	0	4	0	6		6	18
4:45 PM	4		2	6				0		4	0	4	0	4		4	14
5:00 PM	4		2	6				0		4	0	4	0	2		2	12

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

12th St South & May Ave

4:30 PM to 5:30 PM
Tuesday, May 18, 2010

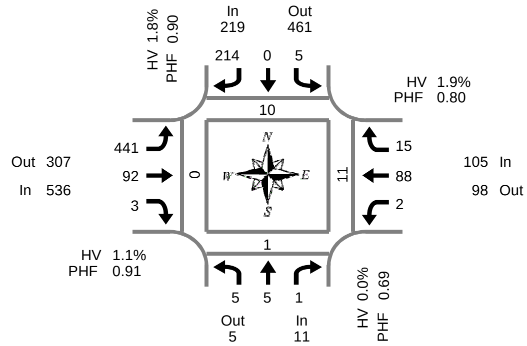


Approach	PHF	HV%	Volume
EB	0.90	4.1%	97
WB	0.86	2.0%	302
NB	0.85	0.9%	867
SB	0.00	0.0%	0
Intersection	0.90	1.4%	1,266

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

12th St North & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	0	0	0	14	0	43	3	0	0	0	5	2	0	67	1	0	0	0
4:05 PM	1	0	0	0	1	1	20	0	34	4	3	0	0	13	0	0	77	1	0	1	0
4:10 PM	1	0	0	0	0	1	16	0	38	5	1	0	0	3	3	0	68	1	1	0	0
4:15 PM	0	0	0	0	1	0	13	0	37	11	0	0	0	6	3	0	71	2	0	1	0
4:20 PM	0	1	0	0	1	0	15	0	37	7	0	0	0	3	0	0	64	0	0	0	0
4:25 PM	0	0	0	0	0	0	7	0	35	4	1	0	0	6	0	0	53	1	0	0	0
4:30 PM	0	2	0	0	0	0	15	0	34	6	0	0	1	1	0	0	59	1	0	0	0
4:35 PM	0	0	0	0	0	0	17	0	38	9	0	0	0	12	3	0	79	0	0	0	0
4:40 PM	1	1	0	0	0	0	19	0	31	4	0	0	1	11	1	0	69	1	0	1	0
4:45 PM	0	1	0	0	0	0	19	0	37	12	0	0	0	5	0	0	74	0	0	2	0
4:50 PM	0	0	1	0	1	0	22	0	33	5	1	0	0	9	1	0	73	2	0	0	0
4:55 PM	0	1	0	0	1	0	18	0	31	6	0	0	0	9	1	0	67	0	0	0	0
5:00 PM	0	0	0	0	0	0	15	0	43	11	1	0	0	7	2	0	79	0	0	1	0
5:05 PM	0	0	0	0	0	0	23	0	30	10	0	0	0	4	2	0	69	1	0	1	0
5:10 PM	3	0	0	0	1	0	15	0	48	5	0	0	0	9	1	0	82	2	0	5	0
5:15 PM	1	0	0	0	2	0	18	0	41	7	0	0	0	9	1	0	79	1	1	1	0
5:20 PM	0	0	0	0	0	0	18	0	38	9	0	0	0	7	3	0	75	2	0	0	0
5:25 PM	0	0	0	0	0	0	15	0	37	8	1	0	0	5	0	0	66	0	0	0	0
5:30 PM	0	0	0	0	0	0	9	0	31	8	0	0	0	8	2	0	58	0	0	0	0
5:35 PM	0	1	0	0	0	0	6	0	20	5	0	0	0	8	1	0	41	2	0	0	0
5:40 PM	0	0	0	0	0	0	5	0	28	6	1	0	0	6	1	0	47	1	0	0	0
5:45 PM	0	0	0	0	0	0	8	0	33	15	0	0	0	5	0	0	61	0	0	0	0
5:50 PM	0	0	0	0	0	0	9	0	27	13	0	0	0	6	3	0	58	1	1	0	0
5:55 PM	0	0	0	0	0	0	11	0	29	5	0	0	0	3	0	0	48	0	0	0	0
Total Survey	7	7	1	0	8	2	347	0	833	178	9	0	2	160	30	0	1,584	20	3	13	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	2	0	0	0	1	2	50	0	115	12	4	0	0	21	5	0	212	3	1	1	0
4:15 PM	0	1	0	0	2	0	35	0	109	22	1	0	0	15	3	0	188	3	0	1	0
4:30 PM	1	3	0	0	0	0	51	0	103	19	0	0	2	24	4	0	207	2	0	1	0
4:45 PM	0	2	1	0	2	0	59	0	101	23	1	0	0	23	2	0	214	2	0	2	0
5:00 PM	3	0	0	0	1	0	53	0	121	26	1	0	0	20	5	0	230	3	0	7	0
5:15 PM	1	0	0	0	2	0	51	0	116	24	1	0	0	21	4	0	220	3	1	1	0
5:30 PM	0	1	0	0	0	0	20	0	79	19	1	0	0	22	4	0	146	3	0	0	0
5:45 PM	0	0	0	0	0	0	28	0	89	33	0	0	0	14	3	0	167	1	1	0	0
Total Survey	7	7	1	0	8	2	347	0	833	178	9	0	2	160	30	0	1,584	20	3	13	0

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	11	5	16	0	219	461	680	0	536	307	843	0	105	98	203	0	871	10	1	11	0
%HV	0.0%				1.8%				1.1%				1.9%				1.4%				
PHF	0.69				0.90				0.91				0.80				0.92				

By Movement	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	5	5	1	11	5	0	214	219	441	92	3	536	2	88	15	105	871
%HV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	1.8%	0.7%	2.2%	33.3%	1.1%	50.0%	1.1%	0.0%	1.9%	1.4%
PHF	0.31	0.42	0.25	0.69	0.42	0.00	0.89	0.90	0.87	0.85	0.38	0.91	0.25	0.79	0.75	0.80	0.92

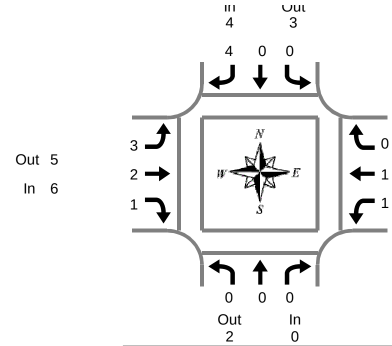
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	3	6	1	0	5	2	195	0	428	76	6	0	2	83	14	0	821	10	1	5	0
4:15 PM	4	6	1	0	5	0	198	0	434	90	3	0	2	82	14	0	839	10	0	11	0
4:30 PM	5	5	1	0	5	0	214	0	441	92	3	0	2	88	15	0	871	10	1	11	0
4:45 PM	4	3	1	0	5	0	183	0	417	92	4	0	0	86	15	0	810	11	1	10	0
5:00 PM	4	1	0	0	3	0	152	0	405	102	3	0	0	77	16	0	763	10	2	8	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

12th St North & May Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	2
4:10 PM	0	0	0	0	0	0	1	1	1	1	0	2	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	1	1	3
4:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:25 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	3
4:45 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
4:50 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
4:55 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
5:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	0	0	0	0	1	2	0	3	0	0	0	0	3
5:25 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:35 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	0	0	6	6	7	4	2	13	1	4	1	6	25

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	1	1	1	1	1	3	0	1	0	1	5
4:15 PM	0	0	0	0	0	0	1	1	2	0	0	2	0	0	1	1	4
4:30 PM	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	3
4:45 PM	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	3
5:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
5:15 PM	0	0	0	0	0	0	0	0	1	2	1	4	0	0	0	0	4
5:30 PM	0	0	0	0	0	0	0	0	1	1	0	2	0	1	0	1	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Survey	0	0	0	0	0	0	6	6	7	4	2	13	1	4	1	6	25

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 12th St North			Southbound 12th St North			Eastbound May Ave			Westbound May Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	2	2	4	3	7	6	5	11	2	2	4	12
PHF	0.00			0.33			0.38			0.50			0.60

By Movement	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	0	0	4	4	3	2	1	6	1	1	0	2	12
PHF	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	0.75	0.25	0.25	0.38	0.25	0.25	0.00	0.50	0.60

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

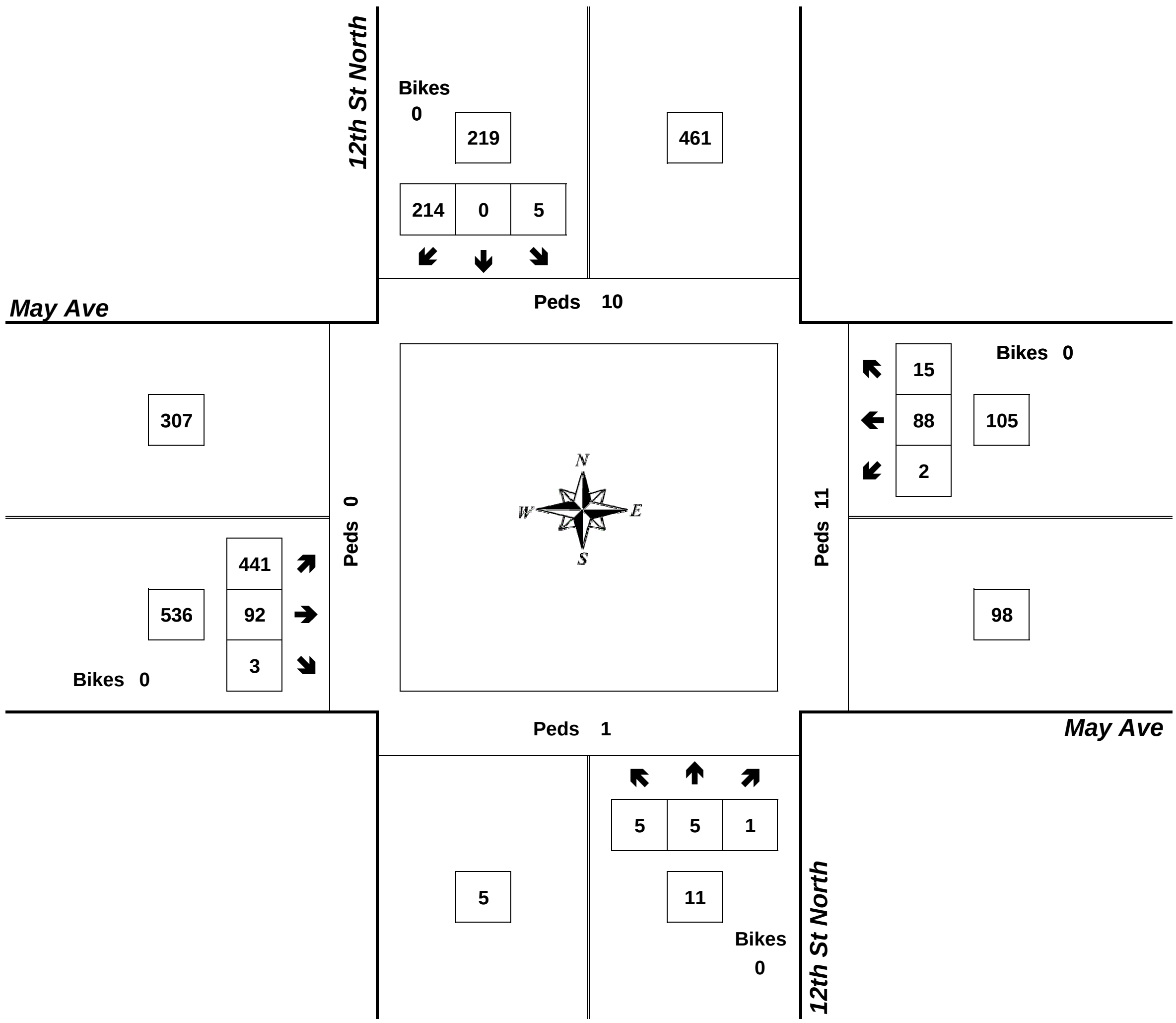
Interval Start Time	Northbound 12th St North				Southbound 12th St North				Eastbound May Ave				Westbound May Ave				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	6	6	4	1	1	6	1	1	1	3	15
4:15 PM	0	0	0	0	0	0	5	5	4	0	0	4	1	1	1	3	12
4:30 PM	0	0	0	0	0	0	4	4	3	2	1	6	1	1	0	2	12
4:45 PM	0	0	0	0	0	0	3	3	3	3	1	7	0	2	0	2	12
5:00 PM	0	0	0	0	0	0	0	0	3	3	1	7	0	3	0	3	10

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

12th St North & May Ave

4:30 PM to 5:30 PM
Tuesday, May 18, 2010



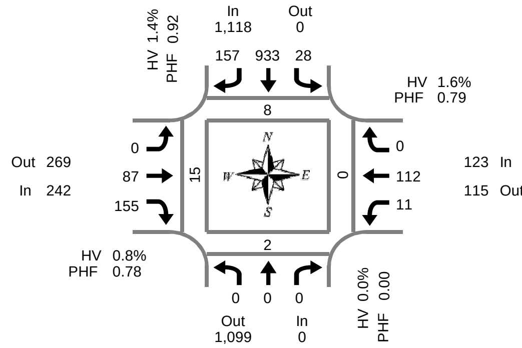
Approach	PHF	HV%	Volume
EB	0.91	1.1%	536
WB	0.80	1.9%	105
NB	0.69	0.0%	11
SB	0.90	1.8%	219
Intersection	0.92	1.4%	871

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:25 PM to 5:25 PM

Belmont Ave & 13th St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	0	5	50	12	0	0	8	16	0	0	11	0	0	102	1	0	0	0
4:05 PM	0	0	0	0	2	59	10	0	0	9	13	0	0	12	0	0	105	1	0	0	0
4:10 PM	0	0	0	0	4	66	13	0	0	12	17	0	2	6	0	1	120	2	0	0	2
4:15 PM	0	0	0	0	1	55	4	0	0	7	11	0	2	7	0	0	87	1	0	0	0
4:20 PM	0	0	0	0	1	55	7	0	0	3	13	0	1	8	0	0	88	1	0	0	0
4:25 PM	0	0	0	0	3	64	16	0	0	7	14	0	0	9	0	0	113	0	0	0	0
4:30 PM	0	0	0	0	4	78	13	0	0	8	14	0	1	8	0	0	126	0	0	0	0
4:35 PM	0	0	0	0	3	69	9	0	0	13	22	1	3	8	0	0	127	0	0	0	0
4:40 PM	0	0	0	0	7	71	14	0	0	4	14	1	2	7	0	0	119	0	0	0	2
4:45 PM	0	0	0	0	1	84	6	0	0	6	8	0	0	10	0	0	115	0	1	0	3
4:50 PM	0	0	0	0	2	83	11	0	0	5	16	0	0	12	0	1	129	3	0	0	7
4:55 PM	0	0	0	1	2	87	11	0	0	2	11	0	2	8	0	0	123	0	0	0	1
5:00 PM	0	0	0	0	0	72	9	0	0	13	10	0	1	7	0	0	112	3	0	0	0
5:05 PM	0	0	0	0	2	95	16	0	0	4	14	0	0	6	0	0	137	0	1	0	2
5:10 PM	0	0	0	0	2	86	18	0	0	9	10	0	2	9	0	0	136	0	0	0	0
5:15 PM	0	0	0	0	1	69	16	0	0	9	8	1	0	13	0	2	116	2	0	0	0
5:20 PM	0	0	0	1	1	75	18	0	0	7	14	0	0	15	0	0	130	0	0	0	0
5:25 PM	0	0	0	0	0	58	21	0	0	8	9	0	0	6	0	0	102	0	0	0	0
5:30 PM	0	0	0	0	1	59	9	0	0	7	10	0	1	7	0	0	94	0	0	0	0
5:35 PM	0	0	0	1	1	61	7	0	0	7	11	0	0	12	0	0	99	0	0	0	0
5:40 PM	0	0	0	0	2	49	6	0	0	11	19	0	2	13	0	0	102	0	0	0	3
5:45 PM	0	0	0	0	0	48	5	0	0	5	12	1	2	8	0	0	80	0	0	0	0
5:50 PM	0	0	0	0	3	56	12	0	0	7	9	0	0	4	0	0	91	1	0	0	2
5:55 PM	0	0	0	0	2	60	12	0	0	8	9	0	1	14	0	0	106	0	0	0	2
Total Survey	0	0	0	3	50	1,609	275	0	0	179	304	4	22	220	0	4	2,659	15	2	0	24

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	0	11	175	35	0	0	29	46	0	2	29	0	1	327	4	0	0	2
4:15 PM	0	0	0	0	5	174	27	0	0	17	38	0	3	24	0	0	288	2	0	0	0
4:30 PM	0	0	0	0	14	218	36	0	0	25	50	2	6	23	0	0	372	0	0	0	2
4:45 PM	0	0	0	1	5	254	28	0	0	13	35	0	2	30	0	1	367	3	1	0	11
5:00 PM	0	0	0	0	4	253	43	0	0	26	34	0	3	22	0	0	385	3	1	0	2
5:15 PM	0	0	0	1	2	202	55	0	0	24	31	1	0	34	0	2	348	2	0	0	0
5:30 PM	0	0	0	1	4	169	22	0	0	25	40	0	3	32	0	0	295	0	0	0	3
5:45 PM	0	0	0	0	5	164	29	0	0	20	30	1	3	26	0	0	277	1	0	0	4
Total Survey	0	0	0	3	50	1,609	275	0	0	179	304	4	22	220	0	4	2,659	15	2	0	24

Peak Hour Summary
4:25 PM to 5:25 PM

By Approach	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	0	1,099	1,099	2	1,118	0	1,118	0	242	269	511	3	123	115	238	3	1,483	8	2	0	15
%HV	0.0%				1.4%				0.8%				1.6%				1.3%				
PHF	0.00				0.92				0.78				0.79				0.95				

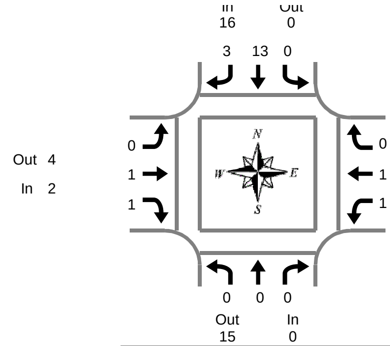
By Movement	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	28	933	157	1,118	0	87	155	242	11	112	0	123	1,483
%HV	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	1.9%	1.4%	0.0%	1.1%	0.6%	0.8%	9.1%	0.9%	0.0%	1.6%	1.3%
PHF	0.00	0.00	0.00	0.00	0.50	0.92	0.75	0.92	0.00	0.78	0.78	0.78	0.46	0.76	0.00	0.79	0.95

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	0	0	1	35	821	126	0	0	84	169	2	13	106	0	2	1,354	9	1	0	15
4:15 PM	0	0	0	1	28	899	134	0	0	81	157	2	14	99	0	1	1,412	8	2	0	15
4:30 PM	0	0	0	2	25	927	162	0	0	88	150	3	11	109	0	3	1,472	8	2	0	15
4:45 PM	0	0	0	3	15	878	148	0	0	88	140	1	8	118	0	3	1,395	8	2	0	16
5:00 PM	0	0	0	2	15	788	149	0	0	95	135	2	9	114	0	2	1,305	6	1	0	9

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:25 PM to 5:25 PM

Belmont Ave & 13th St

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	1	0	1	0	2	2	4	0	0	0	0	5
4:15 PM	0	0	0	0	0	2	0	2	0	0	1	1	0	0	0	0	3
4:20 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	3
4:35 PM	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	2
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
4:45 PM	0	0	0	0	0	5	1	6	0	0	0	0	0	0	0	0	6
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
5:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
5:05 PM	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	2
5:10 PM	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	2
5:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
5:20 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:50 PM	0	0	0	0	0	2	0	2	0	1	0	1	0	0	0	0	3
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	0	20	4	24	0	5	4	9	1	1	0	2	35

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	1	0	1	0	2	2	4	0	0	0	0	5
4:15 PM	0	0	0	0	0	4	0	4	0	0	1	1	0	0	0	0	5
4:30 PM	0	0	0	0	0	4	1	5	0	0	0	0	0	1	0	1	6
4:45 PM	0	0	0	0	0	5	1	6	0	0	1	1	0	0	0	0	7
5:00 PM	0	0	0	0	0	3	1	4	0	0	0	0	1	0	0	1	5
5:15 PM	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	2	0	2	0	2	0	2	0	0	0	0	4
Total Survey	0	0	0	0	0	20	4	24	0	5	4	9	1	1	0	2	35

Heavy Vehicle Peak Hour Summary
4:25 PM to 5:25 PM

By Approach	Northbound Belmont Ave			Southbound Belmont Ave			Eastbound 13th St			Westbound 13th St			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	15	15	16	0	16	2	4	6	2	1	3	20
PHF	0.00			0.50			0.50			0.50			0.56

By Movement	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	0	13	3	16	0	1	1	2	1	1	0	2	20
PHF	0.00	0.00	0.00	0.00	0.00	0.54	0.38	0.50	0.00	0.25	0.25	0.50	0.25	0.25	0.00	0.50	0.56

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

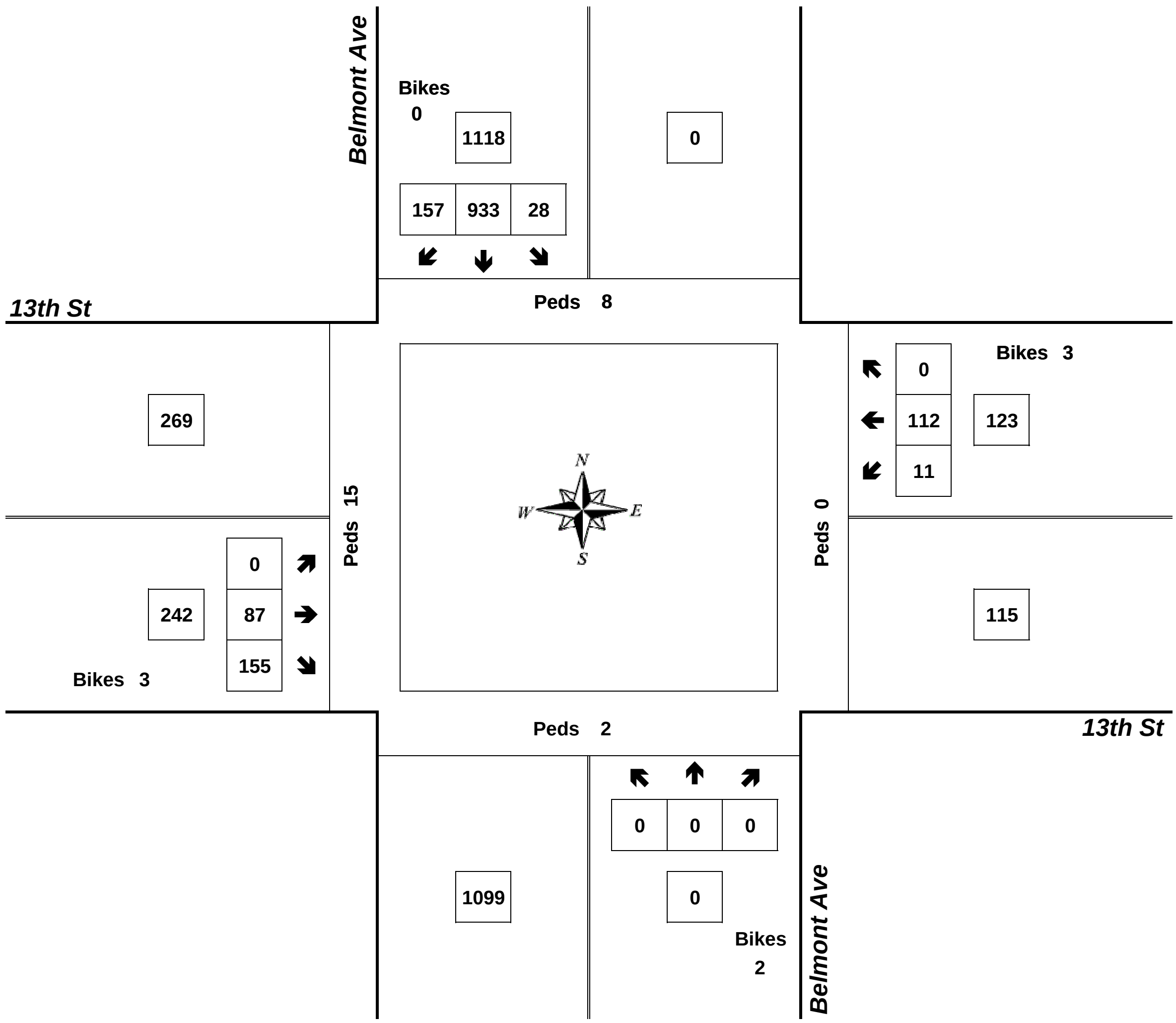
Interval Start Time	Northbound Belmont Ave				Southbound Belmont Ave				Eastbound 13th St				Westbound 13th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	14	2	16	0	2	4	6	0	1	0	1	23
4:15 PM	0	0	0	0	0	16	3	19	0	0	2	2	1	1	0	2	23
4:30 PM	0	0	0	0	0	13	3	16	0	1	1	2	1	1	0	2	20
4:45 PM	0	0	0	0	0	9	3	12	0	1	1	2	1	0	0	1	15
5:00 PM	0	0	0	0	0	6	2	8	0	3	0	3	1	0	0	1	12

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Belmont Ave & 13th St

4:25 PM to 5:25 PM
Tuesday, May 18, 2010



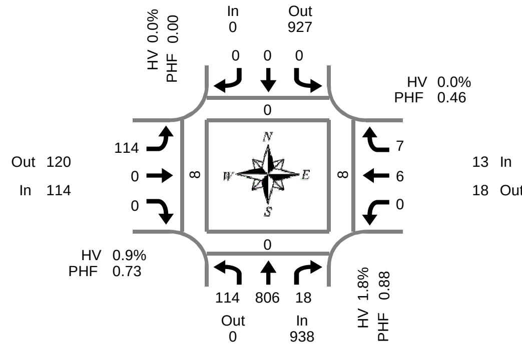
Approach	PHF	HV%	Volume
EB	0.78	0.8%	242
WB	0.79	1.6%	123
NB	0.00	0.0%	0
SB	0.92	1.4%	1,118
Intersection	0.95	1.3%	1,483

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:20 PM to 5:20 PM

12th St & Belmont Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				Interval	Pedestrians			
Start	12th St				12th St				Belmont Ave				Belmont Ave					Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
4:00 PM	9	62	2	0	0	0	0	0	10	2	0	0	0	0	0	0	85	0	0	0	0
4:05 PM	13	74	2	0	0	0	0	0	9	0	0	0	0	2	1	0	101	0	0	0	1
4:10 PM	6	54	2	0	0	0	0	0	21	0	0	0	0	1	1	1	85	0	0	2	1
4:15 PM	9	57	1	0	0	0	0	0	10	0	0	0	0	0	2	0	79	0	0	1	2
4:20 PM	8	65	4	0	0	0	0	0	5	0	0	0	0	0	2	0	84	0	0	0	1
4:25 PM	11	53	0	0	0	0	0	0	10	0	0	0	0	0	1	0	75	0	0	0	0
4:30 PM	9	69	2	1	0	0	0	0	9	0	0	0	0	1	3	0	93	0	0	1	1
4:35 PM	9	58	2	0	0	0	0	0	16	0	0	0	0	2	0	0	87	0	0	0	0
4:40 PM	3	63	0	0	0	0	0	0	14	0	0	1	0	1	0	0	81	0	0	2	1
4:45 PM	16	54	3	0	0	0	0	0	8	0	0	0	0	0	0	0	81	0	0	2	0
4:50 PM	12	64	0	0	0	0	0	0	6	0	0	0	0	1	0	1	83	0	0	1	2
4:55 PM	5	76	4	0	0	0	0	0	7	0	0	0	0	0	0	0	92	0	0	1	0
5:00 PM	11	75	1	1	0	0	0	0	11	0	0	0	0	1	0	0	99	0	0	0	0
5:05 PM	12	84	0	0	0	0	0	0	6	0	0	0	0	0	1	0	103	0	0	0	0
5:10 PM	10	63	2	0	0	0	0	0	12	0	0	0	0	0	0	0	87	0	0	0	2
5:15 PM	8	82	0	0	0	0	0	0	10	0	0	1	0	0	0	1	100	0	0	1	1
5:20 PM	13	51	0	0	0	0	0	0	10	0	0	0	0	0	0	0	74	0	0	0	0
5:25 PM	5	57	1	0	0	0	0	0	9	0	0	0	0	0	0	0	72	0	0	0	1
5:30 PM	9	47	1	0	0	0	0	0	6	1	0	0	0	2	0	0	66	0	0	1	0
5:35 PM	16	51	0	2	0	0	0	0	13	0	0	0	0	0	2	0	82	0	0	2	0
5:40 PM	10	33	1	0	0	0	0	0	11	0	0	0	0	2	0	0	57	0	0	2	0
5:45 PM	8	51	1	0	0	0	0	0	4	1	0	1	0	1	1	0	67	0	0	0	0
5:50 PM	4	53	0	0	0	0	0	0	10	0	0	0	0	0	0	0	67	0	0	0	0
5:55 PM	14	38	1	0	0	0	0	0	7	0	0	0	0	2	1	0	63	0	0	0	0
Total Survey	230	1,434	30	4	0	0	0	0	234	4	0	3	0	16	15	3	1,963	0	0	16	13

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				Interval	Pedestrians			
Start	12th St				12th St				Belmont Ave				Belmont Ave					Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
4:00 PM	28	190	6	0	0	0	0	0	40	2	0	0	0	3	2	1	271	0	0	2	2
4:15 PM	28	175	5	0	0	0	0	0	25	0	0	0	0	0	5	0	238	0	0	1	3
4:30 PM	21	190	4	1	0	0	0	0	39	0	0	1	0	4	3	0	261	0	0	3	2
4:45 PM	33	194	7	0	0	0	0	0	21	0	0	0	0	1	0	1	256	0	0	4	2
5:00 PM	33	222	3	1	0	0	0	0	29	0	0	0	0	1	1	0	289	0	0	0	2
5:15 PM	26	190	1	0	0	0	0	0	29	0	0	1	0	0	0	1	246	0	0	1	2
5:30 PM	35	131	2	2	0	0	0	0	30	1	0	0	0	4	2	0	205	0	0	5	0
5:45 PM	26	142	2	0	0	0	0	0	21	1	0	1	0	3	2	0	197	0	0	0	0
Total Survey	230	1,434	30	4	0	0	0	0	234	4	0	3	0	16	15	3	1,963	0	0	16	13

Peak Hour Summary
4:20 PM to 5:20 PM

By Approach	Northbound				Southbound				Eastbound				Westbound				Total	Pedestrians			
	12th St				12th St				Belmont Ave				Belmont Ave					Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	938	0	938	2	0	927	927	0	114	120	234	2	13	18	31	2	1,065	0	0	8	8
%HV	1.8%				0.0%				0.9%				0.0%				1.7%				
PHF	0.88				0.00				0.73				0.46				0.91				

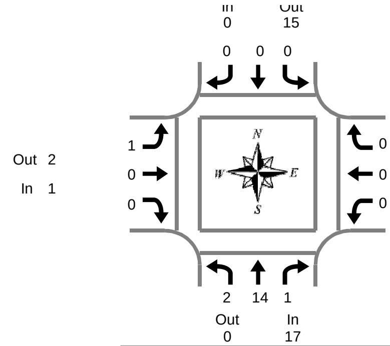
By Movement	Northbound				Southbound				Eastbound				Westbound				Total
	12th St				12th St				Belmont Ave				Belmont Ave				
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	114	806	18	938	0	0	0	0	114	0	0	114	0	6	7	13	1,065
%HV	1.8%	1.7%	5.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%	1.7%
PHF	0.86	0.86	0.64	0.88	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.73	0.00	0.38	0.29	0.46	0.91

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				Interval	Pedestrians			
Start	12th St				12th St				Belmont Ave				Belmont Ave					Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
4:00 PM	110	749	22	1	0	0	0	0	125	2	0	1	0	8	10	2	1,026	0	0	10	9
4:15 PM	115	781	19	2	0	0	0	0	114	0	0	1	0	6	9	1	1,044	0	0	8	9
4:30 PM	113	796	15	2	0	0	0	0	118	0	0	2	0	6	4	2	1,052	0	0	8	8
4:45 PM	127	737	13	3	0	0	0	0	109	1	0	1	0	6	3	2	996	0	0	10	6
5:00 PM	120	685	8	3	0	0	0	0	109	2	0	2	0	8	5	1	937	0	0	6	4

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:20 PM to 5:20 PM

12th St & Belmont Ave

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound 12th St				Southbound 12th St				Eastbound Belmont Ave				Westbound Belmont Ave				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
4:00 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
4:05 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:10 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	2
4:15 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
4:20 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
4:35 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:40 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
4:50 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	3
5:05 PM	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
5:10 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
5:35 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	2
5:50 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
5:55 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Survey	2	28	1	31	0	0	0	0	5	0	0	5	0	0	0	0	36

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound 12th St				Southbound 12th St				Eastbound Belmont Ave				Westbound Belmont Ave				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
4:00 PM	0	4	0	4	0	0	0	0	2	0	0	2	0	0	0	0	6
4:15 PM	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
4:30 PM	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
4:45 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
5:00 PM	2	3	1	6	0	0	0	0	1	0	0	1	0	0	0	0	7
5:15 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
5:45 PM	0	2	0	2	0	0	0	0	2	0	0	2	0	0	0	0	4
Total Survey	2	28	1	31	0	0	0	0	5	0	0	5	0	0	0	0	36

Heavy Vehicle Peak Hour Summary
4:20 PM to 5:20 PM

By Approach	Northbound 12th St			Southbound 12th St			Eastbound Belmont Ave			Westbound Belmont Ave			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	17	0	17	0	15	15	1	2	3	0	1	1	18
PHF	0.71			0.00			0.25			0.00			0.64

By Movement	Northbound 12th St				Southbound 12th St				Eastbound Belmont Ave				Westbound Belmont Ave				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	2	14	1	17	0	0	0	0	1	0	0	1	0	0	0	0	18
PHF	0.25	0.58	0.25	0.71	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.64

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start	Northbound 12th St				Southbound 12th St				Eastbound Belmont Ave				Westbound Belmont Ave				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
4:00 PM	0	17	0	17	0	0	0	0	2	0	0	2	0	0	0	0	19
4:15 PM	2	16	1	19	0	0	0	0	1	0	0	1	0	0	0	0	20
4:30 PM	2	13	1	16	0	0	0	0	1	0	0	1	0	0	0	0	17
4:45 PM	2	12	1	15	0	0	0	0	1	0	0	1	0	0	0	0	16
5:00 PM	2	11	1	14	0	0	0	0	3	0	0	3	0	0	0	0	17

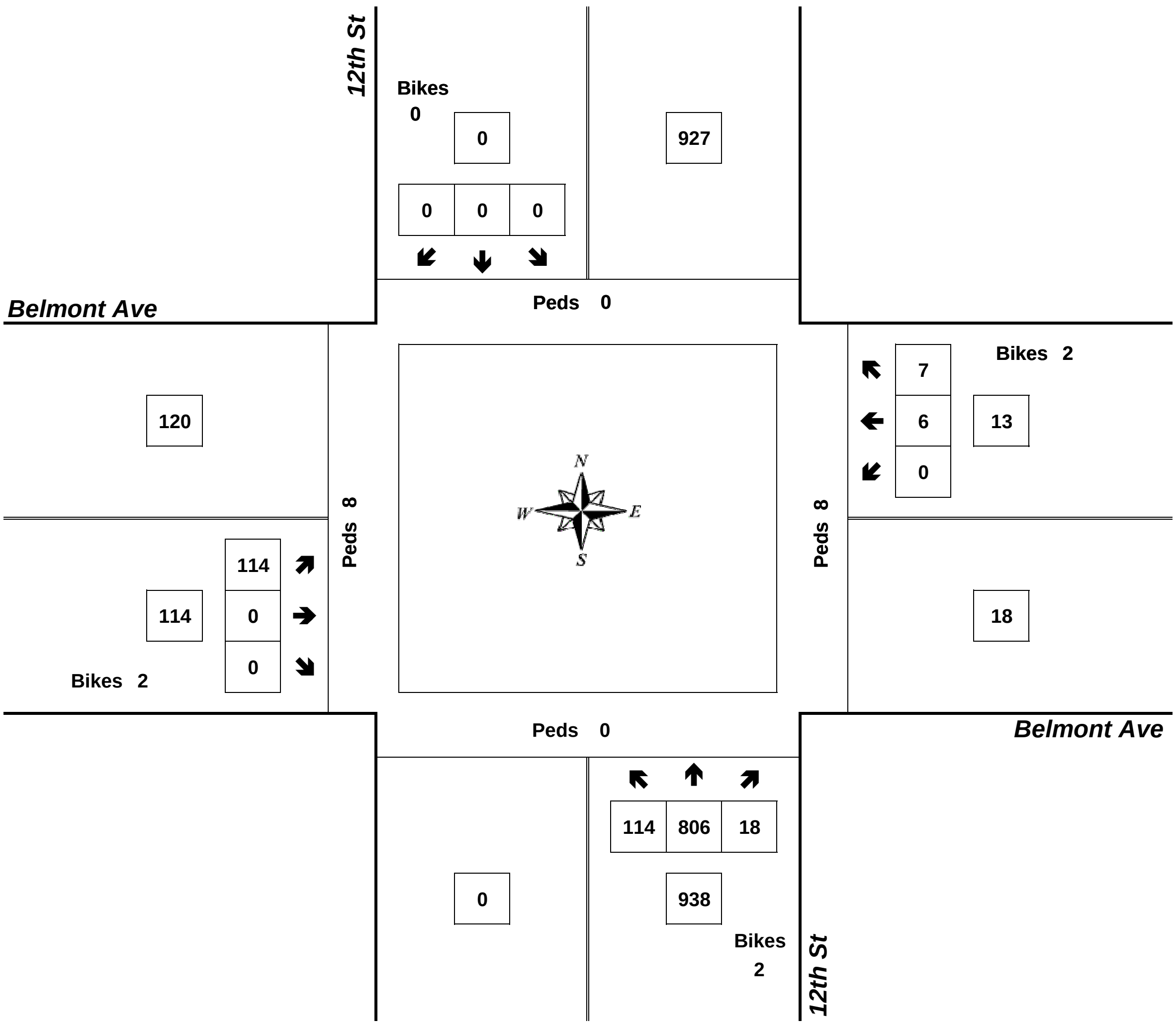
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

12th St & Belmont Ave

4:20 PM to 5:20 PM
Tuesday, May 18, 2010

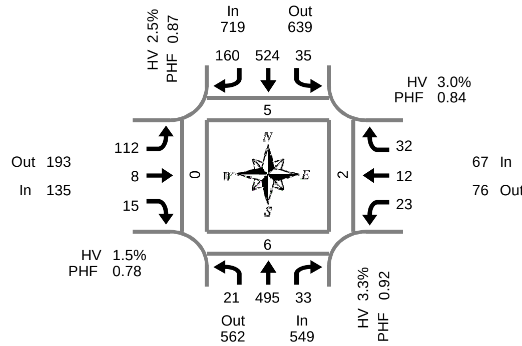


Approach	PHF	HV%	Volume
EB	0.73	0.9%	114
WB	0.46	0.0%	13
NB	0.88	1.8%	938
SB	0.00	0.0%	0
Intersection	0.91	1.7%	1,065

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:15 PM to 5:15 PM

12th St & Brookside Dr

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	0	46	0	0	2	37	10	0	12	0	3	0	2	0	2	0	114	0	0	0	0
4:05 PM	3	40	1	0	3	29	7	0	10	0	4	0	0	2	3	0	102	0	0	0	0
4:10 PM	7	30	4	0	1	41	7	0	8	0	2	0	2	1	2	0	105	0	0	0	0
4:15 PM	2	44	3	0	1	37	9	0	8	2	0	0	5	0	2	0	113	0	0	0	0
4:20 PM	0	37	5	0	2	45	9	1	10	0	1	1	0	2	2	0	113	0	0	0	0
4:25 PM	2	39	3	1	3	39	10	0	6	2	1	0	4	1	3	0	113	0	0	0	0
4:30 PM	2	50	2	0	0	48	6	0	5	1	1	0	1	1	2	0	119	0	0	1	0
4:35 PM	3	46	0	0	2	35	17	0	13	0	1	0	2	2	4	0	125	0	0	0	0
4:40 PM	2	40	3	0	1	57	12	0	9	1	2	0	2	0	1	0	130	0	1	0	0
4:45 PM	0	36	2	0	4	43	14	0	8	0	0	0	3	1	2	1	113	0	0	0	0
4:50 PM	2	35	0	0	2	33	20	0	11	0	3	0	1	0	6	0	113	3	0	0	0
4:55 PM	2	44	2	0	4	42	17	0	6	0	1	0	0	3	4	0	125	0	1	0	0
5:00 PM	0	45	7	0	2	52	16	0	9	1	0	0	0	1	0	0	133	2	1	1	0
5:05 PM	5	42	3	0	12	40	18	0	12	0	2	0	0	0	4	0	138	0	1	0	0
5:10 PM	1	37	3	0	2	53	12	1	15	1	3	0	5	1	2	0	135	0	2	0	0
5:15 PM	1	33	1	0	4	38	13	0	13	0	0	0	2	0	2	0	107	0	0	0	0
5:20 PM	4	31	1	0	2	38	13	0	7	2	2	0	1	3	1	1	105	0	0	0	0
5:25 PM	4	29	1	0	2	31	9	0	5	1	1	0	6	1	2	0	92	0	1	2	0
5:30 PM	2	30	0	0	5	31	13	0	12	0	0	0	3	0	1	1	97	0	1	0	0
5:35 PM	0	33	1	0	2	41	12	0	7	0	0	0	0	0	2	0	98	0	0	0	0
5:40 PM	2	26	0	0	6	32	5	0	7	2	1	0	2	1	1	0	85	0	0	0	0
5:45 PM	1	28	1	0	0	30	9	0	7	0	1	0	0	1	1	0	79	0	1	0	0
5:50 PM	0	20	0	0	1	30	8	0	9	1	1	0	0	0	2	0	72	1	2	0	0
5:55 PM	1	25	0	0	1	31	10	0	5	3	0	0	0	1	1	0	78	0	0	0	0
Total Survey	46	866	43	1	64	933	276	2	214	17	30	1	41	22	52	3	2,604	6	11	4	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	10	116	5	0	6	107	24	0	30	0	9	0	4	3	7	0	321	0	0	0	0
4:15 PM	4	120	11	1	6	121	28	1	24	4	2	1	9	3	7	0	339	0	0	0	0
4:30 PM	7	136	5	0	3	140	35	0	27	2	4	0	5	3	7	0	374	0	1	1	0
4:45 PM	4	115	4	0	10	118	51	0	25	0	4	0	4	4	12	1	351	3	1	0	0
5:00 PM	6	124	13	0	16	145	46	1	36	2	5	0	5	2	6	0	406	2	4	1	0
5:15 PM	9	93	3	0	8	107	35	0	25	3	3	0	9	4	5	1	304	0	1	2	0
5:30 PM	4	89	1	0	13	104	30	0	26	2	1	0	5	1	4	1	280	0	1	0	0
5:45 PM	2	73	1	0	2	91	27	0	21	4	2	0	0	2	4	0	229	1	3	0	0
Total Survey	46	866	43	1	64	933	276	2	214	17	30	1	41	22	52	3	2,604	6	11	4	0

Peak Hour Summary
4:15 PM to 5:15 PM

By Approach	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	549	562	1,111	1	719	639	1,358	2	135	193	328	1	67	76	143	1	1,470	5	6	2	0
%HV	3.3%				2.5%				1.5%				3.0%				2.7%				
PHF	0.92				0.87				0.78				0.84				0.91				

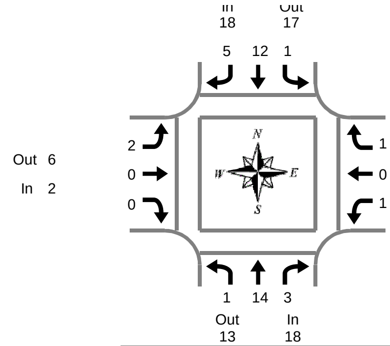
By Movement	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	21	495	33	549	35	524	160	719	112	8	15	135	23	12	32	67	1,470
%HV	4.8%	2.8%	9.1%	3.3%	2.9%	2.3%	3.1%	2.5%	1.8%	0.0%	0.0%	1.5%	4.3%	0.0%	3.1%	3.0%	2.7%
PHF	0.75	0.91	0.63	0.92	0.49	0.90	0.75	0.87	0.78	0.50	0.75	0.78	0.64	0.75	0.67	0.84	0.91

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	25	487	25	1	25	486	138	1	106	6	19	1	22	13	33	1	1,385	3	2	1	0
4:15 PM	21	495	33	1	35	524	160	2	112	8	15	1	23	12	32	1	1,470	5	6	2	0
4:30 PM	26	468	25	0	37	510	167	1	113	7	16	0	23	13	30	2	1,435	5	7	4	0
4:45 PM	23	421	21	0	47	474	162	1	112	7	13	0	23	11	27	3	1,341	5	7	3	0
5:00 PM	21	379	18	0	39	447	138	1	108	11	11	0	19	9	19	2	1,219	3	9	3	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



12th St & Brookside Dr

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Peak Hour Summary
4:15 PM to 5:15 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	1	0	1	0	2	0	2	1	0	0	1	0	0	0	0	4
4:05 PM	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
4:10 PM	0	1	0	1	0	1	0	1	0	0	1	1	0	0	0	0	3
4:15 PM	0	3	0	3	1	1	0	2	0	0	0	0	0	0	0	0	5
4:20 PM	0	1	1	2	0	1	0	1	1	0	0	1	0	0	0	0	4
4:25 PM	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0	3
4:30 PM	1	2	0	3	0	3	0	3	0	0	0	0	0	0	0	0	6
4:35 PM	0	3	0	3	0	0	0	0	1	0	0	1	1	0	0	1	5
4:40 PM	0	1	1	2	0	0	1	1	0	0	0	0	0	0	0	0	3
4:45 PM	0	0	0	0	0	3	1	4	0	0	0	0	0	0	0	0	4
4:50 PM	0	1	0	1	0	0	2	2	0	0	0	0	0	0	0	0	3
4:55 PM	0	1	1	2	0	0	1	1	0	0	0	0	0	0	1	1	4
5:00 PM	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0	3
5:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	1	1	0	2	0	2	0	2	0	0	0	0	0	0	0	0	4
5:25 PM	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	2	0	2	1	0	0	1	0	0	0	0	3
5:35 PM	0	2	0	2	0	0	1	1	0	0	0	0	0	0	0	0	3
5:40 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	3
Total Survey	3	22	3	28	1	23	6	30	4	1	1	6	1	0	1	2	66

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	1	4	0	5	0	3	0	3	1	0	1	2	0	0	0	0	10
4:15 PM	0	5	1	6	1	4	0	5	1	0	0	1	0	0	0	0	12
4:30 PM	1	6	1	8	0	3	1	4	1	0	0	1	1	0	0	1	14
4:45 PM	0	2	1	3	0	3	4	7	0	0	0	0	0	0	1	1	11
5:00 PM	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0	3
5:15 PM	1	2	0	3	0	3	0	3	0	0	0	0	0	0	0	0	6
5:30 PM	0	2	0	2	0	2	1	3	1	1	0	2	0	0	0	0	7
5:45 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	3
Total Survey	3	22	3	28	1	23	6	30	4	1	1	6	1	0	1	2	66

Heavy Vehicle Peak Hour Summary
4:15 PM to 5:15 PM

By Approach	Northbound 12th St			Southbound 12th St			Eastbound Brookside Dr			Westbound Brookside Dr			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	18	13	31	18	17	35	2	6	8	2	4	6	40
PHF	0.56			0.64			0.50			0.50			0.71

By Movement	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	1	14	3	18	1	12	5	18	2	0	0	2	1	0	1	2	40
PHF	0.25	0.58	0.75	0.56	0.25	0.50	0.31	0.64	0.50	0.00	0.00	0.50	0.25	0.00	0.25	0.50	0.71

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 12th St				Southbound 12th St				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	2	17	3	22	1	13	5	19	3	0	1	4	1	0	1	2	47
4:15 PM	1	14	3	18	1	12	5	18	2	0	0	2	1	0	1	2	40
4:30 PM	2	11	2	15	0	11	5	16	1	0	0	1	1	0	1	2	34
4:45 PM	1	7	1	9	0	10	5	15	1	1	0	2	0	0	1	1	27
5:00 PM	1	5	0	6	0	10	1	11	1	1	0	2	0	0	0	0	19

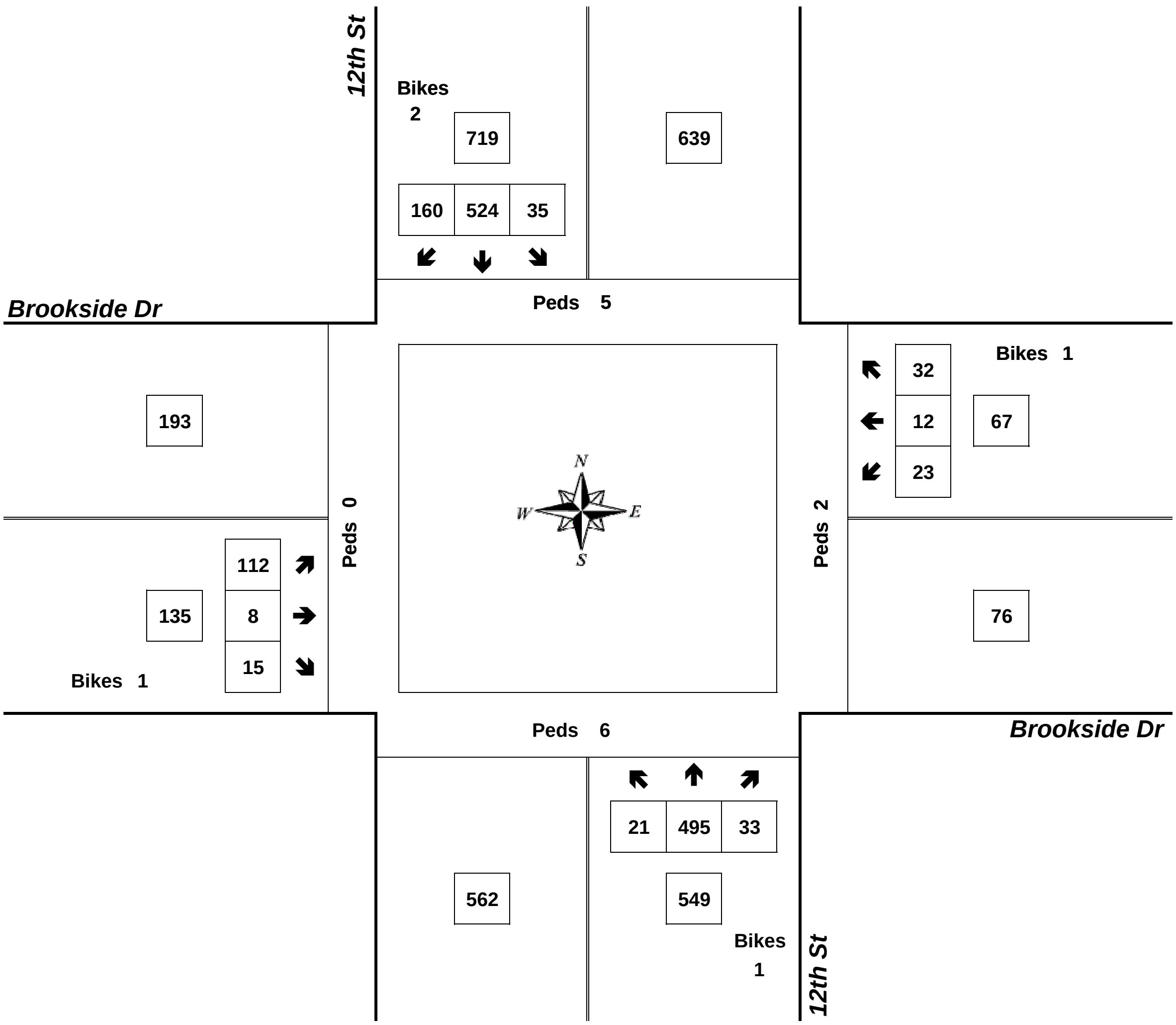
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

12th St & Brookside Dr

4:15 PM to 5:15 PM
Tuesday, May 18, 2010

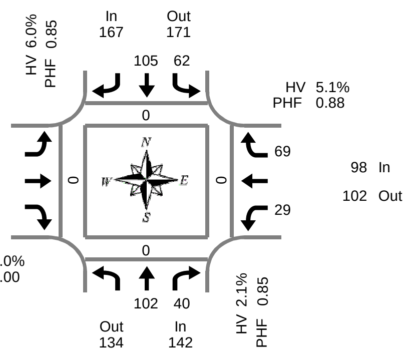


Approach	PHF	HV%	Volume
EB	0.78	1.5%	135
WB	0.84	3.0%	67
NB	0.92	3.3%	549
SB	0.87	2.5%	719
Intersection	0.91	2.7%	1,470

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:00 PM to 5:00 PM

Indian Creek Rd & Brookside Dr

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		10	8	0	11	5		0				0	1		10	0	45	0	0	0	0
4:05 PM		7	4	0	7	10		0				0	2		4	0	34	0	0	0	0
4:10 PM		6	7	0	6	6		0				0	5		6	0	36	0	0	0	0
4:15 PM		8	3	0	5	10		0				0	1		6	0	33	0	0	0	0
4:20 PM		9	3	0	7	5		0				0	3		3	0	30	0	0	0	0
4:25 PM		5	4	0	3	6		0				0	2		7	0	27	0	0	0	0
4:30 PM		9	2	0	5	6		0				0	1		7	0	30	0	0	0	0
4:35 PM		10	3	0	7	8		0				0	3		3	0	34	0	0	0	0
4:40 PM		16	1	0	4	14		0				0	4		2	0	41	0	0	0	0
4:45 PM		10	1	0	3	13		0				0	2		3	0	32	0	0	0	0
4:50 PM		9	2	0	2	11		0				0	3		4	0	31	0	0	0	0
4:55 PM		3	2	0	2	11		0				0	2		14	0	34	0	0	0	0
5:00 PM		6	4	0	4	8		0				0	5		9	0	36	0	0	0	0
5:05 PM		8	1	0	3	11		0				0	3		6	0	32	0	0	0	0
5:10 PM		9	4	0	6	2		0				0	2		6	0	29	0	0	0	0
5:15 PM		11	5	0	6	8		0				0	4		5	0	39	0	0	0	0
5:20 PM		5	1	0	7	6		0				0	4		6	0	29	0	0	0	0
5:25 PM		8	3	0	5	7		0				0	3		9	0	35	0	0	0	0
5:30 PM		5	3	0	2	4		0				0	5		4	0	23	0	0	0	0
5:35 PM		7	3	0	0	5		0				0	3		3	0	21	0	0	0	0
5:40 PM		10	2	0	6	5		0				0	4		5	0	32	0	0	0	0
5:45 PM		11	2	0	3	4		0				0	2		3	0	25	0	0	0	0
5:50 PM		10	3	0	1	7		0				0	3		3	0	27	0	0	0	0
5:55 PM		8	1	0	7	8		0				0	2		6	0	32	0	0	0	0
Total Survey		200	72	0	112	180		0				0	69		134	0	767	0	0	0	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		23	19	0	24	21		0				0	8		20	0	115	0	0	0	0
4:15 PM		22	10	0	15	21		0				0	6		16	0	90	0	0	0	0
4:30 PM		35	6	0	16	28		0				0	8		12	0	105	0	0	0	0
4:45 PM		22	5	0	7	35		0				0	7		21	0	97	0	0	0	0
5:00 PM		23	9	0	13	21		0				0	10		21	0	97	0	0	0	0
5:15 PM		24	9	0	18	21		0				0	11		20	0	103	0	0	0	0
5:30 PM		22	8	0	8	14		0				0	12		12	0	76	0	0	0	0
5:45 PM		29	6	0	11	19		0				0	7		12	0	84	0	0	0	0
Total Survey		200	72	0	112	180		0				0	69		134	0	767	0	0	0	0

Peak Hour Summary
4:00 PM to 5:00 PM

By Approach	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	142	134	276	0	167	171	338	0	0	0	0	0	98	102	200	0	407	0	0	0	0
%HV	2.1%				6.0%				0.0%				5.1%				4.4%				
PHF	0.85				0.85				0.00				0.88				0.88				

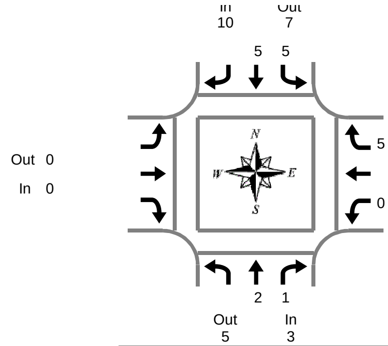
By Movement	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		102	40	142	62	105		167				0	29		69	98	407
%HV	NA	2.0%	2.5%	2.1%	8.1%	4.8%	NA	6.0%	NA	NA	NA	0.0%	0.0%	NA	7.2%	5.1%	4.4%
PHF		0.71	0.53	0.85	0.65	0.69		0.85				0.00	0.81		0.82	0.88	0.88

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		102	40	0	62	105		0				0	29		69	0	407	0	0	0	0
4:15 PM		102	30	0	51	105		0				0	31		70	0	389	0	0	0	0
4:30 PM		104	29	0	54	105		0				0	36		74	0	402	0	0	0	0
4:45 PM		91	31	0	46	91		0				0	40		74	0	373	0	0	0	0
5:00 PM		98	32	0	50	75		0				0	40		65	0	360	0	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:00 PM to 5:00 PM

Indian Creek Rd & Brookside Dr

Tuesday, May 18, 2010
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		1	1	2	1	2		3				0	0		0	0	5
4:05 PM		0	0	0	1	0		1				0	0		1	1	2
4:10 PM		0	0	0	1	0		1				0	0		0	0	1
4:15 PM		0	0	0	0	0		0				0	0		1	1	1
4:20 PM		0	0	0	1	1		2				0	0		0	0	2
4:25 PM		0	0	0	0	0		0				0	0		0	0	0
4:30 PM		0	0	0	0	0		0				0	0		1	1	1
4:35 PM		0	0	0	1	0		1				0	0		0	0	1
4:40 PM		1	0	1	0	2		2				0	0		0	0	3
4:45 PM		0	0	0	0	0		0				0	0		0	0	0
4:50 PM		0	0	0	0	0		0				0	0		1	1	1
4:55 PM		0	0	0	0	0		0				0	0		1	1	1
5:00 PM		0	0	0	0	0		0				0	0		0	0	0
5:05 PM		0	0	0	0	1		1				0	0		0	0	1
5:10 PM		0	0	0	0	0		0				0	0		0	0	0
5:15 PM		1	1	2	0	0		0				0	0		0	0	2
5:20 PM		1	0	1	0	0		0				0	0		0	0	1
5:25 PM		0	0	0	1	1		2				0	0		0	0	2
5:30 PM		0	0	0	0	0		0				0	0		0	0	0
5:35 PM		0	0	0	0	1		1				0	0		1	1	2
5:40 PM		1	0	1	0	0		0				0	0		0	0	1
5:45 PM		1	0	1	0	0		0				0	0		0	0	1
5:50 PM		0	0	0	0	0		0				0	0		0	0	0
5:55 PM		0	0	0	0	0		0				0	0		0	0	0
Total Survey		6	2	8	6	8		14				0	0		6	6	28

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		1	1	2	3	2		5				0	0		1	1	8
4:15 PM		0	0	0	1	1		2				0	0		1	1	3
4:30 PM		1	0	1	1	2		3				0	0		1	1	5
4:45 PM		0	0	0	0	0		0				0	0		2	2	2
5:00 PM		0	0	0	0	1		1				0	0		0	0	1
5:15 PM		2	1	3	1	1		2				0	0		0	0	5
5:30 PM		1	0	1	0	1		1				0	0		1	1	3
5:45 PM		1	0	1	0	0		0				0	0		0	0	1
Total Survey		6	2	8	6	8		14				0	0		6	6	28

Heavy Vehicle Peak Hour Summary
4:00 PM to 5:00 PM

By Approach	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Total
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	3	5	8		10	7	17		0	0	0		5	6	11		18
PHF	0.38				0.50				0.00				0.63				0.56

By Movement	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		2	1	3	5	5		10				0	0		5	5	18
PHF		0.50	0.25	0.38	0.42	0.63		0.50				0.00	0.00		0.63	0.63	0.56

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

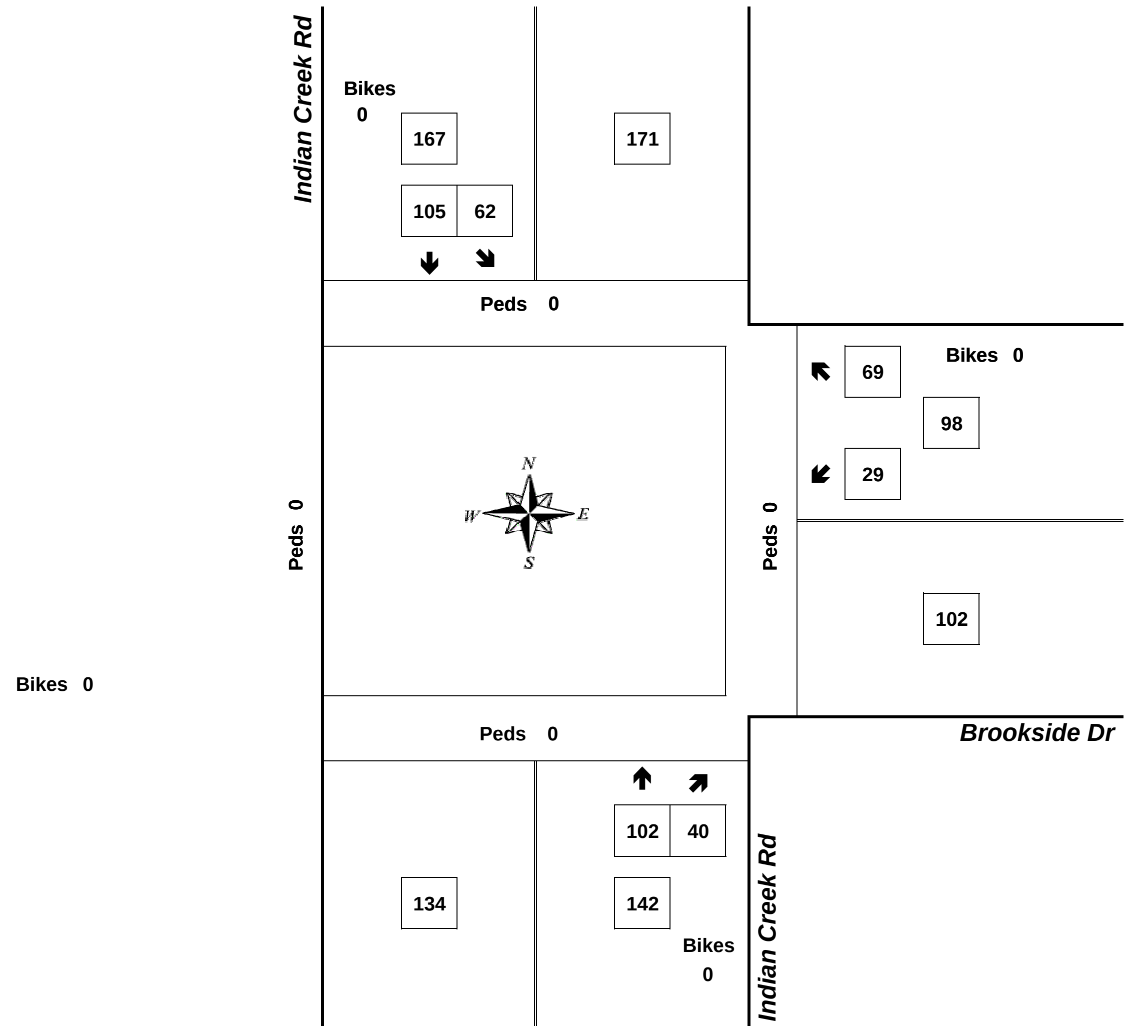
Interval Start Time	Northbound Indian Creek Rd				Southbound Indian Creek Rd				Eastbound Brookside Dr				Westbound Brookside Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		2	1	3	5	5		10				0	0		5	5	18
4:15 PM		1	0	1	2	4		6				0	0		4	4	11
4:30 PM		3	1	4	2	4		6				0	0		3	3	13
4:45 PM		3	1	4	1	3		4				0	0		3	3	11
5:00 PM		4	1	5	1	3		4				0	0		1	1	10

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Indian Creek Rd & Brookside Dr

4:00 PM to 5:00 PM
Tuesday, May 18, 2010



Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.88	5.1%	98
NB	0.85	2.1%	142
SB	0.85	6.0%	167
Intersection	0.88	4.4%	407

Count Period: 4:00 PM to 6:00 PM

Level of Service Descriptions

TRAFFIC LEVELS OF SERVICE

Analysis of traffic volumes is useful in understanding the general nature of traffic in an area, but by itself indicates neither the ability of the street network to carry additional traffic nor the quality of service afforded by the street facilities. For this, the concept of *level of service* has been developed to subjectively describe traffic performance. Level of service can be measured at intersections and along key roadway segments.

Level of service categories are similar to report card ratings for traffic performance. Intersections are typically the controlling bottlenecks of traffic flow and the ability of a roadway system to carry traffic efficiently is generally diminished in their vicinities. Levels of Service A, B and C indicate conditions where traffic moves without significant delays over periods of peak travel demand. Level of service D and E are progressively worse peak hour operating conditions and F conditions represent where demand exceeds the capacity of an intersection. Most urban communities set level of service D as the minimum acceptable level of service for peak hour operation and plan for level of service C or better for all other times of the day. The *Highway Capacity Manual* provides level of service calculation methodology for both intersections and arterials.[1] The following three sections provide interpretations of the analysis approaches.

---

[1] *2000 Highway Capacity Manual*, Transportation Research Board, Washington D.C., 2000, Chapters 16 and 17.

ALL-WAY STOP CONTROLLED INTERSECTIONS

Unsignalized intersections and all-way stop controlled intersections are each subject to a separate capacity analysis methodology. All-way stop controlled intersection operations are reported by leg of the intersection.

This method calculates a delay value for each approach to the intersection. The *2000 Highway Capacity Manual* describes the detailed methodology. The following table describes the amount of delay associated with each level of service.

Delay (Seconds)	Level of Service
0 - 10	A
10 - 15	B
15 - 25	C
25 - 35	D
35 - 50	E
> 50	F

Source: 2000 *Highway Capacity Manual*, Transportation Research Board, Washington, D.C.

UNSIGNALIZED INTERSECTIONS (Two-Way Stop Controlled)

Unsignalized intersection level of service is reported for the major street and minor street (generally, left turn movements). The method assesses available and critical gaps in the traffic stream which make it possible for side street traffic to enter the main street flow. The *2000 Highway Capacity Manual* describes the detailed methodology. It is not unusual for an intersection to experience level of service E or F conditions for the minor street left turn movement. It should be understood that, often, a poor level of service is experienced by only a few vehicles and the intersection as a whole operates acceptably.

Unsignalized intersection levels of service are described in the following table.

Level of Service	Expected Delay	(Sec/Veh)
A	Little or no delay	0-10.0
B	Short traffic delay	>10.1-15.0
C	Average traffic delays	>15.1-25.0
D	Long traffic delays	>25.1-35.0
E	Very long traffic delays	>35.1-50.0
F	Extreme delays potentially affecting other traffic movements in the intersection	> 50

Source: 2000 *Highway Capacity Manual*, Transportation Research Board Washington, D.C.

SIGNALIZED INTERSECTIONS

For signalized intersections, level of service is evaluated based upon average vehicle delay experienced by vehicles entering an intersection. Control delay (or signal delay) includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. In previous versions of this chapter of the HCM (1994 and earlier), delay included only stopped delay. As delay increases, the level of service decreases. Calculations for signalized and unsignalized intersections are different due to the variation in traffic control. The *2000 Highway Capacity Manual* provides the basis for these calculations.

Level of Service	Delay (secs.)	Description
A	≤10.00	**Free Flow/Insignificant Delays:** No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Most vehicles do not stop at all. Progression is extremely favorable and most vehicles arrive during the green phase.
B	10.1-20.0	**Stable Operation/Minimal Delays:** An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles. This level generally occurs with good progression, short cycle lengths, or both.
C	20.1-35.0	**Stable Operation/Acceptable Delays:** Major approach phases fully utilized. Most drivers feel somewhat restricted. Higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, and the number of vehicles stopping is significant.
D	35.1-55.0	**Approaching Unstable/Tolerable Delays:** The influence of congestion becomes more noticeable. Drivers may have to wait through more than one red signal indication. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. The proportion of vehicles not stopping declines, and individual cycle failures are noticeable.
E	55.1-80.0	**Unstable Operation/Significant Delays:** Volumes at or near capacity. Vehicles may wait though several signal cycles. Long queues form upstream from intersection. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are a frequent occurrence.
F	≥80.0	**Forced Flow/Excessive Delays:** Represents jammed conditions. Queues may block upstream intersections. This level occurs when arrival flow rates exceed intersection capacity, and is considered to be unacceptable to most drivers. Poor progression, long cycle lengths, and v/c ratios approaching 1.0 may contribute to these high delay levels.

Source: *2000 Highway Capacity Manual*, Transportation Research Board, Washington D.C.

ARTERIAL LEVEL OF SERVICE

Arterial level of service is based on the average travel speed for the segment, section, or entire arterial under consideration. The average travel speed is computed from the running time on the arterial segment(s) and the intersection approach delay. It is strongly influenced by the number of signals per mile and the average intersection delay. On a given facility, factors such as inappropriate signal timing, poor progression, and increasing traffic flow can substantially degrade the arterial LOS.[2]

Arterial levels of service are summarized in the following table.

Arterial Levels of Service

Arterial Class	**I**	**II**	**III**
Range of Free Flow Speeds (mph)	45 to 35	35 to 30	35 to 25
Typical Free Flow Speed (mph)	40 mph	33 mph	27 mph
Level of Service	**Average Travel Speed (mph)**		
A	35	30	25
B	28	24	19
C	22	18	13
D	17	14	9
E	13	10	7
F	< 13	< 10	< 7

[2] *1994 Highway Capacity Manual*, Special Report 209, Transportation Research Board, Washington D.C., 1994, Chapter 11.

The three arterial classes (I, II, and III) used to find the appropriate level of service are based on design and functional characteristics shown in the table below.

Definition of functional categories

Functional Category	**Characteristics**
Principal Arterial	• Mobility very important • Heavily restricted access • Connected to freeways, important activity centers, major traffic generators • Relatively long trips between above points and through trips entering, leaving,and going through the city.
Minor Arterial	• Mobility important • Substantially restricted access • Connected to principal arterials • Trips of moderate lengths within relatively small geographical area

Design Category	**Characteristics**
Suburban	• Low access density • Multilane divided; undivided or two-lane with shoulders arterial • No parking • Separate left turn lanes • 1 to 5 signals per mile • 40 to 45 mph speed limits • Little Pedestrian activity • Low to medium roadside development density
Intermediate	• Moderate access density • Multilane divided or undivided; one way or two lane arterial • Some parking • Usually separate left turn lanes • 4 to 10 signals per mile • 30 to 40 mph speed limits • Some pedestrian activity • Medium to moderate roadside development density
Urban	• High access density • Undivided one way; two way, two or more lanes arterial • Much parking • Some separate left-turn lanes • 6 to 12 signals per mile • 25 to 35 mph speed limits • Usually pedestrian activity • High density roadside development

Once the arterial is classified using the functional and design categories, the table below can be used to find the associated arterial class.

Arterial Class According to Design and Functional Categories

	FUNCTIONAL CATEGORY	
DESIGN CATEGORY	**PRINCIPAL ARTERIAL**	**MINOR ARTERIAL**
TYPICAL SUBURBAN	I	II
INTERMEDIATE	II	II OR III
TYPICAL URBAN	II OR III	III

Synchro 7 Reports

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (veh/h)	10	5	5	45	50	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	14	7	7	62	68	7
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	144	68	68			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	144	68	68			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	100			
cM capacity (veh/h)	850	1000	1545			

Direction, Lane #	WB 1	SE 1	NW 1	NW 2
Volume Total	21	68	68	7
Volume Left	14	7	0	0
Volume Right	7	0	0	7
cSH	895	1545	1700	1700
Volume to Capacity	0.02	0.00	0.04	0.00
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	9.1	0.8	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.1	0.8	0.0	
Approach LOS	A			

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	16.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	0	0	260	0	10	0	50	5	155	45	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	0	0	310	0	12	0	60	6	185	54	0
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	497	485	62	485	488	54	54			65		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	497	485	62	485	488	54	54			65		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	30	100	99	100			88		
cM capacity (veh/h)	436	426	1008	441	425	994	1565			1524		

Direction, Lane #	WB 1	SE 1	NW 1
Volume Total	321	65	238
Volume Left	310	0	185
Volume Right	12	6	0
cSH	450	1700	1524
Volume to Capacity	0.71	0.04	0.12
Queue Length 95th (ft)	139	0	10
Control Delay (s)	30.6	0.0	6.2
Lane LOS	D		A
Approach Delay (s)	30.6	0.0	6.2
Approach LOS	D		

Intersection Summary			
Average Delay	18.1		
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	SEL	SET	SER	NWL	NWT	NWR	NEL	NER	NER2
Lane Configurations											
Volume (veh/h)	0	0	10	300	0	0	185	245	15	5	175
Sign Control	Stop			Free			Free		Stop		
Grade	0%			0%			0%		0%		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	0	11	323	0	0	199	263	16	5	188
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	543	199	199			323			543	543	323
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	543	199	199			323			543	543	323
tC, single (s)	6.5	6.2	4.3			4.1			7.2	6.5	6.2
tC, 2 stage (s)											
tF (s)	4.0	3.3	2.4			2.2			3.6	4.0	3.3
p0 queue free %	100	100	99			100			96	99	74
cM capacity (veh/h)	446	847	1283			1249			431	446	711

Direction, Lane #	SE 1	NW 1	NW 2	NE 1
Volume Total	333	199	263	210
Volume Left	11	0	0	16
Volume Right	0	0	263	188
cSH	1283	1700	1700	668
Volume to Capacity	0.01	0.12	0.15	0.31
Queue Length 95th (ft)	1	0	0	34
Control Delay (s)	0.3	0.0	0.0	12.8
Lane LOS	A			B
Approach Delay (s)	0.3	0.0		12.8
Approach LOS				B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	335	140	145	345	85	105
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	353	147	153	363	89	111
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			500		1095	426
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			500		1095	426
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			86		54	83
cM capacity (veh/h)			1069		197	632

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	500	516	200
Volume Left	0	153	89
Volume Right	147	0	111
cSH	1700	1069	317
Volume to Capacity	0.29	0.14	0.63
Queue Length 95th (ft)	0	12	100
Control Delay (s)	0.0	3.8	33.8
Lane LOS		A	D
Approach Delay (s)	0.0	3.8	33.8
Approach LOS			D

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	420	95	60	440	55	50	15	65	30	25	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	16	438	99	62	458	57	52	16	68	31	26	42
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	516			536			1135	1159	487	1122	1180	487
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	516			536			1135	1159	487	1122	1180	487
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			63	91	88	78	85	93
cM capacity (veh/h)	947			1032			141	182	581	141	177	579

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	16	536	62	516	135	99
Volume Left	16	0	62	0	52	31
Volume Right	0	99	0	57	68	42
cSH	947	1700	1032	1700	300	272
Volume to Capacity	0.02	0.32	0.06	0.30	0.45	0.36
Queue Length 95th (ft)	1	0	5	0	56	40
Control Delay (s)	8.9	0.0	8.7	0.0	29.6	28.3
Lane LOS	A		A		D	D
Approach Delay (s)	0.3		0.9		29.6	28.3
Approach LOS					D	D

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	115	5	105	175	5	95
Sign Control	Free			Free	Stop	
Grade	1%			2%	2%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	124	5	113	188	5	102
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			129		540	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			129		540	126
tC, single (s)			4.1		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.3
p0 queue free %			92		99	89
cM capacity (veh/h)			1463		440	919

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	129	301	108
Volume Left	0	113	5
Volume Right	5	0	102
cSH	1700	1463	871
Volume to Capacity	0.08	0.08	0.12
Queue Length 95th (ft)	0	6	11
Control Delay (s)	0.0	3.3	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	9.7
Approach LOS			A

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	80	50	80	70	35	80
Sign Control	Stop		Free			Free
Grade	1%		8%			3%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	53	84	74	37	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	279	121			158	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	279	121			158	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	94			97	
cM capacity (veh/h)	693	936			1434	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	137	158	121
Volume Left	84	0	37
Volume Right	53	74	0
cSH	769	1700	1434
Volume to Capacity	0.18	0.09	0.03
Queue Length 95th (ft)	16	0	2
Control Delay (s)	10.7	0.0	2.4
Lane LOS	B		A
Approach Delay (s)	10.7	0.0	2.4
Approach LOS	B		

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	115	0	5	125	85	0	5	10	80	10	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	38	124	0	5	134	91	0	5	11	86	11	65
Pedestrians		12			3			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	226			127			475	438	130	406	393	192
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	226			127			475	438	130	406	393	192
tC, single (s)	4.1			4.1			7.1	6.8	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.3	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	99	99	84	98	92
cM capacity (veh/h)	1355			1468			440	453	921	532	528	841

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	231	16	161
Volume Left	38	5	0	86
Volume Right	0	91	11	65
cSH	1355	1468	685	623
Volume to Capacity	0.03	0.00	0.02	0.26
Queue Length 95th (ft)	2	0	2	26
Control Delay (s)	2.0	0.2	10.4	12.8
Lane LOS	A	A	B	B
Approach Delay (s)	2.0	0.2	10.4	12.8
Approach LOS			B	B

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	120	90	15	145	20	70	85	10	10	125	20
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	11	128	96	16	154	21	74	90	11	11	133	21

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	234	191	176	165
Volume Left (vph)	11	16	74	11
Volume Right (vph)	96	21	11	21
Hadj (s)	-0.20	-0.04	0.06	-0.04
Departure Headway (s)	4.9	5.1	5.3	5.3
Degree Utilization, x	0.32	0.27	0.26	0.24
Capacity (veh/h)	677	646	611	624
Control Delay (s)	10.2	10.1	10.2	9.9
Approach Delay (s)	10.2	10.1	10.2	9.9
Approach LOS	B	B	B	A

Intersection Summary			
Delay	10.1		
HCM Level of Service	B		
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	500	50	85	585	45	20	15	85	15	25	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	38	549	55	93	643	49	22	16	93	16	27	44
Pedestrians					9			9			6	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	698			613			1550	1548	595	1597	1551	674
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	698			613			1550	1548	595	1597	1551	674
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	96			90			63	83	81	68	72	90
cM capacity (veh/h)	903			968			59	98	500	52	98	451

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	38	604	93	692	132	88
Volume Left	38	0	93	0	22	16
Volume Right	0	55	0	49	93	44
cSH	903	1700	968	1700	181	126
Volume to Capacity	0.04	0.36	0.10	0.41	0.73	0.70
Queue Length 95th (ft)	3	0	8	0	115	96
Control Delay (s)	9.2	0.0	9.1	0.0	65.0	81.7
Lane LOS	A		A		F	F
Approach Delay (s)	0.5		1.1		65.0	81.7
Approach LOS					F	F

Intersection Summary			
Average Delay	10.3		
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	120	15	65	125	55	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	135	17	73	140	62	73
Pedestrians				2	2	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			154		432	147
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			154		432	147
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		89	92
cM capacity (veh/h)			1418		554	897

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	152	213	135
Volume Left	0	73	62
Volume Right	17	0	73
cSH	1700	1418	698
Volume to Capacity	0.09	0.05	0.19
Queue Length 95th (ft)	0	4	18
Control Delay (s)	0.0	2.9	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	2.9	11.4
Approach LOS			B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	185	415	340	190	475	60
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1765	1447	1660	1765	1676	1412
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1765	1447	1660	1765	1676	1412
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	199	446	366	204	511	65
RTOR Reduction (vph)	0	286	0	0	0	47
Lane Group Flow (vph)	199	160	366	204	511	18
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		5				1
Heavy Vehicles (%)	2%	2%	3%	2%	2%	6%
Turn Type		Perm	Prot			custom
Protected Phases	2		1	6	8	
Permitted Phases		2				2
Actuated Green, G (s)	20.7	20.7	24.0	48.2	31.1	20.7
Effective Green, g (s)	20.7	20.7	24.0	48.2	31.1	20.7
Actuated g/C Ratio	0.24	0.24	0.28	0.56	0.36	0.24
Clearance Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
Vehicle Extension (s)	6.0	6.0	2.3	6.0	2.3	6.0
Lane Grp Cap (vph)	423	347	462	986	604	339
v/s Ratio Prot	c0.11		c0.22	0.12	c0.30	
v/s Ratio Perm		0.11				0.01
v/c Ratio	0.47	0.46	0.79	0.21	0.85	0.05
Uniform Delay, d1	28.1	28.0	28.8	9.5	25.4	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	2.7	8.6	0.3	10.3	0.2
Delay (s)	30.4	30.8	37.5	9.8	35.7	25.4
Level of Service	C	C	D	A	D	C
Approach Delay (s)	30.7			27.6	34.6	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	10.5
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	95	95	440	35	60	695
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	103	478	38	65	755
Pedestrians			3			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						318
pX, platoon unblocked						
vC, conflicting volume	1386	497			516	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1386	497			516	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	30	82			94	
cM capacity (veh/h)	148	573			1049	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	103	103	516	821
Volume Left	103	0	0	65
Volume Right	0	103	38	0
cSH	148	573	1700	1049
Volume to Capacity	0.70	0.18	0.30	0.06
Queue Length 95th (ft)	100	16	0	5
Control Delay (s)	71.7	12.7	0.0	1.6
Lane LOS	F	B		A
Approach Delay (s)	42.2		0.0	1.6
Approach LOS	E			

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	85	75	255	130	440	0	0	0	25	710	55
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	0	90	80	271	138	468	0	0	0	27	755	59
Pedestrians					10			1			14	
Lane Width (ft)					12.0			0.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	921	848	786	974	877	24	814			10		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	921	848	786	974	877	24	814			10		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	69	80	0	51	55	100			98		
cM capacity (veh/h)	82	288	392	136	281	1032	822			1583		

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	170	410	468	840
Volume Left	0	271	0	27
Volume Right	80	0	468	59
cSH	329	165	1032	1583
Volume to Capacity	0.52	2.48	0.45	0.02
Queue Length 95th (ft)	70	874	60	1
Control Delay (s)	27.1	728.9	11.4	0.5
Lane LOS	D	F	B	A
Approach Delay (s)	27.1	346.2		0.5
Approach LOS	D	F		

Intersection Summary			
Average Delay	163.6		
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	110	0	0	345	480	490
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.98
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1731			3353	1693	1483
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1731			3353	1693	1483
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	122	0	0	383	533	544
RTOR Reduction (vph)	0	0	0	0	0	304
Lane Group Flow (vph)	122	0	0	383	533	240
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	4%	0%	0%	2%	1%	1%
Turn Type						Perm
Protected Phases	2			2	4	
Permitted Phases						4
Actuated Green, G (s)	7.2			7.2	12.0	12.0
Effective Green, g (s)	7.2			7.2	12.0	12.0
Actuated g/C Ratio	0.26			0.26	0.44	0.44
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	0.2			0.2	0.2	0.2
Lane Grp Cap (vph)	458			888	747	654
v/s Ratio Prot	0.07			c0.11	c0.31	
v/s Ratio Perm						0.16
v/c Ratio	0.27			0.43	0.71	0.37
Uniform Delay, d1	7.9			8.3	6.2	5.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.1	2.7	0.1
Delay (s)	8.0			8.4	8.9	5.2
Level of Service	A			A	A	A
Approach Delay (s)	8.0			8.4	7.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	27.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	490	110	5	240	100	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	516	116	5	253	105	16
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			632		837	574
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			632		837	574
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		69	97
cM capacity (veh/h)			951		335	518

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	632	258	121
Volume Left	0	5	105
Volume Right	116	0	16
cSH	1700	951	351
Volume to Capacity	0.37	0.01	0.34
Queue Length 95th (ft)	0	0	37
Control Delay (s)	0.0	0.2	20.5
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	20.5
Approach LOS			C

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Belmont Ave & 13th St

6/17/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR
Lane Configurations											
Volume (veh/h)	0	100	170	10	120	0	30	1040	180	0	0
Sign Control		Stop			Stop			Free		Free	
Grade		0%			0%			0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.92	0.96	0.96	0.92	0.92
Hourly flow rate (vph)	0	104	177	10	125	0	33	1083	188	0	0
Pedestrians								8		15	
Lane Width (ft)								12.0		0.0	
Walking Speed (ft/s)								4.0		4.0	
Percent Blockage								1		0	
Right turn flare (veh)			1								
Median type								None		None	
Median storage veh)											
Upstream signal (ft)											
pX, platoon unblocked											
vC, conflicting volume	1313	1242	650	674	1336	8	0			1271	
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	1313	1242	650	674	1336	8	0			1271	
tC, single (s)	7.5	6.5	6.9	7.7	6.5	6.9	4.1			4.1	
tC, 2 stage (s)											
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2	
p0 queue free %	100	39	57	89	17	100	98			100	
cM capacity (veh/h)	35	171	414	95	150	1071	1622			542	

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	281	135	574	729
Volume Left	0	10	33	0
Volume Right	177	0	0	188
cSH	335	144	1622	1700
Volume to Capacity	0.84	0.94	0.02	0.43
Queue Length 95th (ft)	186	165	2	0
Control Delay (s)	52.9	120.4	0.6	0.0
Lane LOS	F	F	A	
Approach Delay (s)	52.9	120.4	0.3	
Approach LOS	F	F		

Intersection Summary			
Average Delay	18.3		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	130	0	0	0	5	5	125	890	15	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	143	0	0	0	5	5	137	978	16	0	0	0
Pedestrians		8			8							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	780	1285	8	1269	1277	505	8			1003		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	780	1285	8	1269	1277	505	8			1003		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	44	100	100	100	96	99	91			100		
cM capacity (veh/h)	254	150	1071	117	151	514	1600			694		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	143	11	626	505
Volume Left	143	0	137	0
Volume Right	0	5	0	16
cSH	254	234	1600	1700
Volume to Capacity	0.56	0.05	0.09	0.30
Queue Length 95th (ft)	79	4	7	0
Control Delay (s)	36.0	21.1	2.3	0.0
Lane LOS	E	C	A	
Approach Delay (s)	36.0	21.1	1.3	
Approach LOS	E	C		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	10	20	25	15	35	30	525	30	40	570	185
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5	3.5			3.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90			0.94		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1688	1599			1598		1581	1745		1710	3201	
Flt Permitted	0.85	1.00			0.91		0.32	1.00		0.35	1.00	
Satd. Flow (perm)	1505	1599			1476		525	1745		638	3201	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	142	11	23	28	17	40	34	597	34	45	648	210
RTOR Reduction (vph)	0	18	0	0	32	0	0	2	0	0	35	0
Lane Group Flow (vph)	142	16	0	0	53	0	34	629	0	45	823	0
Confl. Peds. (#/hr)	5		7	7		5	4					4
Confl. Bikes (#/hr)						2						1
Heavy Vehicles (%)	1%	0%	0%	4%	0%	3%	8%	2%	8%	0%	2%	3%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	9.1	9.1			9.1		28.3	28.3		28.3	28.3	
Effective Green, g (s)	9.1	9.1			9.1		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.20	0.20			0.20		0.62	0.62		0.62	0.62	
Clearance Time (s)	3.5	3.5			3.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5			2.5		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	302	321			296		327	1088		398	1995	
v/s Ratio Prot		0.01						c0.36			0.26	
v/s Ratio Perm	c0.09				0.04		0.06			0.07		
v/c Ratio	0.47	0.05			0.18		0.10	0.58		0.11	0.41	
Uniform Delay, d1	16.0	14.7			15.1		3.4	5.0		3.5	4.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.0			0.2		0.3	1.2		0.3	0.3	
Delay (s)	16.9	14.7			15.3		3.7	6.2		3.7	4.6	
Level of Service	B	B			B		A	A		A	A	
Approach Delay (s)		16.4			15.3			6.1			4.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	45.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	40	85	115	30	60	120
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	42	89	120	31	62	125
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	385	135			151	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	385	135			151	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	90			96	
cM capacity (veh/h)	594	908			1418	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	130	151	188
Volume Left	42	0	62
Volume Right	89	31	0
cSH	777	1700	1418
Volume to Capacity	0.17	0.09	0.04
Queue Length 95th (ft)	15	0	3
Control Delay (s)	10.6	0.0	2.8
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	2.8
Approach LOS	B		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	30	45	15	20	0	30	0	30	0	25	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	34	51	17	23	0	34	0	34	0	28	6
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	23			85			136	116	60	151	142	23
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	23			85			136	116	60	151	142	23
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			96	100	97	100	96	99
cM capacity (veh/h)	1593			1511			799	765	1006	783	741	1054

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	85	40	68	34
Volume Left	0	17	34	0
Volume Right	51	0	34	6
cSH	1593	1511	891	779
Volume to Capacity	0.00	0.01	0.08	0.04
Queue Length 95th (ft)	0	1	6	3
Control Delay (s)	0.0	3.2	9.4	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	3.2	9.4	9.8
Approach LOS			A	A

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SBL2	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Stop		Stop				Stop			Stop	
Volume (vph)	0	65	0	15	70	155	0	5	35	95	5	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	71	0	16	77	170	0	5	38	104	5	0

Direction, Lane #	SB 1	SB 2	NW 1	NW 2	NE 1	NE 2	SW 1
Volume Total (vph)	0	71	16	247	5	38	110
Volume Left (vph)	0	0	16	0	0	0	104
Volume Right (vph)	0	0	0	170	0	38	0
Hadj (s)	0.00	0.46	0.99	-0.31	0.00	-0.60	0.22
Departure Headway (s)	5.0	5.5	5.9	4.6	4.9	3.2	4.9
Degree Utilization, x	0.00	0.11	0.03	0.31	0.01	0.03	0.15
Capacity (veh/h)	700	632	596	768	675	1121	685
Control Delay (s)	6.8	8.0	7.8	8.4	7.9	6.3	8.8
Approach Delay (s)	8.0		8.4		6.5		8.8
Approach LOS	A		A		A		A

Intersection Summary			
Delay	8.2		
HCM Level of Service	A		
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	355	0	45	60	195	0	0	160	35
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
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1710	1530	1629	1698			1667	1224
Flt Permitted					0.95	1.00	0.59	1.00			1.00	1.00
Satd. Flow (perm)					1710	1530	1005	1698			1667	1224
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	386	0	49	65	212	0	0	174	38
RTOR Reduction (vph)	0	0	0	0	0	35	0	0	0	0	0	19
Lane Group Flow (vph)	0	0	0	0	386	14	65	212	0	0	174	19
Heavy Vehicles (%)	4%	0%	7%	0%	0%	0%	5%	6%	0%	0%	8%	25%
Turn Type				Split		Perm	pm+pt					Perm
Protected Phases				4	4		1	6			2	
Permitted Phases						4	6					2
Actuated Green, G (s)					21.5	21.5	47.1	47.1			39.1	39.1
Effective Green, g (s)					22.0	22.0	47.1	47.1			39.1	39.1
Actuated g/C Ratio					0.29	0.29	0.61	0.61			0.51	0.51
Clearance Time (s)					4.5	4.5	4.0	4.0			4.0	4.0
Vehicle Extension (s)					2.5	2.5	2.3	5.5			6.0	6.0
Lane Grp Cap (vph)					488	437	646	1037			845	621
v/s Ratio Prot					c0.23		0.01	c0.12			0.10	
v/s Ratio Perm						0.01	0.06					0.02
v/c Ratio					0.79	0.03	0.10	0.20			0.21	0.03
Uniform Delay, d1					25.4	19.9	6.2	6.7			10.5	9.5
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					8.3	0.0	0.0	0.4			0.6	0.1
Delay (s)					33.7	19.9	6.2	7.1			11.0	9.6
Level of Service					C	B	A	A			B	A
Approach Delay (s)		0.0			32.1			6.9			10.8	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	5	50	0	0	0	0	175	310	55	460	0
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					1.00		1.00	1.00	
Frt		1.00	0.85					0.91		1.00	1.00	
Flt Protected		0.96	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1719	1485					1586		1629	1731	
Flt Permitted		0.96	1.00					1.00		0.33	1.00	
Satd. Flow (perm)		1719	1485					1586		572	1731	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	91	6	57	0	0	0	0	199	352	62	523	0
RTOR Reduction (vph)	0	0	49	0	0	0	0	60	0	0	0	0
Lane Group Flow (vph)	0	97	8	0	0	0	0	491	0	62	523	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	0%	5%	3%	5%	4%	0%
Turn Type	Split		Perm							pm+pt		
Protected Phases	8	8						6		5	2	
Permitted Phases			8							2		
Actuated Green, G (s)		7.2	7.2					34.1		41.8	41.8	
Effective Green, g (s)		7.7	7.7					34.1		41.8	41.8	
Actuated g/C Ratio		0.13	0.13					0.59		0.73	0.73	
Clearance Time (s)		4.5	4.5					4.0		4.0	4.0	
Vehicle Extension (s)		2.9	2.9					6.0		2.3	6.0	
Lane Grp Cap (vph)		230	199					941		484	1258	
v/s Ratio Prot		c0.06						c0.31		0.01	c0.30	
v/s Ratio Perm			0.01							0.08		
v/c Ratio		0.42	0.04					0.52		0.13	0.42	
Uniform Delay, d1		22.9	21.7					6.9		3.2	3.1	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		1.2	0.1					2.1		0.1	1.0	
Delay (s)		24.0	21.8					9.0		3.3	4.1	
Level of Service		C	C					A		A	A	
Approach Delay (s)		23.2			0.0			9.0			4.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	230	25	110	20	20	15	110	240	5	15	330	165
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	245	27	117	21	21	16	117	255	5	16	351	176
Pedestrians		23			22			23			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		2			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											380	
pX, platoon unblocked	0.91	0.91	0.91	0.91	0.91		0.91					
vC, conflicting volume	1014	1010	485	1138	1096	282	550			283		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	964	960	380	1101	1054	282	451			283		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	0	86	80	80	88	98	88			99		
cM capacity (veh/h)	159	196	582	105	173	747	991			1223		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	388	59	378	543
Volume Left	245	21	117	16
Volume Right	117	16	5	176
cSH	207	169	991	1223
Volume to Capacity	1.87	0.35	0.12	0.01
Queue Length 95th (ft)	696	36	10	1
Control Delay (s)	448.8	37.3	3.7	0.4
Lane LOS	F	E	A	A
Approach Delay (s)	448.8	37.3	3.7	0.4
Approach LOS	F	E		

Intersection Summary			
Average Delay	130.2		
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	35	15	20	15	25	105	30	215	25	90	175	195
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	16	22	16	27	114	33	234	27	98	190	212

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	76	158	293	288	212
Volume Left (vph)	38	16	33	98	0
Volume Right (vph)	22	114	27	0	212
Hadj (s)	-0.07	-0.39	-0.02	0.27	-0.68
Departure Headway (s)	6.0	5.5	5.3	5.8	4.9
Degree Utilization, x	0.13	0.24	0.43	0.47	0.29
Capacity (veh/h)	522	584	651	599	715
Control Delay (s)	9.9	10.3	12.2	12.6	8.6
Approach Delay (s)	9.9	10.3	12.2	10.9	
Approach LOS	A	B	B	B	

Intersection Summary			
Delay	11.1		
HCM Level of Service	B		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	230	410	235	40	65	145
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	264	471	270	46	75	167
Pedestrians		28	4		16	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		2	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	332				1313	337
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	332				1313	337
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	78				44	76
cM capacity (veh/h)	1217				134	684

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	736	316	75	167
Volume Left	264	0	75	0
Volume Right	0	46	0	167
cSH	1217	1700	134	684
Volume to Capacity	0.22	0.19	0.56	0.24
Queue Length 95th (ft)	21	0	69	24
Control Delay (s)	4.8	0.0	61.5	12.0
Lane LOS	A		F	B
Approach Delay (s)	4.8	0.0	27.3	
Approach LOS			D	

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	5	40	200	5	70	25	555	175	55	380	20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	26	5	41	206	5	72	26	572	180	57	392	21

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	72	206	77	26	572	180	57	392	21
Volume Left (vph)	26	206	0	26	0	0	57	0	0
Volume Right (vph)	41	0	72	0	0	180	0	0	21
Hadj (s)	-0.20	0.53	-0.65	0.60	0.03	-0.70	0.50	0.03	-0.70
Departure Headway (s)	8.0	8.1	6.9	7.3	6.7	3.2	7.3	6.8	3.2
Degree Utilization, x	0.16	0.46	0.15	0.05	1.06	0.16	0.11	0.74	0.02
Capacity (veh/h)	408	430	501	482	540	1121	484	517	1121
Control Delay (s)	12.5	16.6	9.9	9.5	80.5	5.6	10.0	25.6	5.1
Approach Delay (s)	12.5	14.8		60.8			22.8		
Approach LOS	B	B		F			C		

Intersection Summary			
Delay	39.4		
HCM Level of Service	E		
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	85	0	100	40	655	0	0	210	410
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	93	0	110	44	720	0	0	231	451
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						5						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1264	1264	456	1264	1038	720	231			720		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1264	1264	456	1264	1038	720	231			720		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	100	100	100	34	100	74	97			100		
cM capacity (veh/h)	107	165	609	143	225	426	1275			891		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	203	764	681
Volume Left	93	44	0
Volume Right	110	0	451
cSH	310	1275	1700
Volume to Capacity	0.66	0.03	0.40
Queue Length 95th (ft)	108	3	0
Control Delay (s)	40.4	0.9	0.0
Lane LOS	E	A	
Approach Delay (s)	40.4	0.9	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	365	60	0	330	295	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	380	62	0	344	307	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	380	63	344	307
Volume Left (vph)	380	0	0	0
Volume Right (vph)	0	63	0	0
Hadj (s)	0.52	-0.65	0.03	0.05
Departure Headway (s)	6.9	5.7	6.0	6.1
Degree Utilization, x	0.73	0.10	0.57	0.52
Capacity (veh/h)	497	602	571	564
Control Delay (s)	25.2	8.2	16.6	15.4
Approach Delay (s)	22.8		16.6	15.4
Approach LOS	C		C	C

Intersection Summary			
Delay	18.8		
HCM Level of Service	C		
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	330	105	0	0	95	260
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	375	119	0	0	108	295
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	0				869	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				869	0
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	77				56	73
cM capacity (veh/h)	1623				243	1085

Direction, Lane #	EB 1	SB 1	SB 2
Volume Total	494	108	295
Volume Left	375	108	0
Volume Right	0	0	295
cSH	1623	243	1085
Volume to Capacity	0.23	0.44	0.27
Queue Length 95th (ft)	22	53	28
Control Delay (s)	6.5	31.2	9.6
Lane LOS	A	D	A
Approach Delay (s)	6.5	15.3	
Approach LOS		C	

Intersection Summary			
Average Delay	10.4		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	270	35	195	10	20	15	155	135	5	15	135	90
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	287	37	207	11	21	16	165	144	5	16	144	96

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	324	207	32	16	309	5	160	96
Volume Left (vph)	287	0	11	0	165	0	16	0
Volume Right (vph)	0	207	0	16	0	5	0	96
Hadj (s)	0.19	-0.60	0.07	-0.60	0.22	-0.60	0.10	-0.68
Departure Headway (s)	5.7	3.2	6.2	3.2	5.7	3.2	6.1	5.4
Degree Utilization, x	0.51	0.18	0.05	0.01	0.49	0.00	0.27	0.14
Capacity (veh/h)	599	1121	491	1121	593	1121	551	626
Control Delay (s)	14.5	6.9	9.6	6.2	14.1	6.2	10.2	8.0
Approach Delay (s)	11.5		8.4		13.9		9.4	
Approach LOS	B		A		B		A	

Intersection Summary			
Delay	11.6		
HCM Level of Service	B		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix C: Draft Technical Memorandum #2 Future Forecasting

Draft Technical Memorandum #2

DATE: July 12, 2010

TO: Hood River TSP PMT

FROM: John Bosket, PE
Garth Appanaitis, EIT

SUBJECT: **Draft Technical Memorandum #2**
Traffic Volume Forecasting Assumptions & Results

P010068-003

The development of future year traffic volumes is a critical task in transportation system planning projects, as those volumes are typically used to identify and quantify system needs and are a foundational element in the design of improvements. Recent transportation studies in the City of Hood River (I-84 Frontage Road Feasibility Study and the I-84 Hood River IAMPs) have forecasted future traffic volumes through the application of an enhanced "cumulative analysis tool" rather than simply applying uniform growth rates to counts collected in the field.

While the traditional methodology of applying simple growth rates is adequate for some studies, its ability to accurately forecast traffic can be limited because it does not acknowledge probable growth patterns influenced by the quantities and locations of buildable lands. Due to such limitations, a more robust forecasting methodology (as used for the I-84 Hood River Frontage Road Feasibility Study and the I-84 Hood River IAMPs[1]) will be employed for the Hood River Transportation System Plan (TSP). This enhanced cumulative analysis tool methodology combines the use of traffic volume growth rates on major roadways feeding into the study area with estimates of local trips related to city-wide growth in housing and employment opportunities. The forecasting tool has been further refined to incorporate local circulation patterns reflected in recent traffic counts outside the IAMP areas (generally located south of Cascade Avenue).

This memorandum is provided to document the results of the future year traffic forecasts for the Hood River TSP, as well as the process used to develop this cumulative analysis tool including key assumptions related to traffic growth rates and housing, population, and employment estimates within the Hood River urban growth boundary (UGB).

[1] Technical Memorandum: Traffic Volume Forecasting Assumptions & Results – Hood River Frontage Road Feasibility Study and Hood River IAMPs, DKS Associates, July 3, 2008.

Introduction

The forecasting methodology associated with the enhanced cumulative analysis tool expands upon the Cumulative Analysis approach, as defined in the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit's (TPAU's) *Analysis Procedures Manual*.[2] In the context of the traditional four-step travel demand model approach, the Cumulative Analysis is used for trip generation and trip distribution purposes only. The result is a trip table (for growth increment, i.e. new development, only) that is used as an input into traffic assignment where analysis is completed by manually assigning the new trips to a transportation network and then adding them to the existing traffic volumes to estimate future volumes. Using this methodology, existing trips using the transportation system are not assumed to change routes in the future based on new development[3], nor with transportation improvements[4], due to the static nature of the methodology.

The enhanced cumulative analysis tool uses the same trip generation and trip distribution methodology as the typical Cumulative Analysis, but it applies the methodology to all land uses within the city (i.e., both existing uses as well as any future development based on a land use inventory). The enhanced tool then uses VISUM modeling software[5] and incorporates intersection node delay to complete the equilibrium trip assignment. The result is an improved traffic volume forecasting tool that dynamically assigns both new and existing trips to the transportation network using an equilibrium assignment procedure that represents routing choice more accurately than manual assignment because it is responsive to varying levels of congestion and delay as traffic patterns change. This tool enables a more comprehensive analysis of future conditions and potential TSP alternatives.

Traffic Forecasting Process

The cumulative analysis forecasting process involves the development of two VISUM models: the first representing the existing (or recent) year and the second representing the future analysis horizon (2031). The existing year model is used for calibration so assumptions regarding area land uses and trip patterns can be checked against actual traffic counts. Once calibrated, the existing model acts as a foundation upon which growth assumptions are applied to reach a desired future year condition.

Existing Year (2006) Model Development

The selection of a year to represent "existing" conditions was based on the availability of data describing that year. Much of the data obtained for recent studies was collected in the years 2005, 2006, and 2007, as well as additional counts collected in 2010. After evaluation of this data, the year 2006 was selected for the base year to match the previously conducted land use inventory. Due to the economic impacts of the last several years, additional traffic counts

[2] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated July 2009, pgs. 61-74

[3] e.g. a trip from a house to the grocery store would continue to travel to the same grocery store, even if a new grocery store was built closer to the house

[4] e.g. a trip from the parking lot of a commercial complex would continue to make a right turn and take the longer route due to the delay in a left turn movement, even if a traffic signal is constructed that reduces the left turn delay

[5] VISUM is a transportation travel demand modeling software developed by PTV Vision

collected in 2010 remain relatively consistent with the historical counts of 2005-2007 that were initially used to calibrate the base model.

Each model was created using four major components describing the area within the UGB[6]:

- Traffic volumes on major roadways feeding the study area;
- Population;
- Number of dwelling units; and
- Number of employees.

Traffic volumes on area roadways were obtained from a variety of sources, including: recent studies, the Port of Hood River (toll booth), ODOT's Traffic Volume Tables, an Automatic Traffic Recorder (ATR) station on I-84[7], and other historic count databases.

A ***population*** for the year 2006 of 6,580 was obtained from the Oregon Economic & Community Development Department.[8] In comparison, the City's website currently states that there is a population of approximately 6,500 full-time residents.

The number of ***dwelling units*** in 2006 was estimated through a rooftop count using aerial photos. The resulting estimate was 2,927 within the city limits and 3,583 within the UGB. In comparison, the Hood River Public Facilities Plan (2000) estimated there would be 2,923 dwelling units within the UGB by 2006 and the 2000 Census reported a total of 2,657 in the year 2000.

A persons-per-dwelling unit ratio of 2.25 is obtained by dividing the 2006 population and dwelling unit estimates, In comparison, the following persons-per-dwelling-unit ratio estimates for the City of Hood River (shown in Table 1) have been used for various planning studies over the past 25 years. The average value of 2.32 is within 5% of the estimate proposed for use in this effort.

Table 1: Past References for Persons/Dwelling Units Estimates

Source	Persons/Dwelling Unit Ratio
City of Hood River Goal 10 Study, 1983	2.04
US Census Bureau, 2000	2.20
Hood River Public Facilities Plan, 2001	2.64
Housing Market Analysis, Oregon Downtown Development Association, 2005	2.38
AVERAGE	**2.32**

The number of ***employees*** within the City of Hood River during 2006 was obtained from the Oregon Employment Department. The data provided contained monthly estimates of employee totals for various industry types. In aggregate, the reported totals were 5,384

[6] For this study, the area within the UGB is assumed to include the area within the City Limits as well.
[7] Station 33-001 (Rowena) I-84 MP 75.93, 0.72 miles west of the Rowena Interchange
[8] Data from Center for Population Research and Census, Portland State University.

employees within the city limits and 5,527 employees within the entire UGB (including the 5,384 employees within the city limits).

The dwelling units and employees estimated for the year 2006 were distributed on lands within the Hood River UGB by creating Transportation Analysis Zones (TAZs) that divided the area based on zoning designations, major transportation facilities, topography, and other barriers/constraints. The dwelling units were allocated according to the results of the aerial photo survey. The employment was allocated by cross-referencing information from the aerial photo with the underlying property zoning and inventories of business types from windshield surveys. This was further supplemented by phone conversations with several employers, including: Embarq, Hood River Sand & Gravel, Columbia River Gorge Hotel, Parkhurst Assisted Living, Best Western Hood River Inn, Dakine, Hood River Distillers, Covenant Christian Church, Maritime Services Corp., Smokehouse, Frankton School, Westside Elementary School, Hood River Middle School, and Providence Memorial Hospital.

Figures 1 and 2 show the TAZ system formed for the area within the City of Hood River UGB and illustrates where the dwelling units and employment for the year 2006 were allocated. Table 2 provides accompanying detail, showing actual numbers of households and employees per TAZ.

Note that these figures also show “external nodes” which act as gateways into and out of the study area along major transportation routes. Traffic growth through these gateways is based on projected traffic growth rates for each facility (as described below).

With the local land uses allocated among the TAZs, a trip table matrix was made to match potential origins with destinations within the urban TAZs and rural external nodes. Trips were assigned to area streets by the model, which looked for the most direct and fastest route between points. Streets in the model were coded with speeds, capacities, and traffic controls (stop signs, signals, etc.) to help determine the attractiveness of each route.

Table 2: Existing (2006) City of Hood River UGB Housing and Employment Allocation by TAZ

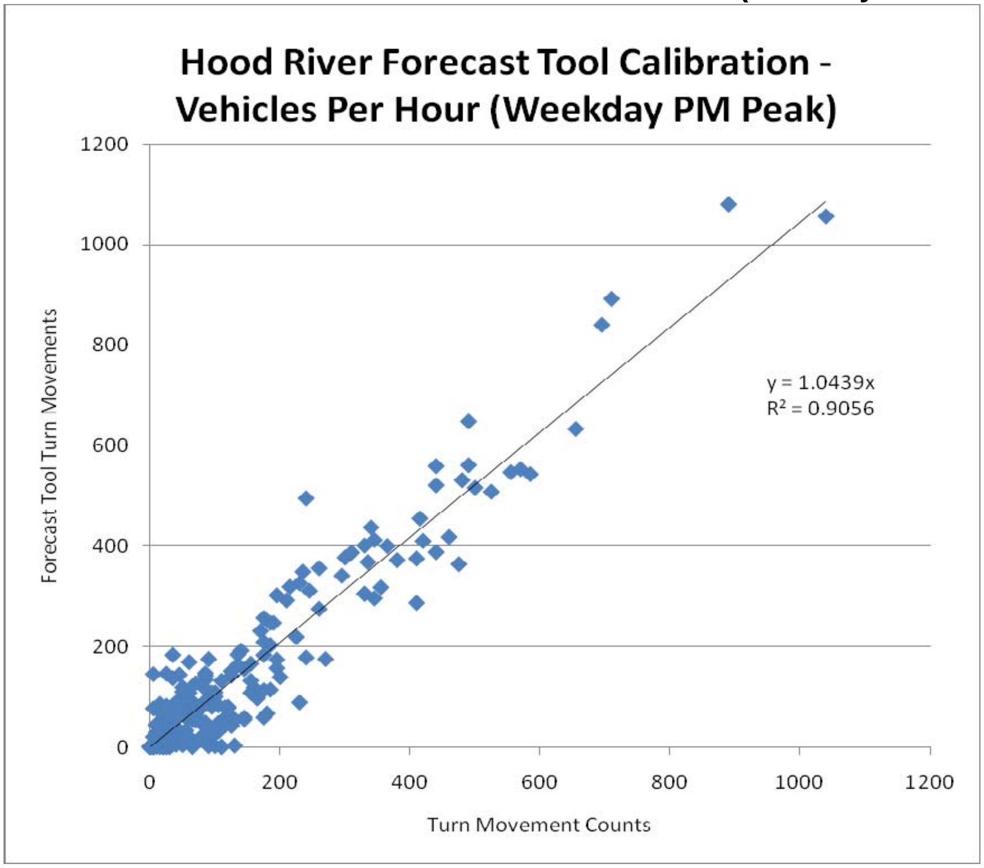
TAZ	Households	Employees	Approximate Trips IN	Approximate Trips OUT
1	3	148	104	139
2	17	28	41	43
3	179	19	113	73
4	23	1	14	8
5	32	207	164	206
6	10	254	127	189
7	230	76	180	143
8	144	98	97	88
9	0	234	148	205
10	70	351	296	362
11	435	22	256	157
12	188	84	168	133
13	333	106	258	203
14	197	77	155	120
15	0	70	144	73
16	0	100	6	33
17	1	258	19	88
18	0	226	102	159
19	170	8	100	61
20	38	660	392	545
21	193	250	139	160
22	140	7	82	50
23	36	190	104	143
24	19	603	660	794
25	220	56	165	118
26	176	625	598	702
27	658	33	387	237
28	0	44	30	41
29	0	10	1	3
30	0	235	163	219
31	71	4	42	26
32	0	35	102	91
33	0	234	170	216
34	0	140	96	130
35	0	35	2	12
Total	**3584**	**5527**	**5625**	**5970**

The resulting volumes on network streets were compared to the actual volumes from traffic counts to determine if the model was sufficiently calibrated and reasonably reflective of actual traffic patterns in the study area. Calibration was performed on the base year model by comparing base year weekday p.m. peak hour counts at the study intersections and intersection turn movements within the model.

A plot comparing actual turn movement counts (turn movement count locations are shown in Figure 3) to the base model counts was analyzed to evaluate the accuracy of the model (shown in Chart 1). Two measures were used to evaluate the ability of the model to replicate actual conditions: the slope of a line of best fit through the data points[9] and the coefficient of determination (R^2). In both cases, values of 1.0 indicate that the model volumes produced perfectly match the actual traffic counts collected in the field.

As shown in Chart 1, the slope of the line of best fit equals 1.044 for the p.m. peak hour, indicating that the model volumes are approximately only 4% higher than the actual counts and that the model trip generation is appropriate and does not require further refinement. Furthermore, the R^2 values of 0.906 indicate that the model volumes are consistent with the count data collected.

Chart 1: Model Volumes vs. Actual Turn Movement Volumes (Weekday PM Peak Hour)



[9] The line of best fit is described by the equation y = mx+b, where m = the slope of the line and b = 0.

Future Year (2031) Model Development

The future year model for 2031 was created using the calibrated existing year model as a base and incorporating:

- planned and reasonably likely to be funded *future transportation improvements**,
- *traffic volume growth on major facilities* that include regional trips*, and*
- new local trips generated by anticipated *growth in housing and employment*.

Future transportation improvements were identified through review of ODOT's Statewide Improvement Program, projects conditioned on new development as mitigation, and the current City of Hood River TSP. These projects are described in Table 3.

For this TSP update, all projects currently proposed in the TSP should be reevaluated for their effectiveness at addressing key transportation issues. Therefore, for the future needs assessment, projects proposed in the current TSP were not included in the future forecast unless they were funded and would be proceeding to construction in the near term*. Only the intersection improvements on Cascade Avenue at Rand Road are currently funded. However, that project can not proceed until ODOT grants necessary approvals for traffic signal construction. Given that uncertainty, no other improvements beyond those shown in Table 3 were assumed to be in place by 2031. Because of this, the resulting traffic volume forecasts for "No Build" conditions in 2031 will differ from those previously published in recent area transportation studies. However, it is anticipated that once improvement projects are integrated back into the model the differences in these forecasts will be nominal.

Table 3: Assumed Future Transportation Improvements for Traffic Forecast Purposes

Project Code	Project Name	Project Description
		***ODOT 2008-2011 STIP*[10]**
15644	I-84: Exit 64 (Hood River) Bundle 224	Replace Bridge #07398 and Exit 64 Interchange Improvements
15816	Industrial Street (Hood River) IOF	Construct New Industrial Street. *(completed)*
		Mitigation Conditioned on Approved Development
N/A	2nd St./Cascade	Restrict turning movements to r-in/r-out only.
N/A	2nd St./ Oak	Install traffic signal.

[10] No additional motor vehicle projects in the Hood River area are included in the 2010-2013 Draft STIP

Sources and resulting assumptions for ***traffic volume growth on major facilities*** feeding the area through the external nodes are listed in Table 4.

Table 4: Major Transportation Corridor Growth Rates

Facility	Source of Assumptions	Growth Rate Assumed (Annual Compound Rate)
I-84 (from West)	ODOT Future Volume Tables	1.89%
I-84 (from East)	ODOT Future Volume Tables	2.08%
OR 35	ODOT Future Volume Tables	1.95%
Historic Columbia River Hwy (east of OR 35)	ODOT Future Volume Tables	1.84%
Tucker Road	ODOT Future Volume Tables	1.29%
Columbia River Bridge	Port of Hood River Historic Count Data	1.80%
Country Club Road	Hood River County TSP	1.72%
Frankton Road	Hood River County TSP	1.72%

The future ***growth in housing and employment*** were based on the existing relationships between these inputs and the population of the City. The population growth was estimated using an assumed compound growth rate of 2.0% per year, which was based on historical growth in the City since the last census (2000). The application of this rate resulted in a forecasted population within the UGB for the year 2031 of approximately 13,215. In comparison, the Hood River Public Facilities Plan used population growth rates of 2.2% (through 2015) and 2.0% (2016 through 2041) per year, which resulted in a population estimate for the year 2031 of 12,879. The difference between these estimates is approximately 3%, which reflects relatively good alignment between the planning for the transportation system needs and other public facilities in the City.

Using the relationships between existing housing (dwelling units) and employment within the UGB, the ratios of 2.25 people per dwelling unit and 1.46 people per job[11] were used to project future housing and employment for the year 2031. The resulting estimates for each are:

- 5,878 dwelling units (2,295 or 64% increase)
- 9,068 employees (3,541 or 64% increase)

The growth in housing and employment was allocated within the TAZs established by: 1) cross-referencing building permits issued and land use approvals since 2006 and 2) identifying areas within the UGB where vacant lands exist for residential and employment-based zones. Growth was spread proportionately across TAZs based on availability of land. However, during the allocation of growth, it was also assumed that the waterfront area (north of I-84 Exit 63) would be fully developed by 2031.

[11] Ratio of assumed 2006 population within the UGB of 8,055 and employment within the UGB of 5,527. UGB population calculated using known ratio of population to households within the City Limits.

Model Refinements for the TSP Forecast

New traffic data was collected for the Hood River TSP update project, therefore minor refinements were made to the Hood River models developed for the I-84 IAMPS (?) to improve city-wide forecasts. These modifications include:

- Reallocation of 25 future employees from TAZ 1 (north of I-84 Exit 62) to other areas of the city to improve the balance of growth across developable lands.
- Adjusted employee forecasts for TAZ 2 (south of I-84 Exit 62) due to the rezoning of lots from General Commercial to Light Industrial
- Minimal adjustments were made to the land use forecasts in other TAZs to account for the identified changes and to maintain the employment control total

Figures 4 and 5 illustrate the allocation of the growth in households and employment between the years 2006 and 2031 by TAZ . Table 5 provides accompanying detail, showing actual numbers of households and employees per TAZ for the year 2031.

With new land use, future transportation improvements, and highway traffic assumptions incorporated into the future year model, the assignment process was repeated to obtain 2031 model traffic volumes. However, rather than using the model-produced traffic volumes for analysis, the traffic volume growth found between the existing year and future year models was applied to the actual volume counts taken in the field to provide a more accurate assessment of future traffic.

Key Assumptions

For quick reference, the key assumptions used in the development of the future year (2031) traffic volumes through the study areas are provided below.

- 2006 population is 6,580 (source: Center for Population Research and Census, Portland State University).
- 2006 dwelling units were estimated at 2,927 within city limits and 3,583 within UGB (source: rooftop counts from aerial photos).
- 2006 employment was estimated at 5,384 employees within the city limits and 5,527 employees within the UGB (source: Oregon Employment Department).
- The population growth assumed a compound growth rate of 2.0% per year (source: historical growth in the City since the 2000 census and City of Hood River Ordinance # 1965).
- Future housing and employment were estimated using the forecasted population for 2031 and the existing relationships between housing, employment, and population (2.25 people per dwelling unit and 1.46 people per job).

Table 5: Future (2031) Housing and Employment Allocation by TAZ

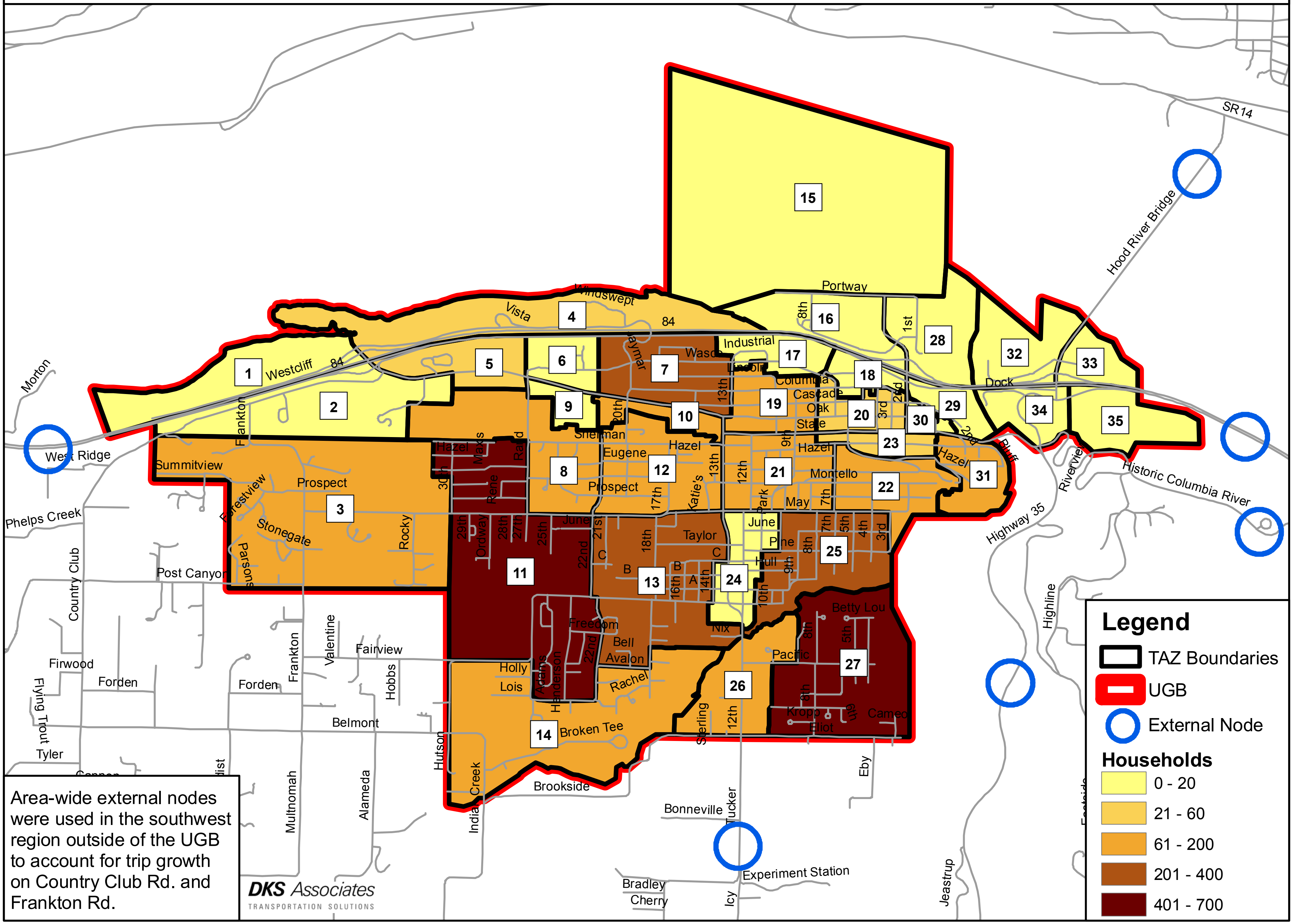
TAZ	Households	Employees	Approximate Trips IN	Approximate Trips OUT
1	38	497	366	474
2	24	1189	817	1098
3	903	19	538	322
4	58	31	54	48
5	32	456	339	440
6	10	355	166	254
7	272	74	203	155
8	519	106	317	219
9	0	313	203	280
10	70	436	354	441
11	849	21	499	299
12	246	94	210	161
13	370	125	293	233
14	360	105	264	195
15	0	146	270	163
16	0	512	222	352
17	1	284	22	98
18	0	233	103	162
19	183	8	108	66
20	40	641	374	523
21	221	244	155	167
22	180	7	106	64
23	51	215	116	159
24	19	907	957	1163
25	232	66	180	130
26	208	831	757	903
27	897	32	527	319
28	0	272	137	206
29	0	10	1	3
30	0	200	138	186
31	90	3	53	32
32	0	104	205	198
33	6	229	169	213
34	0	229	158	213
35	0	76	4	25
Total	**5879**	**9068**	**9381**	**9967**

Future Traffic Volumes

Using the models developed, as described above, future traffic volumes for the years 2031 (planning horizon year) weekday p.m. peak hour were produced. A "post processing" technique following NCHRP 255 methodology[12] was utilized to refine model travel forecasts to the volume forecasts utilized for the 2031 intersection analysis. The 2031 p.m. peak hour weekday traffic volumes are shown in Figures 6a and 6b.

[12] *Highway Traffic Data for Urbanized Area Project Planning and Design – National Cooperative Highway Research Program Report 255*, Transportation Research Board, Washington D.C., 1982.

Figure 1: Hood River 2006 Household Data by TAZ



Area-wide external nodes were used in the southwest region outside of the UGB to account for trip growth on Country Club Rd. and Frankton Rd.

Figure 2: Hood River 2006 Employment Data by TAZ

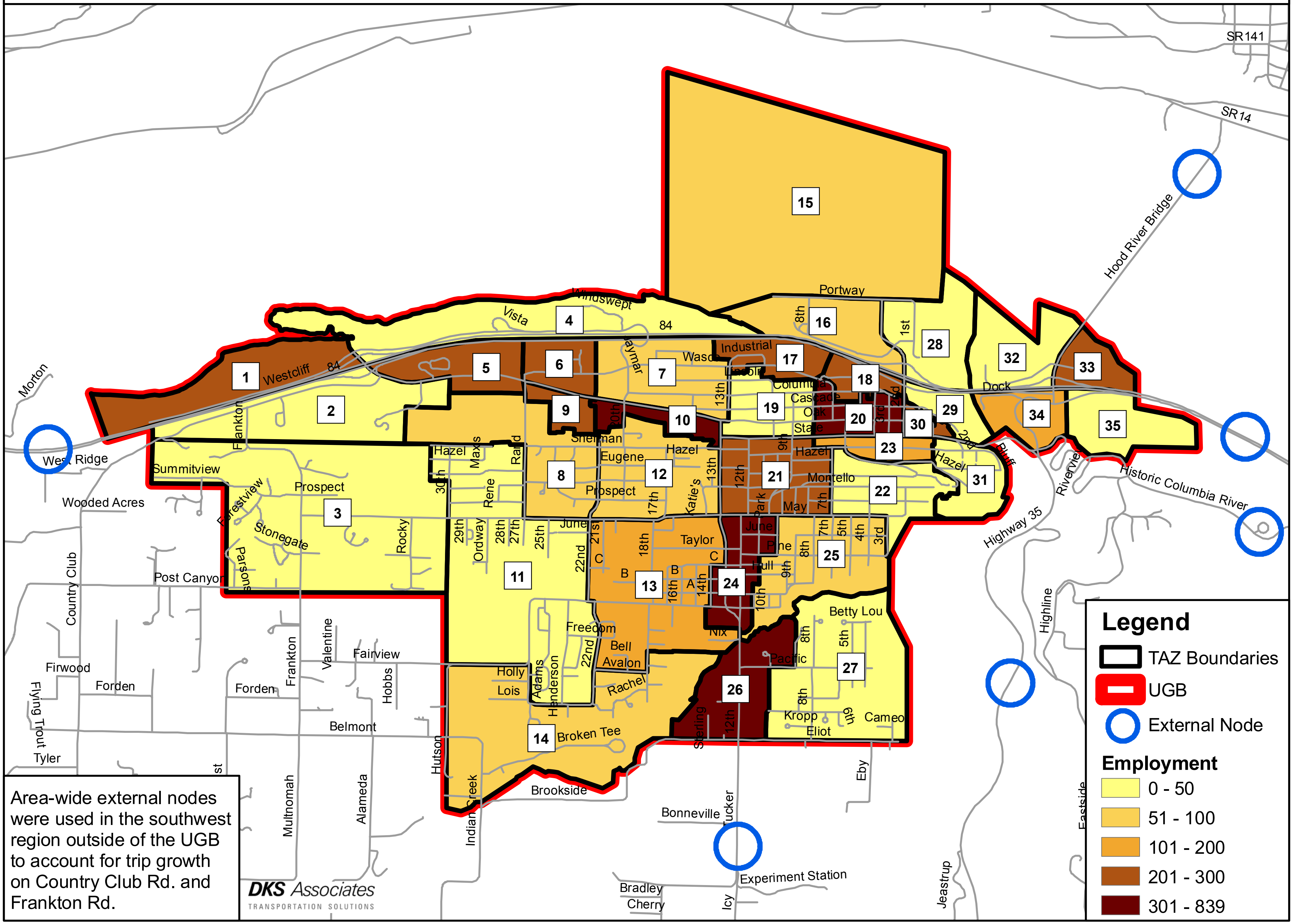


	FIGURE 3: TSP Intersection Count/Calibration Locations	1:21269
		Hood River TSP Update

Figure 4: Hood River Household Growth by TAZ (2031-2006)

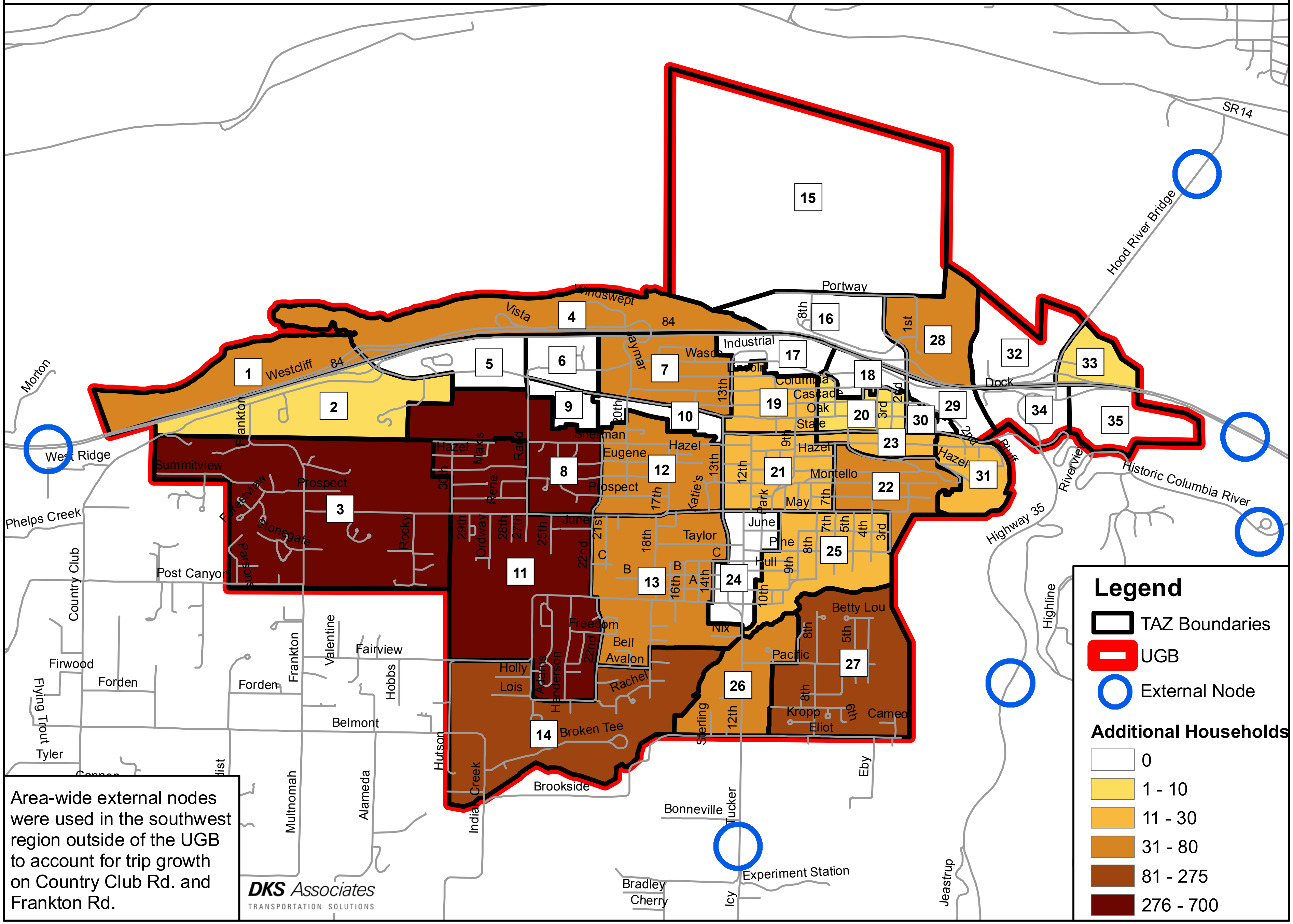
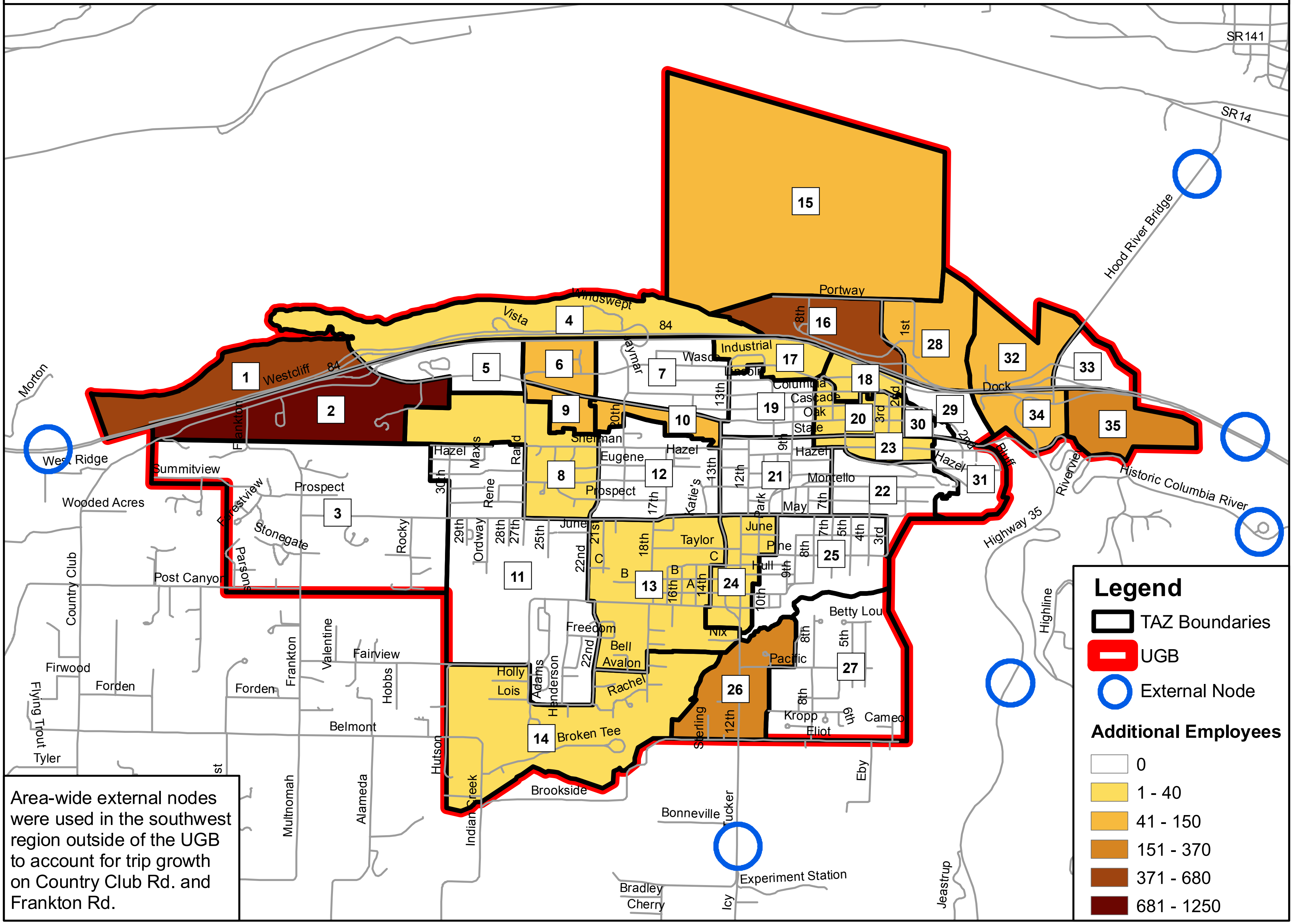
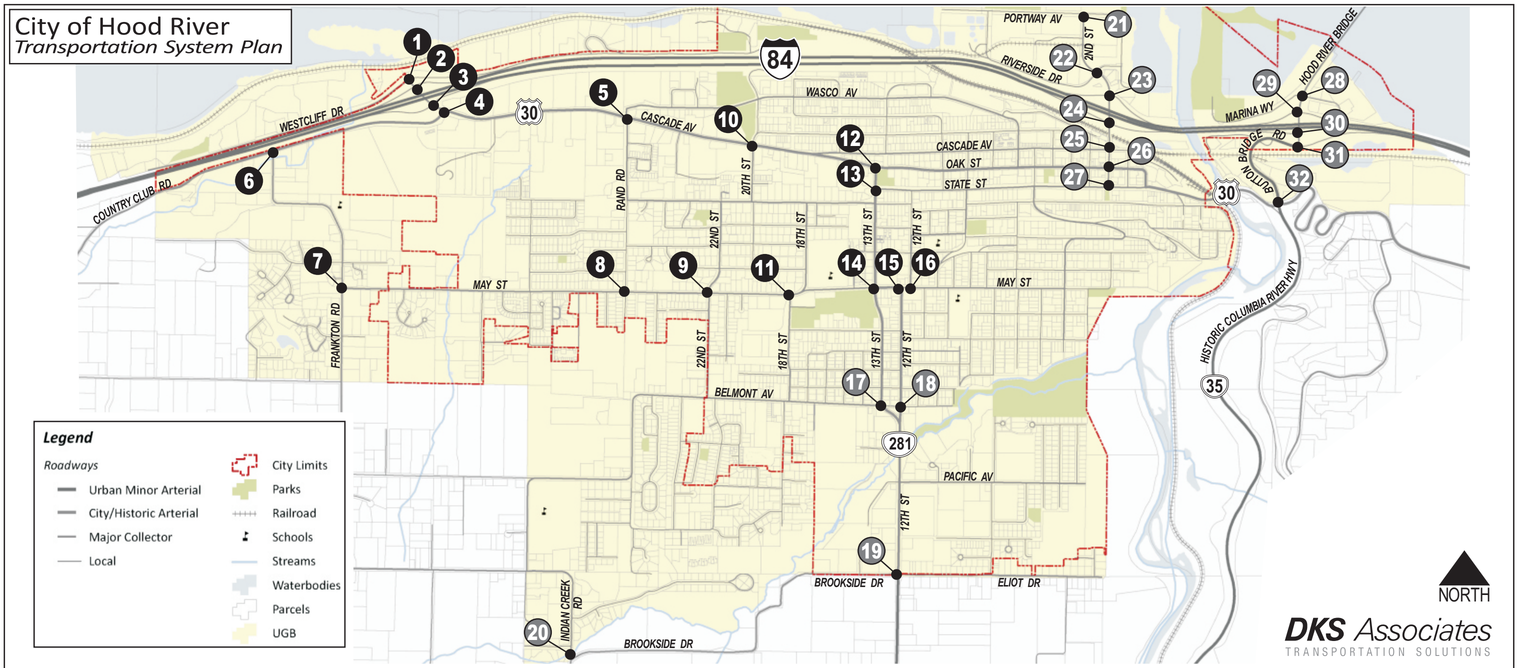
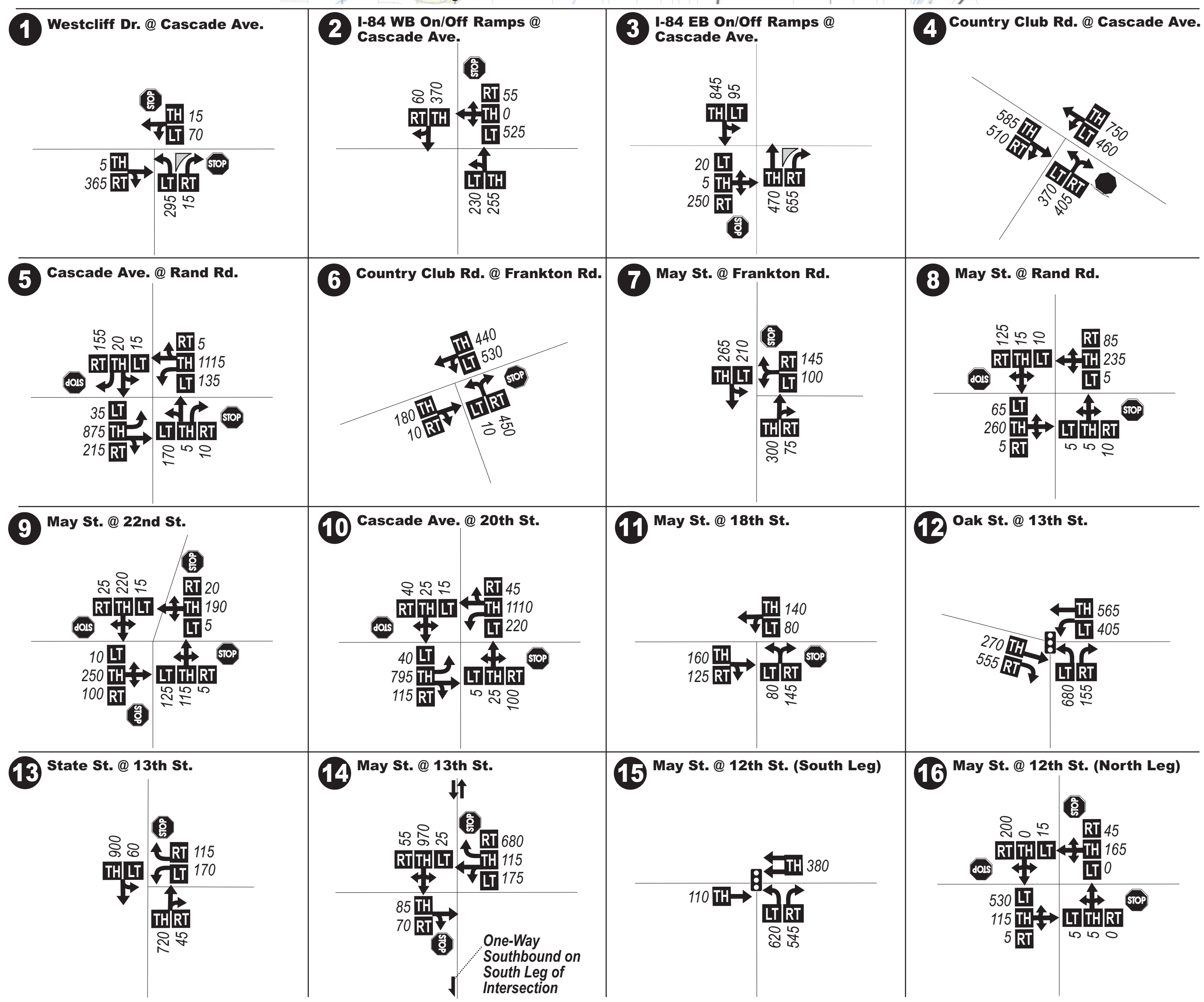


Figure 5: Hood River Employee Growth by TAZ (2031-2006)







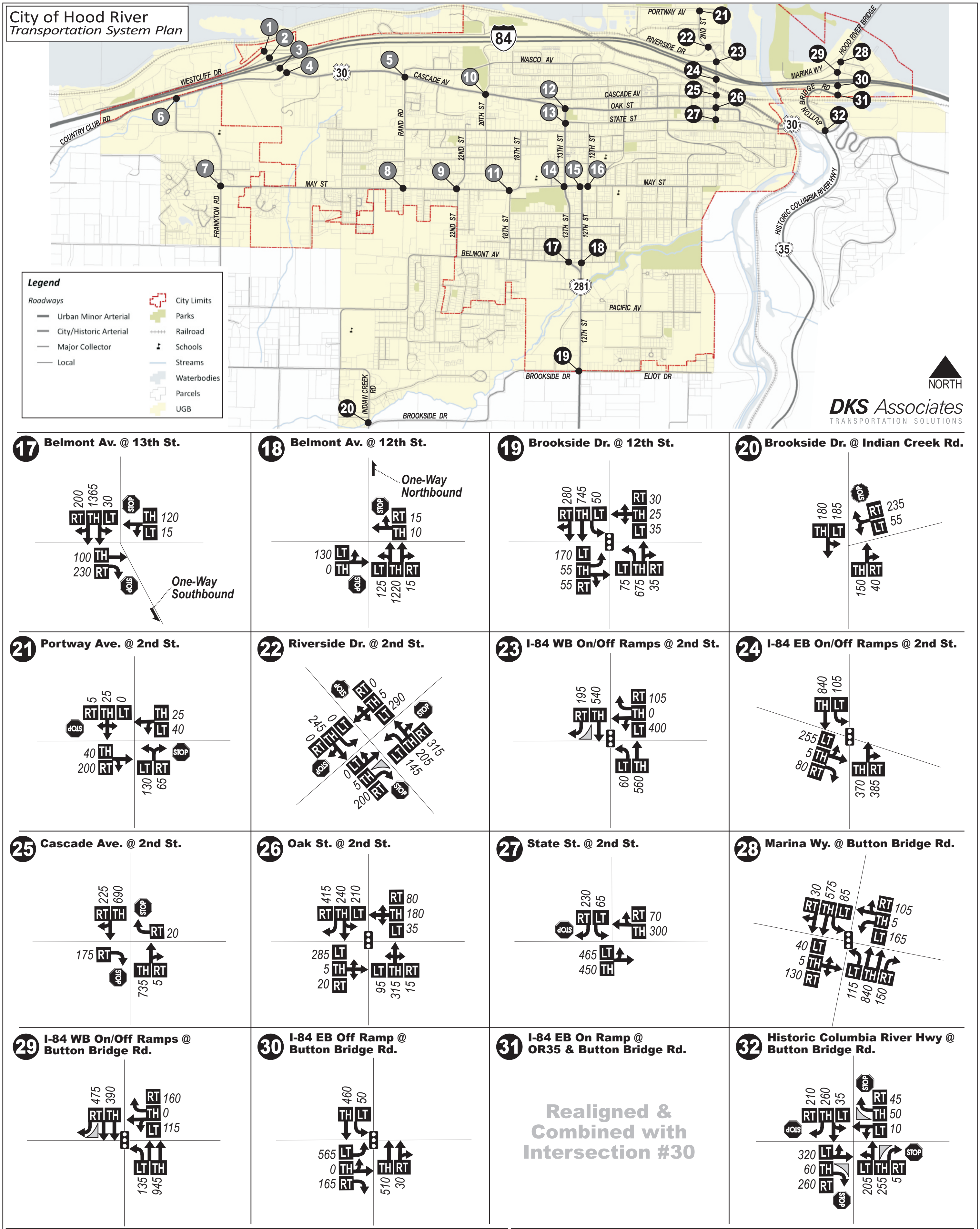
Legend

- 0 Study Intersection & Number (this page)
- 0 Study Intersection & Number (previous page)
- Stop Sign
- Traffic Signal
- Lane Configuration
- 00 30th Highest Hour Traffic Volume
- LT TH RT Volume Turn Movement (Left•Thru•Right)

Note: Projects proposed in the current TSP were not included in the future "No Build" forecast unless they were funded and would be proceeding to construction in the near term. For this reason, forecasted volumes may differ from those previously published in recent transportation studies.

Figure 6a

2031 NO-BUILD WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES



Legend

- 0 Study Intersection & Number (this page)
- 0 Study Intersection & Number (previous page)
- Stop Sign
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Note: Projects proposed in the current TSP were not included in the future "No Build" forecast unless they were funded and would be proceeding to construction in the near term. For this reason, forecasted volumes may differ from those previously published in recent transportation studies.

Figure 6b

2031 NO-BUILD WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

Appendix D: Future Transportation System Needs

Future Transportation System Needs
(Formerly Final TSP Chapter 4)

DATE: August 26, 2010

TO: City of Hood River TSP PMT

FROM: John Bosket, PE
Garth Appanaitis, EIT
Kristen Svicarovich, EIT
Rory Renfro, Alta Planning + Design
Elliot Akwai-Scott, Alta Planning + Design

SUBJECT: **Future Transportation System Needs**
(Formerly Final TSP Chapter 4)

P010068-003

Future transportation system needs through the TSP horizon year of 2031 were projected by building on the inventory and assessment of existing conditions and accounting for the additional impact of forecasted travel demand associated with regional and local growth. This chapter explains the underlying assumptions used in forecasting future trip growth and identifies transportation system deficiencies through the year 2031, which will act as a baseline for developing and prioritizing improvement alternatives.

FUTURE TRAVEL DEMAND FORECASTING METHODOLOGY

While the traditional methodology of applying simple growth rates is adequate for some studies, its ability to accurately forecast traffic can be limited since it does not acknowledge probable growth patterns influenced by the quantities and locations of buildable lands. Because of such limitations, a more robust forecasting methodology (as used for the I-84 Hood River Frontage Road Feasibility Study and the I-84 Hood River IAMPs) was employed for the Hood River Transportation System Plan (TSP). This enhanced cumulative analysis tool methodology combines the use of traffic volume growth rates on major roadways feeding into the study area with estimates of local trips related to city-wide growth in housing and employment opportunities. The forecasting tool was previously developed and reviewed[1], with previous modifications made to address comments received. Additionally, the forecasting tool was further refined to incorporate local circulation patterns reflected in recent traffic counts outside the IAMP areas, generally located south of Cascade Avenue or Historic Columbia River Highway (HCRH).

[1] Technical Memorandum: Traffic Volume Forecasting Assumptions & Results – Hood River Frontage Road Feasibility Study and Hood River IAMPs, DKS Associates, July 3, 2008.

A separate memorandum[2] (located in the Appendix) documented the results of the future year traffic forecasts for the Hood River TSP, as well as the process used to develop this cumulative analysis tool, including key assumptions related to traffic growth rates and housing, population, and employment estimates within the Hood River urban growth boundary (UGB). This first section of this chapter provides a summary of the material included in the full memorandum.

Methodology Overview

The forecasting methodology associated with the enhanced cumulative analysis tool expands upon the Cumulative Analysis approach, as defined in the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit's (TPAU's) *Analysis Procedures Manual*.[3] In the context of the traditional 4-step travel demand model approach, the typical Cumulative Analysis is used for trip generation and trip distribution purposes only. The result is a trip table (for growth increment, i.e. new development, only) that is used as an input into traffic assignment where analysis is completed by manually assigning the new trips to a transportation network and then adding them to the existing traffic volumes to estimate future volumes. Using this methodology, existing trips using the transportation system are not assumed to change routes in the future based on new development[4], nor with transportation improvements[5], due to the static nature of the methodology.

The enhanced cumulative analysis tool uses the same trip generation and trip distribution methodology as the typical Cumulative Analysis, but it applies the methodology to all land uses within the city (i.e., both existing uses as well as any future development based on a land use inventory). The enhanced tool then uses VISUM modeling software[6] and incorporates intersection node delay to complete the equilibrium trip assignment. The result is an improved traffic volume forecasting tool that dynamically assigns both new and existing trips to the transportation network using an equilibrium assignment procedure that represents routing choice more accurately than manual assignment because it is responsive to varying levels of congestion and delay as traffic patterns change. This tool enables a more comprehensive analysis of future conditions and potential TSP alternatives.

The cumulative analysis forecasting process involves the development of two VISUM models: one representing the existing (or recent) year and one representing the future year of interest (2031). The existing year model is used for calibration so assumptions regarding area land uses and trip patterns can be checked against actual traffic counts. Once calibrated, the existing model acts as a foundation upon which growth assumptions are applied to reach a desired future year condition.

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[2] Draft Technical Memorandum #2: Traffic Volume Forecasting Assumptions & Results – Hood River Transportation System Plan, DKS Associates, July 12, 2010.

[3] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated July 2009, pgs. 61-74

[4] e.g. a trip from a house to the grocery store would continue to travel to the same grocery store, even if a new grocery store was built closer to the house

[5] e.g. a trip from the parking lot of a commercial complex would continue to make a right turn and take the longer route due to the delay in a left turn movement, even if a traffic signal is constructed that reduces the left turn delay

[6] VISUM is a transportation travel demand modeling software developed by PTV Vision

Existing Year (2006) Model Development

The selection of a year to represent "existing" conditions was based on the availability of data describing that year. Much of the data obtained for recent studies was collected in the years 2005, 2006, and 2007, as well as additional counts collected in 2010. After evaluation of this data, the year 2006 was selected for use.

Each model was created using four major components describing the area within the UGB[7]:

- Traffic volumes on major roadways feeding the study area
- Population
- Number of dwelling units and
- Number of employees

Traffic volumes on area roadways were obtained from a variety of sources, including: recent studies, the Port of Hood River (toll booth), ODOT's Traffic Volume Tables, an Automatic Traffic Recorder (ATR) station on I-84, and other historic count databases.

A ***population*** for the year 2006 of 6,580 was obtained from the Oregon Economic & Community Development Department.[8] In comparison, the City's website currently states that there is a population of approximately 6,500 full-time residents.

The number of ***dwelling units*** in 2006 was estimated through a rooftop count using aerial photos. The resulting estimate was 2,927 within the city limits and 3,583 within the UGB. In comparison, the Hood River Public Facilities Plan (2000) estimated there would be 2,923 dwelling units within the UGB by 2006 and the 2000 Census reported a total of 2,657 in the year 2000.

By dividing the population and dwelling unit estimates, a persons per dwelling unit ratio of 2.25 is provided. In comparison, the following persons per dwelling unit ratio estimates for the City of Hood River (shown in Table 4-1) have been used for various planning studies over the past 25 years. The average value of 2.32 is within 5% of the estimate proposed for use in this effort.

Table 4-1: Past References for Persons/Dwelling Units Estimates

Source	Persons/ Dwelling Unit Ratio
City of Hood River Goal 10 Study, 1983	2.04
US Census Bureau, 2000	2.20
Hood River Public Facilities Plan, 2001	2.64
Housing Market Analysis, Oregon Downtown Development Association, 2005	2.38
AVERAGE	**2.32**

The number of ***employees*** within the City of Hood River during the year of 2006 was obtained from the Oregon Employment Department. The data provided contained monthly estimates of

[7] For this study, the area within the UGB is assumed to include the area within the City Limits as well.
[8] Data from Center for Population Research and Census, Portland State University.

employee totals for various industry types. In aggregate, the reported totals were 5,384 employees within the city limits and 5,527 employees within the UGB.

The individual dwelling units and employees estimated for the year 2006 were distributed on lands within the Hood River UGB by creating Transportation Analysis Zones (TAZs) that divided the area based on zoning designations, major transportation facilities, topography, and other barriers/constraints. The dwelling units were allocated according to the results of the aerial photo survey. The employment was allocated by cross-referencing information from the aerial photo with the underlying property zoning and inventories of business types from windshield surveys. This was further supplemented by phone conversations with several employers, including: Century Link, Hood River Sand & Gravel, Columbia River Gorge Hotel, Parkhurst Assisted Living, Best Western Hood River Inn, Dakine, Hood River Distillers, Covenant Christian Church, Maritime Services Corp., Smokehouse, Frankton School, Westside Elementary School, Hood River Middle School, and Providence Memorial Hospital. The Appendix includes additional detail regarding land use for each TAZ.

With the local land uses allocated among the TAZs, a trip table (i.e., matrix) was made to match potential origins with destinations within (TAZs) and outside of (external nodes) the City. Trips were assigned to area streets by the model, which looked for the most direct and fastest route between points. Streets in the model were coded with speeds, capacities, and traffic controls (stop signs, signals, etc…) to help determine the attractiveness of each route.

The resulting volumes on network streets were compared to the actual volumes from traffic counts to determine if the model was sufficiently calibrated and reasonably reflective of actual traffic patterns in the study area. Calibration was performed on the base year model by comparing base year weekday p.m. peak hour counts at the study intersections and intersection turn movements within the model.

Future Year (2031) Model Development

The future year model for 2031 was created using the calibrated existing year model as a base and incorporating:

- planned and reasonably likely to be funded *future transportation improvements,*
- *traffic volume growth on major facilities* that include regional trips*, and*
- new local trips generated by anticipated *growth in housing and employment*.

Future transportation improvements were identified through review of ODOT's Statewide Improvement Program, projects conditioned on new development as mitigation, and the current City of Hood River TSP. These projects are described in Table 4-2 and shown in Figure 4-1.

For this TSP update, all projects currently proposed in the TSP should be reevaluated for their effectiveness at addressing key transportation issues. Therefore, for the future needs assessment, projects proposed in the current TSP were not included in the future forecast unless they were funded and would be proceeding to construction in the near term. No other improvements beyond those shown in Table 4-2 were assumed to be in place by 2031. Because of this, the resulting traffic volume forecasts for “No Build” conditions in 2031 will differ from those previously published in recent area transportation studies. However, it is anticipated that once improvement projects are integrated back into the model the differences in these forecasts will be nominal.

Table 4-2: Assumed Future Transportation Improvements for Traffic Forecast

Project Name	Project Description
ODOT 2008-2011 STIP[9]	
I-84: Exit 64 (Hood River) Bundle 224 (Code #15644)	Replace Bridge #07398 and Exit 64 Interchange Improvements
Industrial Street (Hood River) IOF (Code #15216)	Construct New Industrial Street. *(completed)*
Mitigation Conditioned on Approved Development	
2nd St./Cascade	Restrict turning movements to r-in/r-out only.
2nd St./ Oak	Install traffic signal.

Sources and resulting assumptions for ***traffic volume growth on major facilities*** feeding the area through the external nodes are listed in Table 4-3.

Table 4-3: Major Transportation Corridor Growth Rates

Facility	Source of Assumptions	Growth Rate Assumed (Annual Compound Rate)
I-84 (from West)	ODOT Future Volume Tables	1.89%
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Frankton Road	Hood River County TSP	1.72%

The future ***growth in housing and employment*** were based on the existing relationships between these inputs and the population of the City. The population growth was estimated using an assumed compound growth rate of 2.0% per year, which was based on historical growth in the City since the last census (2000) and is consistent with City of Hood River Ordinance # 1965. The application of this rate resulted in a forecasted population within the UGB for the year 2031 of approximately 13,215.

[9] No additional motor vehicle projects in the Hood River area are included in the 2010-2013 Draft STIP

City of Hood River
Transportation System Plan
FIGURE 4-1
COMMITTED TRANSPORTATION IMPROVEMENT PROJECTS
NORTH
0 0.25 0.5 Miles
Shared Use Path from Mitchell Point Tunnel to Westcliff Drive
2nd Street & Cascade - Restrict Turning Movements
2nd Street & Oak - Install Traffic Signal
I-84 Exit 64 Interchange Improvements
June 2010
Legend
Committed Bicycle & Pedestian Project
Other Committed Project
Bicycle Lane
Arterial/Collector Existing Sidewalk
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB

In comparison, the Hood River Public Facilities Plan used population growth rates of 2.2% (through 2015) and 2.0% (2016 through 2041) per year, which resulted in a population estimate for the year 2031 of 12,879. The difference between these estimates is approximately 3%, which reflects relatively good alignment between the planning for the transportation system needs and other public facilities in the City.

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Model Refinements for the TSP Forecast

As new traffic data was collected for the Hood River TSP update project, minor refinements were made to the Hood River models to improve city-wide forecasts. These modifications include:

- Reallocation of 25 future employees from TAZ 1 (north of Exit 62) to other areas of the city to improve the balance of growth across developable lands.
- Adjusted employee forecasts for TAZ 2 (south of Exit 62) due to the rezoning of lots from General Commercial to Light Industrial.
- Minimal adjustments were made to the land use forecasts in other TAZs to account for the identified changes and to maintain the employment control total.

The allocation of the growth in households and employment between the years 2006 and 2031 by TAZ is illustrated in Figures 4-2 and 4-3.

With new land use, future transportation improvements, and highway traffic assumptions incorporated into the future year model, the assignment process was repeated to obtain 2031 model traffic volumes. However, rather than using the model-produced traffic volumes for analysis, the traffic volume growth found between the existing year and future year models was applied to the actual volume counts taken in the field to provide a more accurate assessment of future traffic.

[10] Ratio of assumed 2006 population within the UGB of 8,055 and employment within the UGB of 5,527. UGB population calculated using known ratio of population to households within the City Limits.

Figure 4-2: Hood River Household Growth by TAZ (2031-2006)

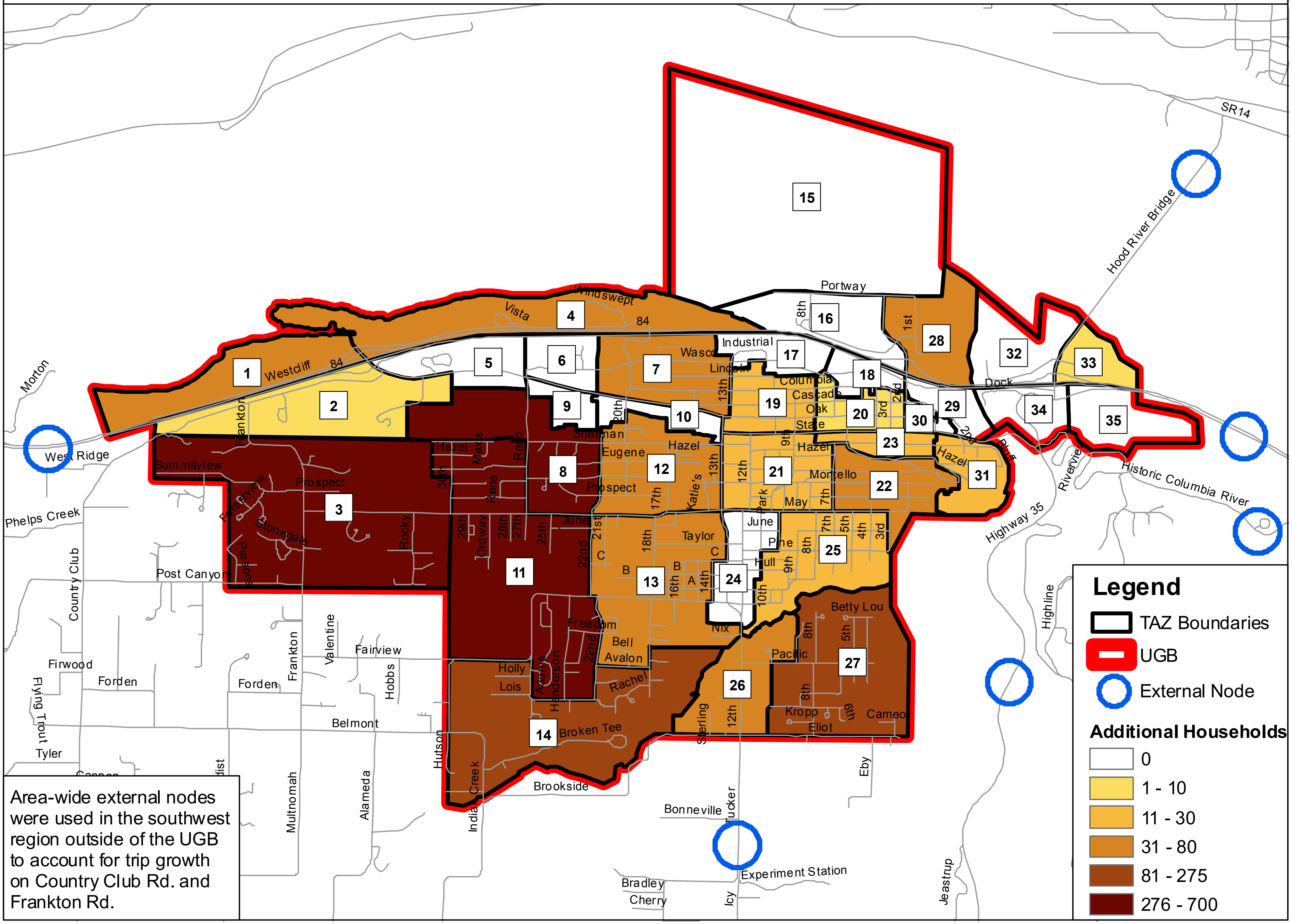
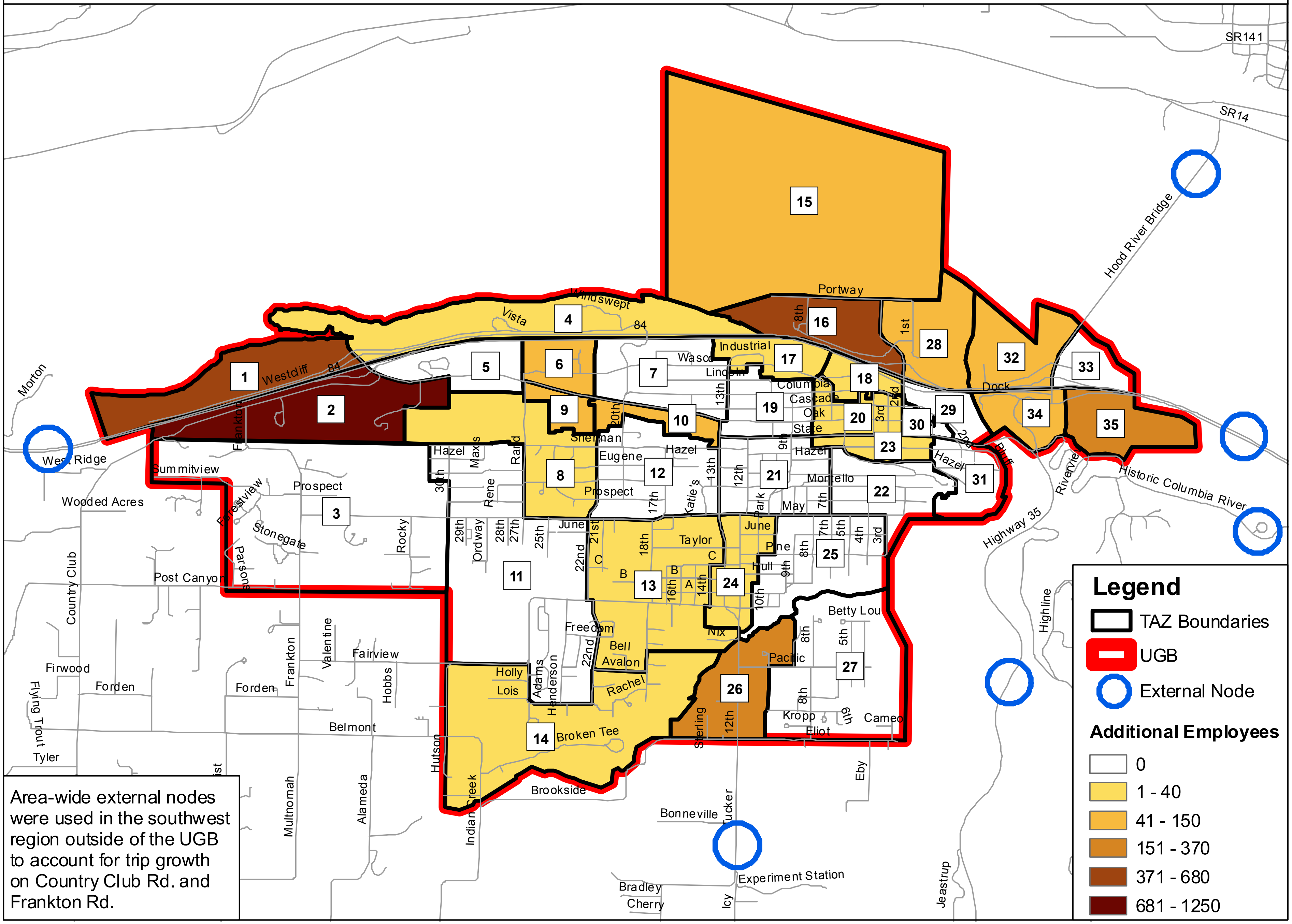


Figure 4-3: Hood River Employee Growth by TAZ (2031-2006)



Area-wide external nodes were used in the southwest region outside of the UGB to account for trip growth on Country Club Rd. and Frankton Rd.

Key Land Use and Growth Assumptions

For quick reference, the key assumptions used in the development of the future year (2031) traffic volumes through the study areas are provided below.

- 2006 population is 6,580 (source: Center for Population Research and Census, Portland State University).
- 2006 dwelling units were estimated at 2,927 within city limits and 3,583 within UGB (source: rooftop counts from aerial photos).
- 2006 employment was estimated at 5,384 employees within the city limits and 5,527 employees within the UGB (source: Oregon Employment Department).
- The population growth assumed a compound growth rate of 2.0% per year (source: historical growth in the City since the 2000 census and City of Hood River Ordinance # 1965).
- Future housing and employment were estimated using the forecasted population for 2031 and the existing relationships between housing, employment, and population (2.25 people per dwelling unit and 1.46 people per job).

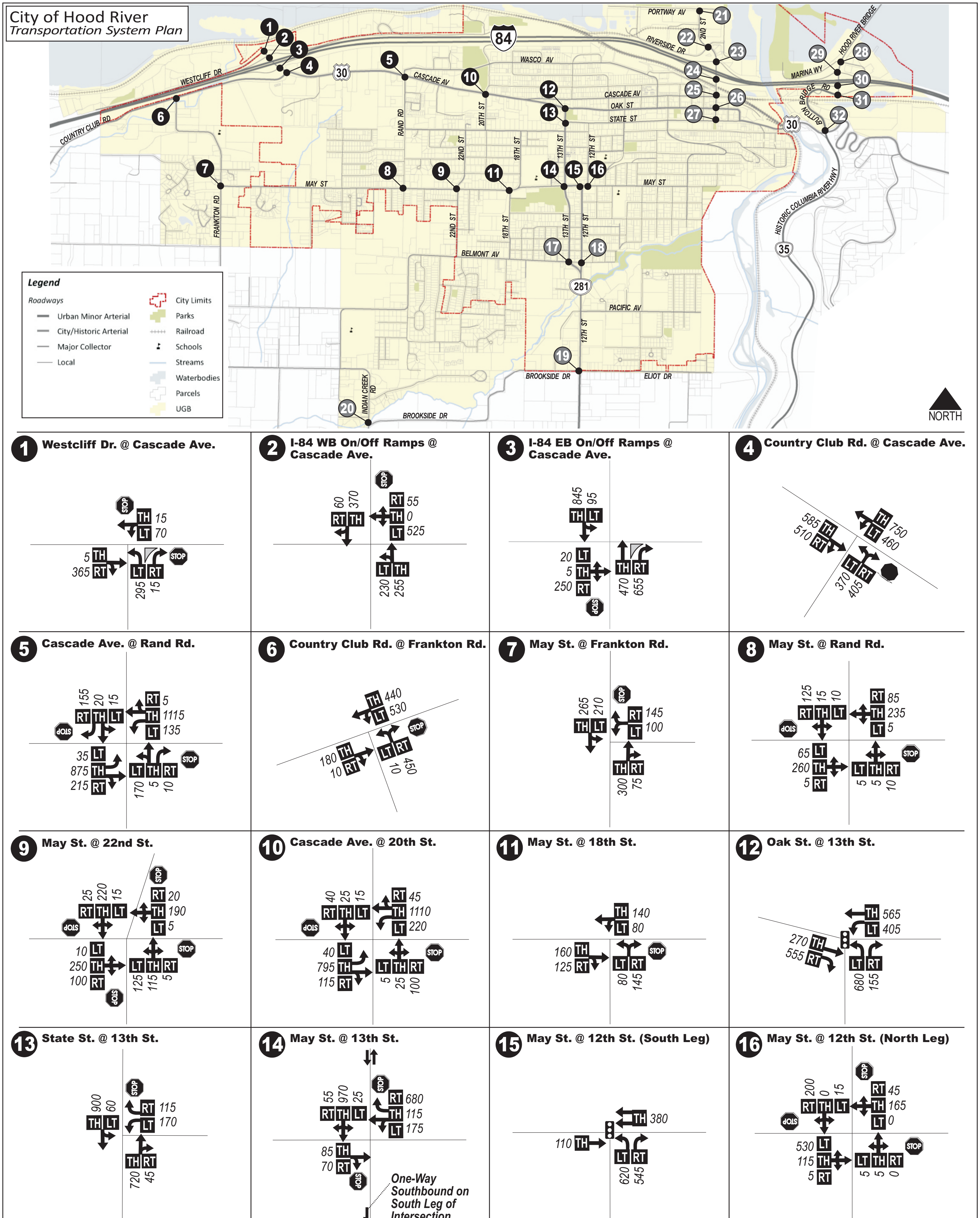
FUTURE TRAFFIC VOLUMES (2031)

Using the previously described methodology, design hour traffic volumes for the year 2031 were forecasted at study intersections, representing the summer weekday p.m. peak hour on the highways and the average weekday p.m. peak hour on the city streets.

The most significant traffic growth in Hood River is projected to generally occur on facilities that currently carry the majority of traffic. The facilities include both regional routes (I-84, OR 35, and OR 281/Tucker Road) that connect Hood River to surrounding areas, as well as facilities within the city (Cascade Avenue/ HCRH, Country Club Road, Frankton Road, May Street, Oak Street and State Street). Future congestion levels and improvements along the facilities will determine whether most growth occurs along the primary routes (Cascade Avenue/ HCRH and Oak Street as east-west routes, and OR 281/Tucker Road as north-south routes) or spills onto parallel facilities (May Street, local trips on I-84, 20th Street, Rand Road, 9th Street).

Potential future connections within the city's roadway system (such as connecting Mt. Adams Avenue from Cascade Avenue (HCRH) to Fairview Drive, or realigning Country Club Road to Mt. Adams Avenue) would impact the circulation of traffic within the City and would affect the "no build" traffic volumes presented in this scenario. Therefore, as alternatives to relieve congestion on the major routes are evaluated, trip growth on city streets should be reassessed.

The forecasted design hour volumes for the year 2031, which were used in the analysis of future operations and needs, are displayed in Figures 4-4a and 4-4b.



Legend

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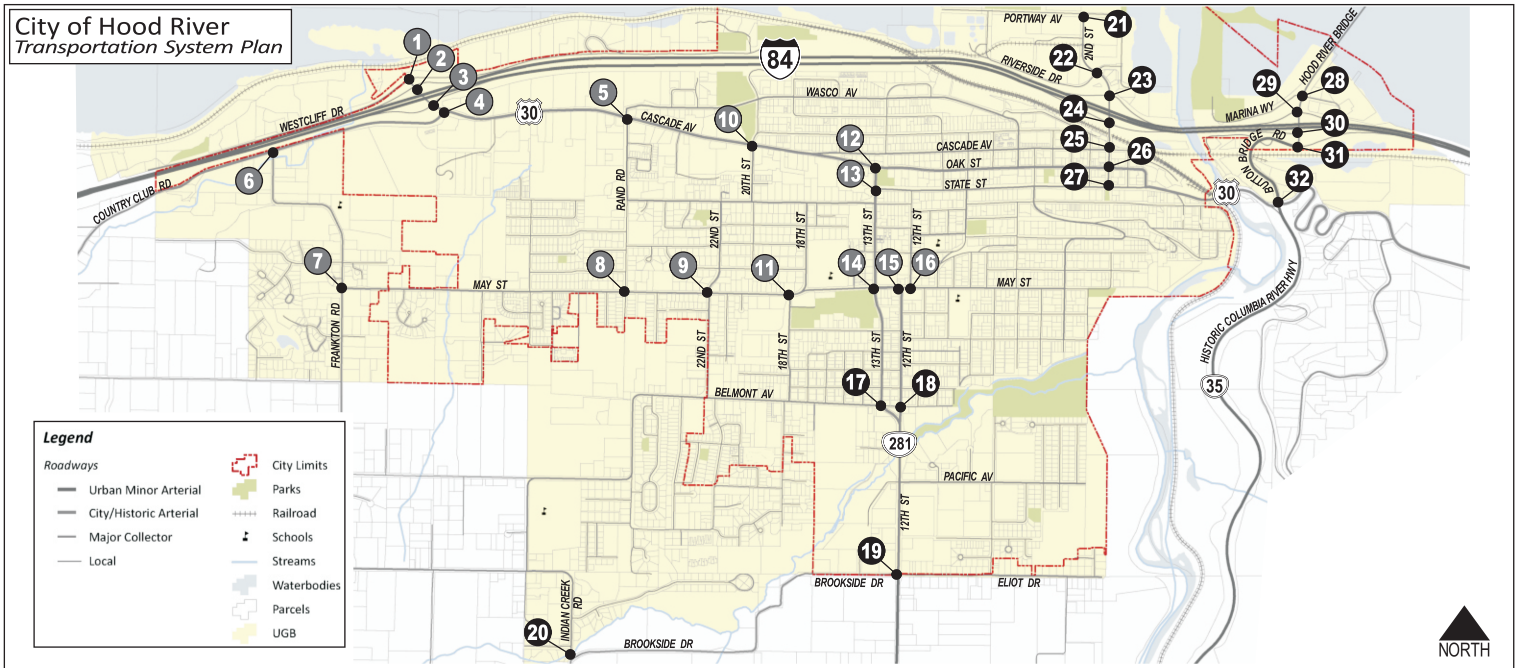
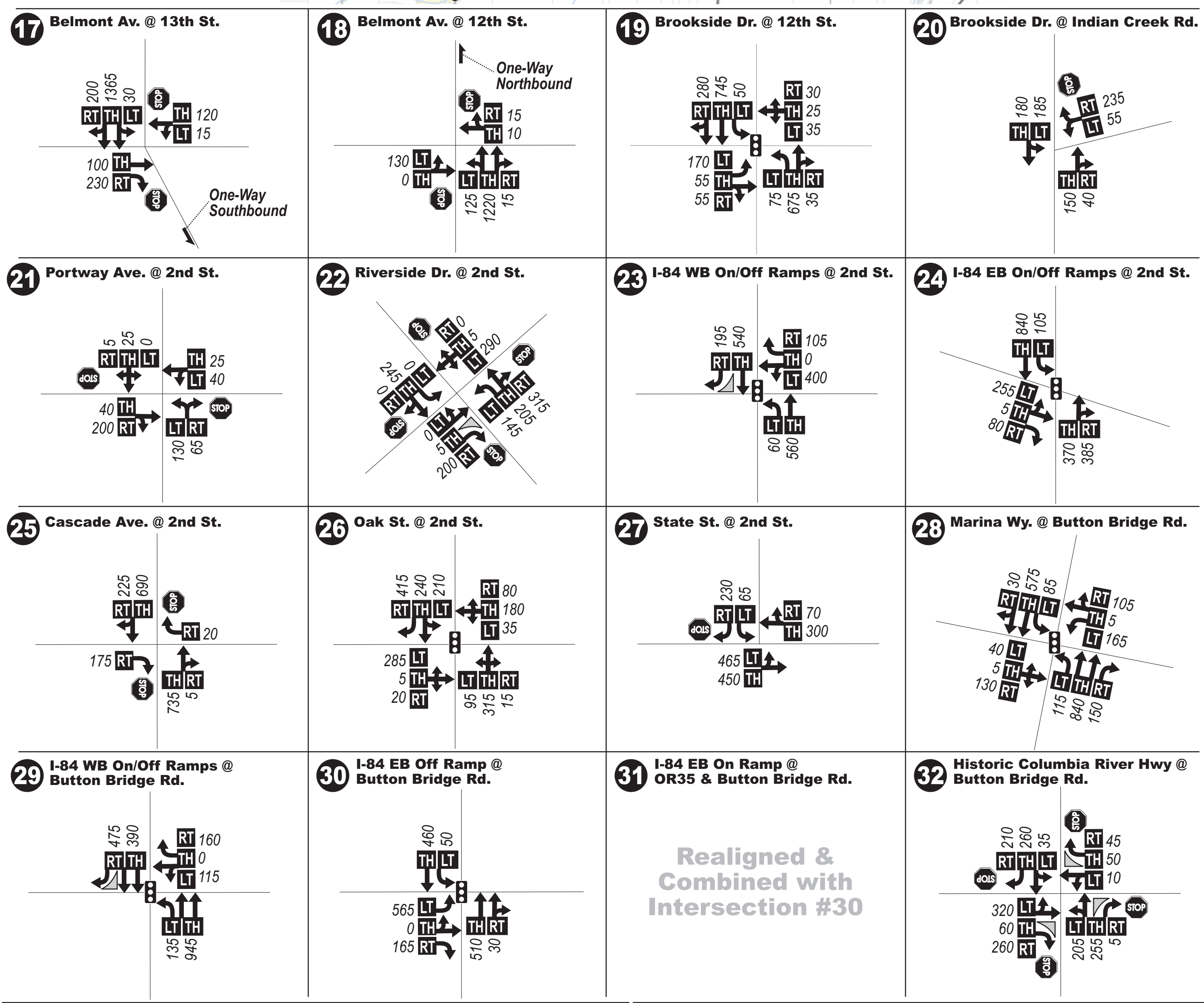
- Stop Sign
- Traffic Signal
- Lane Configuration
- 00 30th Highest Hour Traffic Volume
- LT TH RT Volume Turn Movement (Left•Thru•Right)

Note: Projects proposed in the current TSP were not included in the future "No Build" forecast unless they were funded and would be proceeding to construction in the near term. For this reason, forecasted volumes may differ from those previously published in recent transportation studies.

Figure 4-4a

2031 NO-BUILD WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES





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- Traffic Signal
- Lane Configuration
- 00 30th Highest Hour Traffic Volume
- LT TH RT Volume Turn Movement (Left•Thru•Right)

Note: Projects proposed in the current TSP were not included in the future "No Build" forecast unless they were funded and would be proceeding to construction in the near term. For this reason, forecasted volumes may differ from those previously published in recent transportation studies.

Figure 4-4b

2031 NO-BUILD WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

FUTURE TRAFFIC OPERATIONS (2031)

The 2031 design hour traffic volumes were re-analyzed, using the same methodology employed for existing conditions to assess future operations.

Intersection Operations

As shown in Table 4-4, thirteen study intersections currently do not meet adopted mobility standards, and 19 intersections would not meet standards by 2031 without additional improvements beyond those listed in Table 4-3. These locations are highlighted in Table 4-4 with shaded cells.

One intersection that currently does not meet mobility standards (Button Bridge Road/Marina Way) would meet standards with planned improvements.

The other intersections that will drop below standards are located along state routes (I-84 ramps, US 30, OR 35, and OR 281) and on Frankton Road. These intersections are projected to have increased traffic with the development of the western portion of the UGB.

The study intersections on state facilities are generally located in three areas in Hood River:

- Cascade Avenue (HCRH),
- 2nd Street, and
- 12th/13th Streets (OR 281).

Cascade Avenue (HCRH) is the primary east-west route for travel between Exit 62 and downtown Hood River, and (like Frankton Road) traffic demand along the facility would increase with development in the western portion of the UGB.

Exit 63 (2nd Street) serves direct access to the Port of Hood River, recreational areas and downtown Hood River, and will need additional capacity improvements to support future travel demand.

Finally, 12th Street and 13th Street (OR 281) provide the primary north-south connection within Hood River and south of the city. Similar to Cascade Avenue (HCRH) , this route will continue to support the majority of traffic flow and growth because alternate arterial routes do not exist through the city’s core.

Table 4-4: Weekday PM Peak Hour Intersection Operations

Intersection (North-South / East-West)	Mobility Standard	Existing			Future (2031)		
		Delay	*LOS*	*V/C*	*Delay*	*LOS*	*V/C*
City of Hood River intersections							
Cascade Ave. / Westcliff Dr.	C	9.1	A/A	0.04	*15.8*	A/C	0.22
Frankton Rd. / Country Club Rd.	C	9.7	A/A	0.12	27.8	**A/D**	0.78
Frankton Rd. / May St.	C	10.7	A/B	0.18	35.7	**A/E**	0.70
Rand Rd. / May St.	C	12.8	A/B	0.26	21.4	A/C	0.53
22nd St. / May St.*	C	10.2	B	0.32	16.4	C	0.64
18th St. / May St.	C	11.4	A/B	0.19	14.4	A/B	0.39
Indian Creek Rd. / Brookside Dr.	C	10.6	A/B	0.17	14.7	A/B	0.44
2nd St. / Portway Ave.	C	9.8	A/A	0.08	12.5	A/B	0.31
2nd St. / State St.	C	27.3	**A/D**	0.56	>200	**B/F**	1.68
ODOT intersections							
Cascade Ave. / I-84 WB Ramps	0.85	30.6	**A/D**	0.71	>200	**A/F**	**4.53**
Cascade Ave. / I-84 EB Ramps	0.85	12.8	A/B	0.31	129.9	**A/F**	**1.11**
Cascade Ave. / Country Club Rd.	0.90	33.8	**A/D**	0.63	>200	**D/F**	**>5**
Cascade Ave. / Rand Rd.	0.90	29.6	**A/D**	0.45	>200	**B/F**	**NA**
20th St. / Cascade Ave.	0.90	81.7	**A/F**	0.73	>200	**B/F**	**NA**
13th St. / Oak St.	0.90	30.9	C	0.73	61.5	**E**	**1.01**
13th St. / State St.	0.90	71.7	**A/F**	0.70	>200	**A/F**	**2.39**
13th St. / May St.	0.90	29.5	**A/D**		28.4	**A/D**	**1.02**
12th St. (South Leg) / May St.	0.90	7.4	A	0.61	8.9	A	0.68
12th St. (North Leg) / May St.	0.90	20.5	A/C	0.37	30.4	**A/D**	0.63
13th St. / Belmont Ave.	0.90	120.4	**A/F**		>200	**A/F**	**2.43**
12th St. / Belmont Ave.	0.90	36.0	**A/E**	0.56	85.2	**A/F**	0.83
12th St. / Brookside Dr.	0.85	6.8	A	0.55	10.2	B	0.67
2nd St. / Riverside Dr.*	0.90	8.8	A	0.31	26.1	**D**	**0.94**
2nd St. / I-84 WB On/Off Ramps	0.85	19.7	B	0.39	19.7	B	0.74
2nd St. / I-84 EB On/Off Ramps	0.85	8.4	A	0.51	35.2	**D**	**0.93**
2nd St. / Cascade Ave.	0.90	>200	**A/F**		25.3	**A/D**	0.57
2nd St. / Oak St.	0.90	12.2	A/B	0.47	29.4	C	**0.98**
Button Bridge Rd. / Marina Wy.	0.80	60.8	**B/F**	**1.06**	10.7	B	0.57
Button Bridge Rd. / I-84 WB Ramps	0.80	40.4	**A/E**	0.66	7.9	A	0.46
Button Bridge Rd. / I-84 EB Off Ramp	0.85	22.8	C/C	0.73	12.5	B	0.46
OR35 & Button Bridge Rd. / I-84 EB On Ramp	0.80	31.2	**A/D**	0.44	NA	NA	NA
Button Bridge Rd. / Historic Columbia River Hwy.*	0.80	13.9	B	0.51	30.1	**D**	**0.96**

Signalized & All Way Stop Intersection:
Delay = Average Intersection Delay (sec.)
LOS = Level of Service
V/C = Volume to Capacity Ratio
Shaded values do not meet standards

Unsignalized Intersection:
Delay = Critical Movement Approach Delay (sec.)
LOS = Major Street LOS / Minor Street LOS
V/C = Critical Movement Volume-to-Capacity Ratio
Shaded values do not meet standards

*all way stop control

Signal Warrant Analysis

The 13 unsignalized study intersections that fail to meet adopted mobility standards in 2031 were evaluated for potential signalization using ODOT Preliminary Signal Warrants. These warrants are intended for use in determining whether signalization of an intersection would be justified at a time in the future. However, even where the preliminary warrants are met, full MUTCD warrants using current volume data at the time of proposed installation will need to be evaluated before signal construction is authorized by ODOT or the City.[11]

The intersections evaluated and the results of the analysis are discussed below. In addition to potential traffic signal control, roundabout control was also considered. However, in most cases the steep terrain and/or developed areas adjacent to the intersections would make roundabout construction undesirable. Finally, it should be recognized that as alternatives are tested to address deficiencies, travel patterns through the city may change and could potentially affect the signalization needs of intersections evaluated under No-Build conditions.

Frankton Road at Country Club Road: The minor street volumes on Frankton Road are projected to be too low to justify signalization. Although a large number of northbound right turn movements from Frankton Road to Country Club Road are projected (450 during the p.m. peak hour), these vehicles would be able to find gaps in the traffic stream and proceed to Country Club Road after stopping. In order to reduce delay at the intersection, a roundabout could be an effective treatment and should be considered during alternatives evaluation. However, the required geometrics may be difficult to achieve given the current right-of-way constraints and topography. Further, roundabout control or other future improvements at the intersection would need to account for the heavy truck traffic that uses Country Club Road.

Frankton Road at May Street: The minor street volumes on May Street would be too low to justify signalization. A roundabout could be an effective treatment and should be considered during alternatives evaluation. However, the required geometrics may be difficult to achieve given the current right-of-way constraints and topography.

2nd Street at State Street: The volume on State Street would be too low to meet signal warrants. A roundabout would not be feasible due to current development and restricted right of way.

Cascade Avenue (HCRH) at I-84 WB Ramps: The projected traffic volumes would meet the preliminary signal warrant. In particular, the westbound left turn from I-84 is projected to exceed 500 vehicles during the p.m. peak hour. Roundabouts were considered as an alternative through the I-84 Exit 62 Interchange Area management Plan. However, signals were found to be a better operational improvement and would cost considerably less money to construct.

[11] MUTCD signal warrants must be met based on ODOT methodology and OAR 734-020-460 (1). A traffic signal shall not be installed unless one or more of the warrants identified in the MUTCD are met or will be met consistent with the requirements of OAR 734-020-0490. The satisfaction of a warrant or warrants, however, is not in itself justification or a traffic signal. Installation of a signal must be approved by the State Traffic Engineer on a facility under ODOT jurisdiction.

Cascade Avenue (HCRH) at I-84 EB Ramps: Signalization may be needed at this intersection to address long queues and spillback onto the freeway as identified in the I-84 Exit 2 Interchange Area Management Plan (IAMP). Roundabouts were considered as an alternative through the I-84 Exit 62 IAMP. However, signals were found to be a better operational improvement and would cost considerably less money to construct.

Cascade Avenue (HCRH) at Country Club Road: The projected future volumes at this intersection would be high enough to meet the preliminary signal warrant. The intersection is projected to have significant traffic growth on all approaches with the development of lands in the western portion of the UGB. Through the I-84 Exit 62 Interchange Area management Plan, it was found that signalization at this location could not operate effectively due to the proximity to the I-84 ramp intersections. Because of this a realignment of Country Club Road to intersect with a future Mt. Adams Avenue extension was proposed. Roundabouts were also considered, but signals were found to be a better operational improvement.

Cascade Avenue (HCRH) at Rand Road: The projected future volumes would meet the preliminary signal warrant, even though the forecasting indicated that some vehicles may divert from Rand Road to seek other routes due to the high delay that would be experienced on the Rand Road approaches. A roundabout was recently evaluated at this intersection and it was determined that a roundabout would require significant right of way and a traffic signal would be a more feasible alternative.

Cascade Avenue (HCRH) at 20th Street: The minor street volumes on 20th Street are projected to be too low to meet preliminary signal warrants. However, volumes would approach the warrant threshold and the location should continue to be monitored because it may require signalization if traffic volumes were to further increase along 20th Street. A roundabout could be an effective treatment and should be considered during alternatives evaluation. However, the required geometrics may be difficult to achieve given the current right-of-way constraints with site access and adjacent buildings.

13th Street (OR 281) at State Street: The projected volumes would be high enough to meet the preliminary peak hour signal warrant, with approaching volumes on 13th Street (OR 281) exceeding 1,700 vehicles during the p.m. peak hour. Due to current right-of-way constraints and topography, as well as the traffic signal at Oak Street and 13th Street (OR 281), a roundabout would not be suitable at this location.

13th Street (OR 281) at May Street: The projected volumes would be high enough to meet the preliminary peak hour signal warrant. While the traffic growth along 13th Street (OR 281) would be somewhat limited due to congestion, the westbound approach is projected to have approximately 300 vehicles yielding to the 1,000 southbound vehicles during the p.m. peak hour, which would meet the preliminary signal warrant. An issue of particular concern with future signalization could include problems with stopping heavy vehicles on the 13th Street hill, especially during winter conditions.

12th Street (OR 281) at May Street (North leg): The combination of approach volumes at the intersection are projected to be too low to meet preliminary signal warrants. Future traffic control options will need to consider the slightly offset south-leg of 12th Street that is located approximately 75 feet to the west and is currently signal-controlled.

13th Street (OR 281) at Belmont Avenue: The projected volumes would be high enough to meet the preliminary peak hour signal warrant. While a large number of eastbound right turn traffic is projected, delays for this movement would be high given the high levels of traffic and limited gaps on 13th Street (OR 281). The required geometrics may be difficult to construct a roundabout in this location given the topography, current right-of-way constraints and proximity to the intersection of 12th Street (OR 281)/Belmont Avenue.

12th Street (OR 281) at Belmont Avenue: The combination of approach volumes at the intersection are projected to be too low to meet preliminary signal warrants. Even if alternative traffic control was warranted, a roundabout would be difficult to construct in this location given the topography, current right-of-way constraints (including structures west of 12th Street) and proximity to the intersection of 13th Street (OR 281)/Belmont Avenue.

2nd Street at Riverside Drive: The combination of approach volumes at the intersection are projected to be too low to meet preliminary signal warrants, even with the westbound left turn (westbound on Riverside to southbound on 2nd) volume of approximately 300 vehicles during the p.m. peak hour. A variety of traffic control types were considered through the I-84 Exit 63 and Exit 64 Interchange Area Management Plan, including signalization and roundabouts. However, because of queuing conflicts with the nearby I-84 Westbound Ramp signal, the restriction of turn movements to allow only right-in and right-out on the Riverside Drive approaches and a southbound left in from 2nd Street was selected as the preferred alternative.

2nd Street at Cascade Avenue: The 2031 No-Build scenario analysis assumed that only right-in/right-out turn movements to/from Cascade Avenue were allowed at the intersection. While the delay for the right turn movements from Cascade Avenue would be long due to high traffic volumes on 2nd Street, the side street volumes would not be high enough to meet signal warrants. Furthermore, this may not be an appropriate location for a traffic signal given the proximity to adjacent ramp terminals and a planned traffic signal at 2nd Street/Oak Street.

Button Bridge Road at Historic Columbia River Highway: The projected volumes would be high enough to meet the preliminary peak hour signal warrant. Through the I-84 Exit 63 and Exit 64 Interchange Area Management Plan, both signalization and a roundabout were found to provide adequate operation of the intersection. However, signalization was selected as the preferred alternative by the public. The geometric impacts of a roundabout on the Historic Columbia River Highway were also determined to be undesirable by the Historic Columbia River Highway Advisory Committee.

The preliminary signal warrant analysis indicates that six of the sixteen stop-controlled intersections that are projected to not meet mobility standards would meet preliminary traffic signal warrants by 2031. This analysis was based on projected 2031 traffic volumes that assume a “no build” transportation system (only projects listed in Table 4-2 are included). As alternatives are tested to address deficiencies, travel patterns through the city may change and could potentially affect the signalization needs of intersections evaluated under No-Build conditions.

PEDESTRIANS AND BICYCLES

As reviewed in Chapter 3 Existing Conditions, the existing bicycle and pedestrian networks in Hood River are functional, but lack connections to important destinations and the completion of sidewalks and bicycle facilities declines with distance from downtown. In downtown Hood River, residents and visitors walk using a complete sidewalk network with short blocks and marked crosswalks, and enjoy active storefronts and amenities such as benches, street trees and wayfinding signage. Bicyclists traveling downtown may feel comfortable riding with traffic due to slow speeds, but some may find difficulty riding up steep streets or finding secure parking near their destination.

Outside of downtown, pedestrians use sidewalks on some neighborhood streets, and may share the street with vehicles on low-traffic roads where sidewalks do not exist. However, several arterial streets that serve as key routes to schools for children in Hood River are missing sidewalks. Many older sidewalks lack curb ramps that are needed to accommodate wheelchair users, families with strollers, child bicyclists and persons with delivery carts. Bicyclists use bike lanes on Belmont Drive, Cascade Avenue (HCRH) and several other Hood River streets, but share the road with high-speed vehicle traffic on other arterial and collector streets, which can be difficult on narrow roadways outside the city limits. Neighborhood streets are comfortable routes for most bicyclists, but may not connect directly to common destinations such as schools and downtown. Steep hills also impact bicycling in Hood River where cyclists going south, uphill from the Columbia River, have limited choices of through-streets to travel on. Many cyclists may not feel comfortable riding on busy streets while traveling uphill due to the differential in speeds between uphill bicyclists and faster vehicles that attempt to pass.

Committed Hood River Transportation Improvements

Four planned or ongoing transportation improvement projects in Hood River (Figure 4-1) currently have committed funding. Of the four projects, a bicycle and pedestrian path west along I-84 from Westcliff Drive to Mitchell Point Tunnel will have the greatest impact on bicycle and pedestrian movements in Hood River. However, the project is located just outside of the Hood River urban growth boundary that is the subject of this plan, and does not connect to any existing bike lanes or sidewalks, limiting its effect on the larger bicycle and pedestrian network. The project may increase the number of recreational and fitness bicyclists traveling through Hood River and may also induce new bicycle and pedestrian traffic along Westcliff Drive to access the path.

Improvements to the I-84 Exit 64 interchange will include bike lanes and a sidewalk on Button Bridge Road, and will increase bicycle and pedestrian access to the Columbia River and the Hood River Bridge from downtown via State Street and US 30. Although the Exit 64 area does not currently experience significant bicycle and pedestrian volumes, the Button Bridge Road sidewalk and bike lanes will connect to an existing shoulder and overpass sidewalk on US 30, improving connectivity of the bicycle and pedestrian network. Three new signalized intersections will be created with the project, providing protected crossing phases for pedestrians and increasing safety for all modes. While the overall project is likely to improve conditions for bicycles and pedestrians, a right turn slip lane planned for vehicles entering I-84 eastbound may create conflicts with bicyclists continuing straight in the bike lane. A refuge island at this intersection will help protect pedestrians make a two-stage crossing of the intersection, including the slip lane.

The two other currently funded transportation improvement projects may have a small effect on bicycling and walking in Hood River. Restricting vehicle movements at the intersection of 2nd Street and Cascade should improve bicycle and pedestrian safety at that location by reducing potential conflict points, and the installation of a traffic signal at 2nd Street and Oak will give pedestrians a protected crossing phase while walking downtown.

Future Bicycle and Pedestrian Needs

The transportation projects currently funded in Hood River do not represent sufficient safety, connectivity and efficiency improvements for bicycle and pedestrian traffic for the year 2031. While these projects improve conditions for bicycles and pedestrians at several specific locations, they do not address larger gaps in the non-motorized transportation system in Hood River. Existing bicycle and pedestrian users are likely to benefit from these projects, but more improvements will be necessary to broaden the base of Hood River residents that feel safe and confident choosing to walk and bicycle for transportation.

Existing Challenges

Current gaps in the transportation system,and limited right of way that does not provide space to expand the system, hinder pedestrians and bicycle movements.

Bicycle and Pedestrian Transportation System Gaps

Key transportation system gaps for pedestrians in Hood River include:

- Lack of sidewalks or adequate shoulders for walking on arterial and collector streets in less-developed areas of the UGA.
- Difficult crossings at busy non-signalized intersections (ex. 13th Street/ OR 281 and May Street).
- Under-controlled intersections near schools (ex. 17th Street and May Street, or Belmont Drive and Fairview Drive, where one or more legs of the intersection are not stop-controlled).
- Lack of curb ramps outside of downtown
- Lack of sidewalks along key routes to schools (ex. May Street, Fairview Drive).
- Lack of connection between the northern and southern segments of the Indian Creek Trail southwest of Columbia Gorge Community College.
- Low connectivity of local streets (requiring longer travel distances to reach key destinations) due to topographical limitations.

Key transportation system gaps for bicyclists in Hood River include:

- Lack of bike lanes or wide shoulders on state highways.
- Lack of bike lanes or wide shoulders on city and county arterial and collector streets in outer Hood River.

- Lack of low-traffic bicycle-friendly streets comfortable for children or new/inexperienced cyclists.
- Low connectivity of local streets (requiring longer travel distances to reach key destinations) due to topographical limitations.
- Low maintenance funding that prevents adequate sweeping to keep bike lanes and shoulders clear of gravel and debris.
- Lack of climbing bike lanes or other facilities to help bicyclists negotiate steep hills.
- Difficult crossings at non-signalized intersections (ex. 13th Street/ OR 281 and May Street).
- Lack of secure bike parking at key destinations such as at schools and around downtown Hood River.
- Lack of secure long-term bike parking at transit stops.
- Variable availability of bike racks on Columbia Area Transit buses.

Right-of-Way

Limited right-of-way availability will challenge implementation of new bicycle and pedestrian facilities in Hood River. The Project Team conducted an assessment of available right-of-way on non-highway arterial and collector streets to determine whether right-of-way is sufficient to add bike lanes to these streets. Factors such as the width of the paved roadway, the presence of curbs and sidewalks, the configuration of travel lanes, parking lanes, and other characteristics were also noted during this assessment, as they affect what changes may be necessary in order to add bike lanes to a street.

Most arterial and collector streets in Hood River have 60’ of right-of-way, although some streets have as little as 40’ available in constrained areas. A small number of streets have up to 80’ of right-of-way in portions. Inside downtown, the right-of-way available for most streets is fully occupied by the existing paved roadway and sidewalks. Where sidewalks already exist, any new bicycle facilities would need to be integrated into the existing roadway width. Within downtown Hood River, most streets have a 36’ to 40’ paved roadway width, which would require parking removal (on at least one side) to accommodate bike lanes. In the few locations where the paved roadway on downtown streets is greater than 44’ wide, such as on Front Street, and State Street between 4th and 5th Streets, this extra space is used for angled parking to increase parking capacity. Though these streets could accommodate bike lanes without full removal of a parking lane, parallel parking would need to replace the existing angle parking, also resulting in reduced parking capacity.

In less-developed areas of the UGA, there is excess rightofway on many streets where the existing roadway could be expanded to add sidewalks and/or bike lanes. Example streets include Frankton Road, May Street, and Rand Road, where the current roadway width may be as narrow as 22’, leaving ample room to extend paved shoulders and/or construct sidewalks. Table 4-5 includes estimated right-of-way and roadway widths for arterial and collector streets in Hood River.

Table 4-5: Estimated Right-of-Way and Roadway Widths for Arterials and Collectors

Street	Right-of-Way*	Bike Lane Potential
2nd St	80' (50' roadway)	Bike lanes exist
4th St	60' (30' roadway)	Bike lanes may not be necessary on this residential street[1]
6th St	60' (36' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
7th St	54'-60' (38' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
9th St	60' (36' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
17th St	50'-60' (40' roadway)	Bike lanes may not be necessary on this residential street[1]
18th St	48' (38' roadway)	Bike lanes may not be necessary on this residential street[1]
20th St	60' (40' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
22nd St	60' (36' roadway)	Bike lanes may not be necessary on this residential street[1]
Belmont Dr/Ave	60' (30' roadway)	Bike lanes exist
Brookside Dr	60' (22' roadway)	ROW sufficient to add bike lanes with roadway expansion
Cascade Ave (HCRH)	60' (28'-26' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
Country Club Rd	n/a (28' roadway)	ROW sufficient to add bike lanes with roadway expansion
Eliot Dr	40'-50' (22' roadway)	ROW sufficient to add bike lanes with roadway expansion
Eugene St	50' (30' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes
Front St	60' (36' roadway)	Bike lanes may not be necessary on this short street in downtown Hood River
Frankton Rd	48'-75' (24' roadway)	ROW sufficient to add bike lanes with roadway expansion
Indian Creek Rd	40'-67' (30' roadway)	ROW sufficient to add bike lanes with roadway expansion
May St	40'-70' (30'-50' roadway)	ROW sufficient in some locations to add bike lanes with roadway expansion
Pacific Ave	60' (25'-40' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
Rand Rd	78' (28'-45' roadway)	ROW sufficient to add bike lanes with roadway expansion
Serpentine Rd	60' (36' roadway)	Roadway is sufficient to add bike lanes without expansion
Sherman Ave	50'-60' (38'-40' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
State St	80' (30'-50' roadway)	ROW sufficient in some locations to add bike lanes with roadway expansion
Wasco St	60' (38' roadway)	Existing roadway and sidewalks fill available ROW; roadway configuration would be required to add bike lanes[2]
Westcliff Dr	n/a (22' roadway)	Bike lanes may not be necessary on this section of the Historic Columbia River Highway[1]

** Measurements are estimated from aerial photos and should not be used without confirmation*
[1] Traffic volumes and speeds on these streets indicate they could be suitable for bicycling without bike lanes.
[2] The existing roadway on these streets is not wide enough to accommodate striping bike lanes without some level of parking removal or other reallocation of roadway space, and expansion of the roadway is impractical.

Future Opportunities

Several types of solutions exist to address the needs and improve the pedestrian and bicycle systems.

Uphill Bicycle Routes

Close in, Serpentine Road represents the best opportunity to create dedicated bike lanes on a street up the hill southbound out of downtown. Serpentine Road's switchback gives it a lower grade than other north-south roads, making the climb up the hill more manageable for less experienced cyclists. At 36' wide with virtually unused parking lanes, it would be possible to stripe two 6' bike lanes and two 12' travel lanes on Serpentine Road without expanding the roadway. However, this would necessitate the removal of on-street parking.

Though steeper than Serpentine Road, 9th Street (combined with Park Street south of Eugene Street) provides a low-traffic route for cyclists traveling north-south in and out of downtown Hood River. Less steep and with better pavement than 12th Street (OR 281), 9th Street and Park Street may also be a good location to create a bicycle facility that would encourage a broader base of users to consider bicycling to downtown Hood River.

Neighborhood Streets and Bicycle Boulevards

Bicycle boulevards that are comfortable to a wide range of bicyclists, can be created along lower volume local streets where conflicts with high-speed vehicles and heavy traffic can be avoided. minimizing conflicts with high-speed vehicles and heavy traffic. A flexible range of treatments including signage, pavement markings and traffic calming can make the route attractive for all types of bicyclists and for pedestrians as well.

One opportunity for a bicycle boulevard in Hood River is along Prospect Avenue and Montello Avenue parallel to May Street. The construction of a new path through the Hood River Middle School campus would allow bicycle traffic to travel between 30th Street and Serpentine Road on local streets, avoiding narrow shoulders on May Street. Combined with improved crossings of 12th and 13th Streets (OR 281) at Montello Avenue, this route would allow more cautious bicyclists to avoid the intersections at May Street at 12th and 13th Streets (OR 281), where complex turning movements can be challenging to navigate for less experienced riders. A Prospect Avenue/Montello Avenue/Eugene Street bicycle boulevard would create a comfortable east-west route across central Hood River.

Implementation of bicycle boulevard improvements could be coordinated with sidewalk infill and curb ramp modernization projects, which are priority pedestrian system improvements, especially near schools. Other corridors that could be considered for bicycle boulevard improvements include north-south routes using 20th Street and 22nd Street , or 17th Street, 18th Street and Avalon Way.

Paths and Accessways

Pedestrians in Hood River currently enjoy several paths and accessways that provide direct connections through gaps in the street grid. Bicyclists also use these facilities, although several accessways such as the 2nd Street stairs are not accessible to bicycles or wheelchair users.

Creating new accessways could increase pedestrian traffic by increasing connectivity thereby improving the efficiency of walking trips. For example, many Westside Elementary School students must currently detour to Frankton Street to travel between the school and neighborhoods north of May Street. A new north-south accessway creating a direct connection from any of several cul-de-sacs south of May Street to either Fairview Drive or Belmont Drive would reduce walking distances to school by over a mile for these students, making walking to school quicker and more feasible. A segment of the proposed Westside Community Trail being pursued by Hood River Valley Parks & Recreation would create an off-street path connecting Fairview Drive to May Street via Rocky Road. This route, which is currently located on private property, is already used informally by some students walking to Westside Elementary.

Bicycle Parking

Increased secure bicycle parking options may encourage Hood River residents to use their bicycle more often for short trips. Although a minimum of two bicycle parking spaces are required for all land uses subject to site plan review in Hood River, bike racks are not universally available at popular bicycle destinations. Currently, many bicyclists lock their bikes to railings, sign posts and parking meters when visiting downtown. This can create problems by disrupting the flow of pedestrian traffic on sidewalks, and these objects are less secure to lock to than standard bicycle racks and are more likely to allow a bicycle to pivot and fall, potentially causing damage. Adding bicycle parking around downtown outside of the required permit review process could increase the viability of bicycle transportation to downtown shops and businesses. Bicycle parking can be installed at low-cost, and costs can be shared between with local businesses that want to increase parking capacity for their customers.

At schools, Hood River Municipal Code 17.20.040 requires a minimum of one bicycle parking space per 20 students and faculty, all of which should be sheltered under some type of cover. Additional bicycle parking code requirements, such as requiring convenient siting of bike parking near building entrances, could be considered to increase the use and accessibility of bicycle parking at schools and other locations. The bike parking code does not currently specify preferred bike rack design. Recommending a standard bike rack design in Hood River could help increase use of bicycle parking by ensuring that all bike racks offer secure locking points to protect the bike from theft while also providing sufficient support to prevent the damage associated with falls. Requiring standard bike rack design may also help ensure compliance with bike parking minimums, as the actual capacity of many bike rack designs can be lower than the capacity advertised by the manufacturer.

Secure bicycle parking is especially important at bus stops. Sidewalk mounted bike racks are sufficient for trips lasting only a few hours, but for transit users such as those using Columbia Area Transit's weekly service to Portland that must leave their bike locked for long periods of time, enclosed bike lockers would provide an increased level of security on longer trips. Readily-available bike parking at bus stops is complementary to bike racks on buses, as transit users have the option to leave their bike at the stop if space is not available on the onboard bus bike racks. While limited parking is available at the new transit facility, enclosed bicycle parking is planned with the new park and ride.

SYSTEM DEFICIENCIES

Deficiencies identified in the previous sections are summarized below.

Existing Motor Vehicle System

- Interchange spacing exceeds ODOT's access management standards, no additional interchanges should be added along I-84.
- OR 281 needs pavement improvements.
- Thirteen study intersections currently do not meet mobility standards.
- All of the major side streets along Cascade Avenue (HCRH) between the I-84 Exit 62 interchange and OR 281 (Country Club Road, Rand Road, and 20th Street) are meeting ODOT's mobility standard, but not the City's.
- At the I-84 Exit 62 interchange, the westbound ramp terminal is failing to meet the City's LOS C standard. In addition, the close proximity of the nearby intersection on Cascade Avenue (HCRH) at Country Club Road to the I-84 eastbound ramp terminal (approximately 75 feet) creates confusion among drivers and often results in turning conflicts.
- Crossing 13th Street (OR 281)on the north approach to Oak Street can be difficult for pedestrians due to heavy eastbound to southbound traffic flow and limited visibility of pedestrians waiting on the southwest corner.
- Congestion at the intersections on 13th Street (OR 281) at State and May Streets and often results in traffic cutting through the neighborhood to the east via 12th Street, Eugene Street, and 9th Street. However, the portions of streets that compose this route are classified as collector streets in the City's TSP. Congestion at 13th Street (OR 281) and May Street can be seen in Exhibit 3-11.
- The intersections on 13th Street and 12th Street (OR 281) at Belmont Avenue both fail to meet the City's mobility standard. However, only the intersection on 13th Street (OR 281) at Belmont Avenue also fails to meet ODOT's mobility standard.
- While the intersection on Button Bridge Road at Marina Way is shown to operate poorly, this intersection is included in the current reconstruction project of the I-84 Exit 64 interchange, which will include additional turning lanes and a traffic signal.
- Seven intersections have had six or more accidents between 2006 to 2008, though none of the locations is rated in ODOT's 10% Safety Priority Index System (SPIS) list, nor do any locations exceed one collision per million entering vehicles.
- The intersection on Cascade Avenue (HCRH) at Rand Road is a top 15% SPIS location.

- The OR 281 corridor needs to be monitored for collisions and safety needs.
- Downtown issues include truck access to and from the industrial area to the southwest of Exist 63, truck parking and deliveries within the downtown core, and lack of parking for customers near businesses and for employees elsewhere.
- The narrow streets and tight corners in the downtown can be difficult for large vehicles to navigate.
- Country Club Road and OR 281 have historically been preferred routes for trucks, many of which are traveling to and from agricultural businesses to the south. Many of these trucks have recently diverted to Country Club Road due to the enforcement of truck length restrictions that have been placed on OR 281.
- Truck routing through the City of Hood River needs to be addressed.
- Truck circulation in downtown Hood River needs to be addressed in regards to congestion caused while loading and unloading, in addition to access to the industrial area north of Columbia Street.

Future Conditions (2031)

- Increased traffic demand will lead to additional congestions along major routes.
- 19 study intersections (Sixteen on state routes and three with City jurisdiction) will not meet adopted mobility standards.
- Vehicles will be diverted to parallel routes due to congestion along the arterial routes.

Pedestrian System

Key transportation system gaps for pedestrians in Hood River include:

- Lack of sidewalks or adequate shoulders for walking on outer Hood River arterial and collector streets.
- Difficult crossings at non-signalized intersections (ex. 13th Street/ OR 281 and May Street).
- Under-controlled intersections near schools (ex. 17th Street and May Street, or Belmont Drive and Fairview Drive, where one or more legs of the intersection are not stop-controlled).
- Lack of curb ramps outside of downtown.
- Lack of sidewalks along key routes to schools (ex. May Street, Fairview Drive).
- Lack of connection between the northern and southern segments of the Indian Creek Trail southwest of Columbia Gorge Community College.
- Low connectivity of local streets (requiring longer travel distances to reach key destinations) due to topographical limitations.

Bicycle System

Key transportation system gaps for bicyclists in Hood River include:

- Lack of bike lanes or wide shoulders on state highways.
- Lack of bike lanes or wide shoulders on city and county arterial and collector streets in outer Hood River.
- Lack of low-traffic bicycle-friendly streets comfortable for children or new/inexperienced cyclists.
- Low connectivity of local streets (requiring longer travel distances to reach key destinations) due to topographical limitation.
- Low maintenance funding that prevents adequate sweeping to keep bike lanes and shoulders clear of gravel and debris.
- Lack of climbing bike lanes or other facilities to help bicyclists negotiate steep hills.
- Difficult crossings at non-signalized intersections (ex. 13th Street/ OR 281 and May Street).
- Lack of secure bike parking at key destinations such as at schools and around downtown Hood River.
- Lack of bike racks and secure long-term bike parking at transit stops.
- Variable availability of bike racks on Columbia Area Transit buses.

TRANSPORTATION FUNDING

Transportation projects will be needed in order to address the transportation deficiencies noted. This section outlines the funding sources that can be used to meet the transportation needs of the community that have been identified.

Funding Strategies

The City of Hood River uses two continuing sources of funding for construction of its transportation infrastructure, as described below. These sources provide annual funding that is used to maintain street facilities or construct new roadway improvements, with some restrictions on the type and location of projects.

State/City Fuel Tax and Vehicle License Fee

Over the last four years, Hood River has received an average of $290,000 in State gas tax and $10,000 in vehicle registration fee revenue. In addition to the revenues from state fuel tax, Hood River also receives a share of the citywide gas tax. In 2010, this equaled approximately $280,000. Because there is no index for cost inflation, this revenue level will increase only proportionate with the city’s population growth. Historically, fuel efficiency in new vehicles has reduced the potential funding collected through this system. Improved fuel efficiency and the advent of electric vehicles will further reduce the funds collected through this system unless the system is overhauled to account for these changes.

System Development Charges

System development charges (SDC) are fees collected from new development, generally based on the proposed land use and size. The transportation component of the fee is typically based on the land use's potential to generate vehicle trips. These charges are used as a dedicated funding source for capacity adding projects for the transportation system including new and expanded roads or intersection improvements, as well as sidewalks, bike lanes, and transit capital projects.

The SDC fee is based on calculations of SDC-eligible project costs and total increases in trips. The cost per vehicle trip is $69.60. Charges assessed may vary based on the specific development characteristics. For purposes of this analysis, the cost per trip is multiplied by the increase in person trips to estimate available SDC revenues.

Average revenues received for the last three fiscal years resulted in approximately $45,000 income for development within Hood River. SDC income potential over the next 21 years was estimated based on the forecasted land use changes and resulting person trip growth for Hood River. As a result, Hood River is expected to receive approximately $170,500 in annual SDC revenues based on the forecasted future land use growth and existing SDC rate. In addition, there is an existing account balance of approximately $225,000.

Funding Summary

Table 4-6 summarizes the current funding sources and the estimated annual revenue over the next 21 years. Funds from estimated SDC fees are based on the future land use forecasts and would be obtained from future development. If the forecasted future growth does not occur, the amount of SDC revenue would be reduced drastically. Other funding sources are based on existing levels and historical averages, as noted in the table.

Table 4-6: Transportation Revenues

Revenue Source	Estimated Annual Revenue (2010)
City Gas Tax	$280,000[12]
State Fuel Apportionment	$290,000[13]
State Vehicle License Fee	$10,000[14]
Road SDC	$170,500[15]
Total	**$750,500**

Source: City of Hood River

Other funding sources not listed included in Table 4-6 may be used to fund projects in Hood River. However, these sources are not included in the estimate of transportation revenues because they are either irregular (i.e. not a reoccurring and regularly scheduled revenue stream) or not allocated by the City (i.e. may not be applied to projects of the City's choosing). Notable examples of other revenue sources include federal and state grants, county funds, and ODOT projects. These revenues tend to be project-specific and are therefore included in the TSP by

[12] Based on City Estimate for 2010-2011
[13] Based on 2007-2009 average from Road Fund
[14] Based on 2007-2009 average from Road Fund
[15] Assumes $69.60 fee per trip and preliminary 21 year trip growth estimate from land use projections

lowering the expected share of project costs that would be covered by the City. Other revenue sources are likely to be available, but are assumed in this plan only for specific projects, due to the high level of uncertainty and lack of City control involved.

Transportation Expenses

This section presents the transportation related expenses that can be expected for the City of Hood River. The existing transportation facilities will require on-going operation and maintenance improvements across a variety of areas. In addition, support must be provided for on-going updates and execution of related planning documents. These costs must be considered before identifying available funding for additional improvements to the transportation system.

Roadway Maintenance and Repairs

The current annual cost of maintaining roadways under the jurisdiction of Hood River was estimated at $105,000. This is generally considered to be a cost covered by state gas taxes. Future annual maintenance costs for Hood River roadways will likely increase if the City takes jurisdiction over existing roadways from Hood River County or ODOT, or when new roadways are constructed within the City limits, however the existing maintenance cost was assumed to continue for this analysis.

Operations and Personnel

To operate and manage the existing transportation system a significant amount of costs are incurred. Materials, equipment, insurance, financing and various servicing costs are incurred as a result of operating and managing the transportation system in Hood River. An annual allocation of $155,000 is set aside for personnel and $324,000 is allocated for operations. Both costs are assumed to continue at current levels in the future.

Expense Summary

Table 4-7 summarizes the current (and assumed future) annual expenses for the Hood River transportation system.

Table 4-7: Transportation Expenses

Expense	Estimated Annual Expense (2010)
Repairs & Maintenance	$105,000[16]
Personnel	$155,000[17]
Operations & Equipment	$324,000[18]
Total	**$584,000**

Source: City of Hood River

Available Transportation Funding For TSP Plan Projects

Based on the revenues and costs identified above, an annual projected balance[19] $166,500 is available to implement the projects outlined in the Transportation System Plan including

[16] Based on City Estimate for 2010-2011
[17] Based on City email 7/8/2010.
[18] Based on City email 7/8/2010, total expenses less estimate for repairs & maintenance and personnel.
[19] Annual revenue of $750,500 minus annual expense of $584,000

Roadways, Transit, Bicycles and Pedestrians Plans. Together with the existing balance, over 21 years, a total of **approximately $3.7 million** of City funds can be spent on TSP projects.

Note that some additional projects that are anticipated to be funded by other agencies may be included in the Revenue Forecast Scenario project list to be developed. These non-City funds have not been included in the total projected funding for City projects in this chapter. Potentially, new funding sources could allow additional Preferred Plan projects to be included in the Revenue Forecast Scenario Plan.

Appendix

2031 No-Build Synchro 7 Reports

2031 No-Build Synchro 7 Reports

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Volume (veh/h)	70	15	5	365	295	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	16	5	397	321	16
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	728	321	321			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	728	321	321			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	98	100			
cM capacity (veh/h)	392	725	1251			

Direction, Lane #	WB 1	SE 1	NW 1	NW 2
Volume Total	92	402	321	16
Volume Left	76	5	0	0
Volume Right	16	0	0	16
cSH	426	1251	1700	1700
Volume to Capacity	0.22	0.00	0.19	0.01
Queue Length 95th (ft)	20	0	0	0
Control Delay (s)	15.8	0.2	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.8	0.2	0.0	
Approach LOS	C			

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	180	10	530	440	10	450
Sign Control	Free			Free	Stop	
Grade	1%			2%	2%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	189	11	558	463	11	474
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			200		1774	195
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			200		1774	195
tC, single (s)			4.1		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.3
p0 queue free %			60		79	44
cM capacity (veh/h)			1378		50	841

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	200	1021	484
Volume Left	0	558	11
Volume Right	11	0	474
cSH	1700	1378	625
Volume to Capacity	0.12	0.40	0.78
Queue Length 95th (ft)	0	50	183
Control Delay (s)	0.0	7.5	27.8
Lane LOS		A	D
Approach Delay (s)	0.0	7.5	27.8
Approach LOS			D

Intersection Summary			
Average Delay	12.4		
Intersection Capacity Utilization	106.0%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	465	450	300	70	65	230
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	505	489	326	76	71	250
Pedestrians		28	4		16	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		2	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	418				1884	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	418				1884	408
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	55				0	60
cM capacity (veh/h)	1131				42	624

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	995	402	71	250
Volume Left	505	0	71	0
Volume Right	0	76	0	250
cSH	1131	1700	42	624
Volume to Capacity	0.45	0.24	1.68	0.40
Queue Length 95th (ft)	59	0	181	48
Control Delay (s)	8.8	0.0	540.6	14.6
Lane LOS	A		F	B
Approach Delay (s)	8.8	0.0	130.5	
Approach LOS			F	

Intersection Summary			
Average Delay	29.4		
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	400	0	105	60	560	0	0	540	195
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
Lane Util. Factor					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1710	1530	1629	1698			1667	1224
Flt Permitted					0.95	1.00	0.26	1.00			1.00	1.00
Satd. Flow (perm)					1710	1530	446	1698			1667	1224
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	421	0	111	63	589	0	0	568	205
RTOR Reduction (vph)	0	0	0	0	0	75	0	0	0	0	0	41
Lane Group Flow (vph)	0	0	0	0	421	36	63	589	0	0	568	164
Heavy Vehicles (%)	4%	0%	7%	0%	0%	0%	5%	6%	0%	0%	8%	25%
Turn Type				Split		Perm	pm+pt					Perm
Protected Phases				4	4		1	6			2	
Permitted Phases						4	6					2
Actuated Green, G (s)					22.9	22.9	47.0	47.0			39.0	39.0
Effective Green, g (s)					23.4	23.4	47.0	47.0			39.0	39.0
Actuated g/C Ratio					0.30	0.30	0.60	0.60			0.50	0.50
Clearance Time (s)					4.5	4.5	4.0	4.0			4.0	4.0
Vehicle Extension (s)					2.5	2.5	2.3	5.5			6.0	6.0
Lane Grp Cap (vph)					510	457	328	1018			829	609
v/s Ratio Prot					c0.25		0.01	c0.35			c0.34	
v/s Ratio Perm						0.02	0.11					0.13
v/c Ratio					0.83	0.08	0.19	0.58			0.69	0.27
Uniform Delay, d1					25.6	19.8	8.8	9.6			15.0	11.4
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					10.3	0.1	0.2	2.4			4.6	1.1
Delay (s)					35.9	19.8	9.0	12.0			19.6	12.5
Level of Service					D	B	A	B			B	B
Approach Delay (s)		0.0			32.5			11.7			17.7	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	78.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR
Lane Configurations											
Volume (veh/h)	0	100	230	15	120	0	30	1365	200	0	0
Sign Control		Stop			Stop			Free		Free	
Grade		0%			0%			0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	0	102	235	15	122	0	31	1393	204	0	0
Pedestrians								8		15	
Lane Width (ft)								12.0		0.0	
Walking Speed (ft/s)								4.0		4.0	
Percent Blockage								1		0	
Right turn flare (veh)			1								
Median type								None		None	
Median storage veh)											
Upstream signal (ft)											
pX, platoon unblocked											
vC, conflicting volume	1625	1556	813	824	1658	8	0			1597	
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	1625	1556	813	824	1658	8	0			1597	
tC, single (s)	7.5	6.5	6.9	7.7	6.5	6.9	4.1			4.1	
tC, 2 stage (s)											
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2	
p0 queue free %	0	8	27	0	0	100	98			100	
cM capacity (veh/h)	0	111	323	13	96	1071	1622			406	

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	337	138	727	901
Volume Left	0	15	31	0
Volume Right	235	0	0	204
cSH	237	57	1622	1700
Volume to Capacity	1.42	2.43	0.02	0.53
Queue Length 95th (ft)	478	346	1	0
Control Delay (s)	252.6	804.5	0.5	0.0
Lane LOS	F	F	A	
Approach Delay (s)	252.6	804.5	0.2	
Approach LOS	F	F		

Intersection Summary			
Average Delay	93.4		
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SBL2	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Stop		Stop				Stop			Stop	
Volume (vph)	0	245	0	145	205	315	0	5	200	290	5	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	266	0	158	223	342	0	5	217	315	5	0

Direction, Lane #	SB 1	SB 2	NW 1	NW 2	NE 1	NE 2	SW 1
Volume Total (vph)	0	266	158	565	5	217	321
Volume Left (vph)	0	0	158	0	0	0	315
Volume Right (vph)	0	0	0	342	0	217	0
Hadj (s)	0.00	0.46	0.99	-0.23	0.00	-0.60	0.23
Departure Headway (s)	6.8	7.2	7.2	6.0	7.6	3.2	6.7
Degree Utilization, x	0.00	0.54	0.32	0.94	0.01	0.19	0.59
Capacity (veh/h)	530	488	491	590	426	1121	524
Control Delay (s)	8.6	17.1	12.3	45.7	10.7	7.0	18.9
Approach Delay (s)	17.1		38.4		7.1		18.9
Approach LOS	C		E		A		C

Intersection Summary			
Delay	26.1		
HCM Level of Service	D		
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	40	200	40	25	0	130	0	65	0	25	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	43	217	43	27	0	141	0	71	0	27	5
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	27			261			285	266	152	337	375	27
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	27			261			285	266	152	337	375	27
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			77	100	92	100	95	99
cM capacity (veh/h)	1587			1304			622	618	894	554	537	1048

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	261	71	212	33
Volume Left	0	43	141	0
Volume Right	217	0	71	5
cSH	1587	1304	692	585
Volume to Capacity	0.00	0.03	0.31	0.06
Queue Length 95th (ft)	0	3	32	4
Control Delay (s)	0.0	4.9	12.5	11.5
Lane LOS		A	B	B
Approach Delay (s)	0.0	4.9	12.5	11.5
Approach LOS			B	B

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	255	5	80	0	0	0	0	370	385	105	840	0
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					1.00		1.00	1.00	
Frt		1.00	0.85					0.93		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1716	1485					1612		1629	1731	
Flt Permitted		0.95	1.00					1.00		0.13	1.00	
Satd. Flow (perm)		1716	1485					1612		216	1731	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	277	5	87	0	0	0	0	402	418	114	913	0
RTOR Reduction (vph)	0	0	65	0	0	0	0	47	0	0	0	0
Lane Group Flow (vph)	0	282	22	0	0	0	0	773	0	114	913	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	0%	5%	3%	5%	4%	0%
Turn Type	Split		Perm							pm+pt		
Protected Phases	8	8						6		5	2	
Permitted Phases			8							2		
Actuated Green, G (s)		14.8	14.8					27.8		37.5	37.5	
Effective Green, g (s)		15.3	15.3					27.8		37.5	37.5	
Actuated g/C Ratio		0.25	0.25					0.46		0.62	0.62	
Clearance Time (s)		4.5	4.5					4.0		4.0	4.0	
Vehicle Extension (s)		2.9	2.9					6.0		2.3	6.0	
Lane Grp Cap (vph)		432	374					737		266	1068	
v/s Ratio Prot		c0.16						c0.48		0.04	c0.53	
v/s Ratio Perm			0.01							0.22		
v/c Ratio		0.65	0.06					1.05		0.43	0.85	
Uniform Delay, d1		20.4	17.3					16.5		11.5	9.4	
Progression Factor		1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2		3.4	0.1					46.6		0.6	8.8	
Delay (s)		23.8	17.3					63.1		12.2	18.2	
Level of Service		C	B					E		B	B	
Approach Delay (s)		22.3			0.0			63.1			17.5	
Approach LOS		C			A			E			B	

Intersection Summary			
HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
13: Oak & 13th St

3/31/2011

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	270	555	405	565	680	155
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1765	1444	1660	1765	1676	1412
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1765	1444	1660	1765	1676	1412
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	284	584	426	595	716	163
RTOR Reduction (vph)	0	262	0	0	0	84
Lane Group Flow (vph)	284	322	426	595	716	79
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		5				1
Heavy Vehicles (%)	2%	2%	3%	2%	2%	6%
Turn Type		Perm	Prot			custom
Protected Phases	2		1	6	8	
Permitted Phases		2				2
Actuated Green, G (s)	25.5	25.5	29.0	58.0	40.5	25.5
Effective Green, g (s)	25.5	25.5	29.0	58.0	40.5	25.5
Actuated g/C Ratio	0.24	0.24	0.27	0.55	0.38	0.24
Clearance Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
Vehicle Extension (s)	6.0	6.0	2.3	6.0	2.3	6.0
Lane Grp Cap (vph)	427	349	456	970	643	341
v/s Ratio Prot	0.16		c0.26	0.34	c0.43	
v/s Ratio Perm		c0.22				0.06
v/c Ratio	0.67	0.92	0.93	0.61	1.11	0.23
Uniform Delay, d1	36.1	39.1	37.3	16.1	32.5	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	31.2	26.2	2.0	70.9	1.0
Delay (s)	42.2	70.2	63.5	18.1	103.4	33.1
Level of Service	D	E	E	B	F	C
Approach Delay (s)	61.1			37.1	90.3	
Approach LOS	E			D	F	

Intersection Summary			
HCM Average Control Delay	61.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	105.5	Sum of lost time (s)	10.5
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	285	5	20	35	180	80	95	375	15	210	240	415
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			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.99			1.00			1.00	0.93
Flpb, ped/bikes		0.98			1.00			1.00			0.99	1.00
Frt		0.99			0.96			1.00			1.00	0.85
Flt Protected		0.96			0.99			0.99			0.98	1.00
Satd. Flow (prot)		1673			1686			1753			1645	1408
Flt Permitted		0.50			0.94			0.79			0.59	1.00
Satd. Flow (perm)		870			1586			1398			1000	1408
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	300	5	21	37	189	84	100	395	16	221	253	437
RTOR Reduction (vph)	0	4	0	0	22	0	0	2	0	0	0	169
Lane Group Flow (vph)	0	322	0	0	288	0	0	509	0	0	474	268
Confl. Peds. (#/hr)	19		28	28		19	19		19	28		28
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	6%	6%	1%
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		22.0			22.0			29.0			29.0	29.0
Effective Green, g (s)		22.0			22.0			29.0			29.0	29.0
Actuated g/C Ratio		0.37			0.37			0.49			0.49	0.49
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)		324			591			687			492	692
v/s Ratio Prot												
v/s Ratio Perm		c0.37			0.18			0.36			c0.47	0.19
v/c Ratio		0.99			0.49			0.74			0.96	0.39
Uniform Delay, d1		18.4			14.2			12.0			14.5	9.4
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		47.8			0.6			4.3			31.2	0.4
Delay (s)		66.2			14.8			16.3			45.7	9.8
Level of Service		E			B			B			D	A
Approach Delay (s)		66.2			14.8			16.3			28.4	
Approach LOS		E			B			B			C	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	795	115	220	1100	45	5	25	100	15	25	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	864	125	239	1196	49	5	27	109	16	27	43
Pedestrians					9			9			6	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1251			998			2754	2751	945	2787	2789	1226
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1251			998			2754	2751	945	2787	2789	1226
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	92			66			0	0	66	0	0	80
cM capacity (veh/h)	561			696			0	12	316	0	11	216

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	43	989	239	1245	141	87
Volume Left	43	0	239	0	5	16
Volume Right	0	125	0	49	109	43
cSH	561	1700	696	1700	0	0
Volume to Capacity	0.08	0.58	0.34	0.73	Err	Err
Queue Length 95th (ft)	6	0	38	0	Err	Err
Control Delay (s)	12.0	0.0	12.9	0.0	Err	Err
Lane LOS	B		B		F	F
Approach Delay (s)	0.5		2.1		Err	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	175	0	0	20	0	735	5	0	690	225
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	184	0	0	21	0	774	5	0	726	237
Pedestrians		23			22			23			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		2			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								277			380	
pX, platoon unblocked	0.60	0.60	0.52	0.60	0.60	0.83	0.52			0.83		
vC, conflicting volume	1667	1669	891	1850	1784	800	986			801		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1149	1152	321	1454	1344	659	506			660		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	49	100	100	94	100			100		
cM capacity (veh/h)	93	115	358	30	89	381	539			735		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	184	21	779	963
Volume Left	0	0	0	0
Volume Right	184	21	5	237
cSH	358	381	1700	1700
Volume to Capacity	0.51	0.06	0.46	0.57
Queue Length 95th (ft)	70	4	0	0
Control Delay (s)	25.3	15.0	0.0	0.0
Lane LOS	D	C		
Approach Delay (s)	25.3	15.0	0.0	0.0
Approach LOS	D	C		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	5	130	165	5	105	115	840	150	85	575	30
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	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.90		1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1544		1676	1542		1613	3353	1530	1710	3353	1530
Flt Permitted		0.91		0.64	1.00		0.37	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)		1415		1123	1542		623	3353	1530	534	3353	1530
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	41	5	133	168	5	107	117	857	153	87	587	31
RTOR Reduction (vph)	0	105	0	0	85	0	0	0	78	0	0	17
Lane Group Flow (vph)	0	74	0	168	27	0	117	857	75	87	587	14
Heavy Vehicles (%)	0%	25%	4%	2%	0%	0%	6%	2%	0%	0%	2%	0%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)		10.1		10.1	10.1		28.3	23.8	23.8	24.3	21.8	21.8
Effective Green, g (s)		10.1		10.1	10.1		28.3	23.8	23.8	24.3	21.8	21.8
Actuated g/C Ratio		0.21		0.21	0.21		0.58	0.49	0.49	0.50	0.45	0.45
Clearance Time (s)		4.0		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	3.0
Lane Grp Cap (vph)		295		234	322		456	1649	752	329	1510	689
v/s Ratio Prot					0.02		c0.02	c0.26		0.01	0.18	
v/s Ratio Perm		0.05		c0.15			0.13		0.05	0.12		0.01
v/c Ratio		0.25		0.72	0.08		0.26	0.52	0.10	0.26	0.39	0.02
Uniform Delay, d1		16.0		17.8	15.4		4.7	8.4	6.6	6.4	8.9	7.4
Progression Factor		1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.4		10.1	0.1		0.3	0.3	0.1	0.4	0.2	0.0
Delay (s)		16.4		27.9	15.5		5.0	8.7	6.6	6.8	9.0	7.4
Level of Service		B		C	B		A	A	A	A	A	A
Approach Delay (s)		16.4			22.9			8.0			8.7	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	115	0	160	135	945	0	0	390	475
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	1.00	0.95			0.95	
Frt					1.00	0.85	1.00	1.00			0.92	
Flt Protected					0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)					1676	1485	1513	3386			3039	
Flt Permitted					0.95	1.00	0.18	1.00			1.00	
Satd. Flow (perm)					1676	1485	284	3386			3039	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	125	0	174	147	1027	0	0	424	516
RTOR Reduction (vph)	0	0	0	0	0	95	0	0	0	0	294	0
Lane Group Flow (vph)	0	0	0	0	125	79	147	1027	0	0	646	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	3%	13%	1%	0%	0%	6%	1%
Turn Type				Perm		Perm	pm+pt					
Protected Phases					8		5	2			6	
Permitted Phases				8		8	2					
Actuated Green, G (s)					7.2	7.2	29.6	29.6			19.3	
Effective Green, g (s)					7.2	7.2	29.6	29.6			19.3	
Actuated g/C Ratio					0.16	0.16	0.66	0.66			0.43	
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)					269	239	360	2237			1309	
v/s Ratio Prot							0.06	c0.30			0.21	
v/s Ratio Perm					0.07	0.05	0.21					
v/c Ratio					0.46	0.33	0.41	0.46			0.49	
Uniform Delay, d1					17.1	16.7	4.4	3.7			9.2	
Progression Factor					1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2					1.3	0.8	0.8	0.2			0.3	
Delay (s)					18.3	17.5	5.1	3.9			9.5	
Level of Service					B	B	A	A			A	
Approach Delay (s)		0.0			17.8			4.0			9.5	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	44.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	585	510	460	750	370	405
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	597	520	469	765	378	413
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			1117		2561	857
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1117		2561	857
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			25		0	0
cM capacity (veh/h)			629		7	360

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1117	1235	791
Volume Left	0	469	378
Volume Right	520	0	413
cSH	1700	629	14
Volume to Capacity	0.66	0.75	55.40
Queue Length 95th (ft)	0	166	Err
Control Delay (s)	0.0	25.6	Err
Lane LOS		D	F
Approach Delay (s)	0.0	25.6	Err
Approach LOS			F

Intersection Summary			
Average Delay	2526.1		
Intersection Capacity Utilization	191.8%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	320	60	260	10	50	45	205	255	5	35	260	210
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	337	63	274	11	53	47	216	268	5	37	274	221

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	400	274	63	47	484	5	311	221
Volume Left (vph)	337	0	11	0	216	0	37	0
Volume Right (vph)	0	274	0	47	0	5	0	221
Hadj (s)	0.18	-0.60	0.03	-0.60	0.22	-0.60	0.10	-0.68
Departure Headway (s)	7.3	3.2	8.7	3.2	7.1	3.2	7.6	6.8
Degree Utilization, x	0.81	0.24	0.15	0.04	0.96	0.00	0.66	0.42
Capacity (veh/h)	489	1112	382	1121	501	1121	468	519
Control Delay (s)	34.5	7.2	13.2	6.3	56.4	6.2	22.8	13.4
Approach Delay (s)	23.4		10.3		55.9		18.9	
Approach LOS	C		B		F		C	

Intersection Summary			
Delay	30.1		
HCM Level of Service	D		
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	565	0	165	0	0	0	0	510	30	50	460	0
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	
Lane Util. Factor	0.95	0.95	1.00					0.95		1.00	0.95	
Frt	1.00	1.00	0.85					0.99		1.00	1.00	
Flt Protected	0.95	0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1608	1608	1485					3325		1676	3320	
Flt Permitted	0.95	0.95	1.00					1.00		0.36	1.00	
Satd. Flow (perm)	1608	1608	1485					3325		629	3320	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	577	0	168	0	0	0	0	520	31	51	469	0
RTOR Reduction (vph)	0	0	119	0	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	288	289	49	0	0	0	0	545	0	51	469	0
Heavy Vehicles (%)	1%	2%	3%	2%	2%	2%	0%	2%	2%	2%	3%	0%
Turn Type	Split		Perm							pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	15.9	15.9	15.9					24.8		31.0	31.0	
Effective Green, g (s)	15.9	15.9	15.9					24.8		31.0	31.0	
Actuated g/C Ratio	0.29	0.29	0.29					0.45		0.56	0.56	
Clearance Time (s)	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	
Lane Grp Cap (vph)	466	466	430					1502		397	1875	
v/s Ratio Prot	0.18	c0.18						c0.16		0.01	c0.14	
v/s Ratio Perm			0.03							0.07		
v/c Ratio	0.62	0.62	0.11					0.36		0.13	0.25	
Uniform Delay, d1	16.9	16.9	14.3					9.9		5.7	6.1	
Progression Factor	1.00	1.00	1.00					1.00		1.00	1.00	
Incremental Delay, d2	2.4	2.6	0.1					0.7		0.1	0.3	
Delay (s)	19.3	19.4	14.4					10.5		5.8	6.4	
Level of Service	B	B	B					B		A	A	
Approach Delay (s)		18.3			0.0			10.5			6.3	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (veh/h)	0	0	0	525	0	55	0	370	60	230	255	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	571	0	60	0	402	65	250	277	0
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	1272	1212	435	1212	1245	277	277			467		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1272	1212	435	1212	1245	277	277			467		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	0	100	92	100			77		
cM capacity (veh/h)	110	141	626	128	135	745	1297			1084		

Direction, Lane #	WB 1	SE 1	NW 1
Volume Total	630	467	527
Volume Left	571	0	250
Volume Right	60	65	0
cSH	139	1700	1084
Volume to Capacity	4.53	0.27	0.23
Queue Length 95th (ft)	Err	0	22
Control Delay (s)	Err	0.0	5.8
Lane LOS	F		A
Approach Delay (s)	Err	0.0	5.8
Approach LOS	F		

Intersection Summary			
Average Delay	3881.1		
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	SEL	SET	SER	NWL	NWT	NWR	NEL	NER	NER2
Lane Configurations											
Volume (veh/h)	0	0	95	845	0	0	470	655	20	5	250
Sign Control	Stop			Free			Free		Stop		
Grade	0%			0%			0%		0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	100	889	0	0	495	689	21	5	263
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	1584	495	495			889			1584	1584	889
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	1584	495	495			889			1584	1584	889
tC, single (s)	6.5	6.2	4.3			4.1			7.2	6.5	6.2
tC, 2 stage (s)											
tF (s)	4.0	3.3	2.4			2.2			3.6	4.0	3.3
p0 queue free %	100	100	90			100			72	95	22
cM capacity (veh/h)	98	579	991			770			76	98	338

Direction, Lane #	SE 1	NW 1	NW 2	NE 1
Volume Total	989	495	689	289
Volume Left	100	0	0	21
Volume Right	0	0	689	263
cSH	991	1700	1700	261
Volume to Capacity	0.10	0.29	0.41	1.11
Queue Length 95th (ft)	8	0	0	309
Control Delay (s)	2.6	0.0	0.0	129.9
Lane LOS	A			F
Approach Delay (s)	2.6	0.0		129.9
Approach LOS				F

Intersection Summary			
Average Delay	16.3		
Intersection Capacity Utilization	106.4%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	875	215	135	1115	5	170	5	10	15	20	155
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	36	893	219	138	1138	5	173	5	10	15	20	158
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1143			1112			2577	2492	1003	2388	2599	1140
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1143			1112			2577	2492	1003	2388	2599	1140
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			78			0	76	97	0	0	35
cM capacity (veh/h)	538			628			0	22	294	15	18	243

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	36	1112	138	1143	189	194
Volume Left	36	0	138	0	173	15
Volume Right	0	219	0	5	10	158
cSH	538	1700	628	1700	0	73
Volume to Capacity	0.07	0.65	0.22	0.67	Err	2.66
Queue Length 95th (ft)	5	0	21	0	Err	474
Control Delay (s)	12.2	0.0	12.3	0.0	Err	871.8
Lane LOS	B		B		F	F
Approach Delay (s)	0.4		1.3		Err	871.8
Approach LOS					F	F

Intersection Summary			
Average Delay	732.3		
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	170	115	720	45	60	900
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	179	121	758	47	63	947
Pedestrians			3			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						318
pX, platoon unblocked						
vC, conflicting volume	1858	782			805	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1858	782			805	
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	69			92	
cM capacity (veh/h)	75	394			819	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	179	121	805	1011
Volume Left	179	0	0	63
Volume Right	0	121	47	0
cSH	75	394	1700	819
Volume to Capacity	2.39	0.31	0.47	0.08
Queue Length 95th (ft)	424	32	0	6
Control Delay (s)	754.1	18.1	0.0	2.2
Lane LOS	F	C		A
Approach Delay (s)	457.2		0.0	2.2
Approach LOS	F			

Intersection Summary			
Average Delay	65.9		
Intersection Capacity Utilization	116.3%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	85	70	175	115	680	0	0	0	25	970	55
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	89	74	184	121	716	0	0	0	26	1021	58
Pedestrians					10			1			14	
Lane Width (ft)					12.0			0.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1177	1113	1051	1232	1142	24	1079			10		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1177	1113	1051	1232	1142	24	1079			10		
tC, single (s)	7.1	*6.2	*4.1	*4.1	*6.2	*0.1	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	*3.5	*3.5	*2.5	*2.5	*0.1	2.2			2.2		
p0 queue free %	100	63	85	41	57	98	100			98		
cM capacity (veh/h)	108	242	496	311	285	35272	654			1583		

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	163	305	716	1105
Volume Left	0	184	0	26
Volume Right	74	0	716	58
cSH	314	300	35272	1583
Volume to Capacity	0.52	1.02	0.02	0.02
Queue Length 95th (ft)	70	276	2	1
Control Delay (s)	28.2	95.1	5.1	0.5
Lane LOS	D	F	A	A
Approach Delay (s)	28.2	32.0		0.5
Approach LOS	D	D		

Intersection Summary			
Average Delay	16.5		
Intersection Capacity Utilization	97.1%	ICU Level of Service	F
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	260	5	5	235	85	5	5	10	90	15	125
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	68	274	5	5	247	89	5	5	11	95	16	132
Pedestrians		12			3			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	337			282			870	764	282	732	721	304
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	337			282			870	764	282	732	721	304
tC, single (s)	4.1			4.1			7.1	6.8	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.3	3.3	3.5	4.0	3.3
p0 queue free %	94			100			97	98	99	70	95	82
cM capacity (veh/h)	1234			1289			204	281	758	314	334	728

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	347	342	21	242
Volume Left	68	5	5	95
Volume Right	5	89	11	132
cSH	1234	1289	360	457
Volume to Capacity	0.06	0.00	0.06	0.53
Queue Length 95th (ft)	4	0	5	76
Control Delay (s)	2.0	0.2	15.6	21.4
Lane LOS	A	A	C	C
Approach Delay (s)	2.0	0.2	15.6	21.4
Approach LOS			C	C

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	110	0	0	380	620	545
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.98
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1731			3353	1693	1483
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1731			3353	1693	1483
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	0	0	413	674	592
RTOR Reduction (vph)	0	0	0	0	0	285
Lane Group Flow (vph)	120	0	0	413	674	307
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	4%	0%	0%	2%	1%	1%
Turn Type						Perm
Protected Phases	2			2	4	
Permitted Phases						4
Actuated Green, G (s)	8.7			8.7	18.0	18.0
Effective Green, g (s)	8.7			8.7	18.0	18.0
Actuated g/C Ratio	0.25			0.25	0.52	0.52
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	0.2			0.2	0.2	0.2
Lane Grp Cap (vph)	434			841	878	769
v/s Ratio Prot	0.07			c0.12	c0.40	
v/s Ratio Perm						0.21
v/c Ratio	0.28			0.49	0.77	0.40
Uniform Delay, d1	10.5			11.1	6.7	5.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.2	3.7	0.1
Delay (s)	10.6			11.3	10.3	5.2
Level of Service	B			B	B	A
Approach Delay (s)	10.6			11.3	7.9	
Approach LOS	B			B	A	

Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	34.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	250	100	5	190	20	125	115	5	15	220	25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	263	105	5	200	21	132	121	5	16	232	26

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	379	226	258	274
Volume Left (vph)	11	5	132	16
Volume Right (vph)	105	21	5	26
Hadj (s)	-0.11	-0.04	0.10	-0.02
Departure Headway (s)	6.1	6.5	6.6	6.4
Degree Utilization, x	0.64	0.41	0.47	0.49
Capacity (veh/h)	549	485	490	499
Control Delay (s)	19.2	13.9	15.4	15.5
Approach Delay (s)	19.2	13.9	15.4	15.5
Approach LOS	C	B	C	C

Intersection Summary			
Delay	16.4		
HCM Level of Service	C		
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	160	125	80	140	80	145
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	174	136	87	152	87	158
Pedestrians				2	2	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			312		570	246
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			312		570	246
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		81	80
cM capacity (veh/h)			1241		452	790

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	310	239	245
Volume Left	0	87	87
Volume Right	136	0	158
cSH	1700	1241	624
Volume to Capacity	0.18	0.07	0.39
Queue Length 95th (ft)	0	6	47
Control Delay (s)	0.0	3.4	14.4
Lane LOS		A	B
Approach Delay (s)	0.0	3.4	14.4
Approach LOS			B

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	100	145	300	75	210	265
Sign Control	Stop		Free			Free
Grade	1%		8%			3%
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	102	148	306	77	214	270
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	1043	344			383	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1043	344			383	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	51	79			82	
cM capacity (veh/h)	208	703			1187	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	250	383	485
Volume Left	102	0	214
Volume Right	148	77	0
cSH	357	1700	1187
Volume to Capacity	0.70	0.23	0.18
Queue Length 95th (ft)	127	0	16
Control Delay (s)	35.7	0.0	4.9
Lane LOS	E		A
Approach Delay (s)	35.7	0.0	4.9
Approach LOS	E		

Intersection Summary			
Average Delay	10.1		
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	130	0	0	0	10	15	125	1220	15	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	141	0	0	0	11	16	136	1326	16	0	0	0
Pedestrians		8			8							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	965	1630	8	1614	1622	679	8			1350		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	965	1630	8	1614	1622	679	8			1350		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	17	100	100	100	88	96	92			100		
cM capacity (veh/h)	170	93	1071	65	94	396	1600			513		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	141	27	799	679
Volume Left	141	0	136	0
Volume Right	0	16	0	16
cSH	170	173	1600	1700
Volume to Capacity	0.83	0.16	0.08	0.40
Queue Length 95th (ft)	143	14	7	0
Control Delay (s)	85.2	29.6	2.1	0.0
Lane LOS	F	D	A	
Approach Delay (s)	85.2	29.6	1.2	
Approach LOS	F	D		

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	170	55	55	35	25	30	75	675	35	50	745	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5	3.5			3.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93			0.95		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1687	1650			1630		1581	1747		1710	3183	
Flt Permitted	0.75	1.00			0.87		0.21	1.00		0.24	1.00	
Satd. Flow (perm)	1336	1650			1451		347	1747		430	3183	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	60	60	38	27	33	82	734	38	54	810	304
RTOR Reduction (vph)	0	45	0	0	23	0	0	2	0	0	46	0
Lane Group Flow (vph)	185	75	0	0	75	0	82	770	0	54	1068	0
Confl. Peds. (#/hr)	5		7	7		5	4					4
Confl. Bikes (#/hr)						2						1
Heavy Vehicles (%)	1%	0%	0%	4%	0%	3%	8%	2%	8%	0%	2%	3%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	14.3	14.3			14.3		34.0	34.0		34.0	34.0	
Effective Green, g (s)	14.3	14.3			14.3		34.0	34.0		34.0	34.0	
Actuated g/C Ratio	0.25	0.25			0.25		0.60	0.60		0.60	0.60	
Clearance Time (s)	3.5	3.5			3.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5			2.5		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	339	419			369		210	1055		260	1922	
v/s Ratio Prot		0.05						c0.44			0.34	
v/s Ratio Perm	c0.14				0.05		0.24			0.13		
v/c Ratio	0.55	0.18			0.20		0.39	0.73		0.21	0.56	
Uniform Delay, d1	18.2	16.4			16.5		5.8	7.9		5.0	6.6	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.2			0.2		2.5	3.1		0.8	0.6	
Delay (s)	19.6	16.6			16.7		8.3	11.0		5.9	7.2	
Level of Service	B	B			B		A	B		A	A	
Approach Delay (s)		18.4			16.7			10.8			7.2	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	55	235	150	40	185	180
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	56	240	153	41	189	184
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	735	173			194	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	735	173			194	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	72			86	
cM capacity (veh/h)	336	865			1367	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	296	194	372
Volume Left	56	0	189
Volume Right	240	41	0
cSH	666	1700	1367
Volume to Capacity	0.44	0.11	0.14
Queue Length 95th (ft)	57	0	12
Control Delay (s)	14.7	0.0	4.7
Lane LOS	B		A
Approach Delay (s)	14.7	0.0	4.7
Approach LOS	B		

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	530	120	15	200	170	50
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	541	122	15	204	173	51
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			663		837	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			663		837	602
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		48	90
cM capacity (veh/h)			926		331	500

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	663	219	224
Volume Left	0	15	173
Volume Right	122	0	51
cSH	1700	926	359
Volume to Capacity	0.39	0.02	0.63
Queue Length 95th (ft)	0	1	101
Control Delay (s)	0.0	0.8	30.4
Lane LOS		A	D
Approach Delay (s)	0.0	0.8	30.4
Approach LOS			D

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

Additional: 2031 No-Build Synchro 7 Reports

Note: Additional analysis was required after completion of the Future Transportation System Needs Memorandum. The additional Synchro output follows which updates the reports shown above.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	0	80	0	10	75	10	505	20	20	675	360
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	0	84	0	11	79	11	532	21	21	711	379
Pedestrians		23			22			23			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		2			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								254			365	
pX, platoon unblocked	0.93	0.93	0.92	0.93	0.93	0.88	0.92			0.88		
vC, conflicting volume	1614	1561	591	1090	1740	566	1112			575		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1284	1226	370	716	1419	443	940			452		
tC, single (s)	7.6	6.5	6.9	7.5	6.5	6.9	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	53	100	85	100	91	84	98			98		
cM capacity (veh/h)	79	154	553	229	118	492	657			922		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	121	89	563	376	734
Volume Left	37	0	11	21	0
Volume Right	84	79	21	0	379
cSH	195	358	657	922	1700
Volume to Capacity	0.62	0.25	0.02	0.02	0.43
Queue Length 95th (ft)	88	24	1	2	0
Control Delay (s)	49.4	18.4	0.4	0.7	0.0
Lane LOS	E	C	A	A	
Approach Delay (s)	49.4	18.4	0.4	0.3	
Approach LOS	E	C			

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	225	40	20	35	130	120	70	275	15	145	290	380
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	237	42	21	37	137	126	74	289	16	153	305	400

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	300	300	379	458	400
Volume Left (vph)	237	37	74	153	0
Volume Right (vph)	21	126	16	0	400
Hadj (s)	0.12	-0.21	0.03	0.27	-0.68
Departure Headway (s)	8.6	8.3	8.2	8.6	7.6
Degree Utilization, x	0.71	0.69	0.86	1.10	0.85
Capacity (veh/h)	391	408	424	417	468
Control Delay (s)	30.3	27.9	44.8	100.9	39.1
Approach Delay (s)	30.3	27.9	44.8	72.1	
Approach LOS	D	D	E	F	

Intersection Summary			
Delay 52.4			
HCM Level of Service	F		
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

Appendix E: Final Technical Memorandum #3 Transportation System Solutions

Final Technical Memorandum #3

DATE: March 24, 2011

TO: City of Hood River TSP PMT

FROM: John Bosket, PE
Garth Appanaitis, EIT
Kristen Svicarovich, EIT
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SUBJECT: **Final Technical Memorandum #3**
Hood River Transportation System Solutions

P010068-003

This memorandum presents a set of transportation system solutions to address the future deficiencies and needs identified for the City of Hood River. The solutions begin with objectives and strategies that build the framework for management of the system. Two important components include transportation system management (TSM) and transportation demand management (TDM). In addition to these central programs and strategies, each major mode of travel is reviewed to address the identified needs through a set of recommended improvement alternatives. These improvements include both programs to enhance the mode of travel and capital projects. Cost estimates are provided for each improvement and were compared to the total expected transportation revenue. The next step, upon feedback from stakeholders and residents, will be to prioritize improvements to determine the sets of programs and projects that will be reasonably likely to be funded.

A summary of the contents of this memorandum appears below.

Contents

TRANSPORTATION SYSTEM MANAGEMENT (TSM)

Transportation System Management (TSM) focuses on strategies to enhance the operational performance of the transportation system. The focus of TSM is to find solutions to better manage the existing facilities and treat all modes of travel as a coordinated system rather than relying on single mode improvements, such as adding roadway capacity for vehicles. TSM strategies are often easier to implement because they have lower capital investment costs and they extend the functional life of the existing and future facilities by optimizing their ability to move people in a safe and efficient manner.

Access Management

Access Management is a broad set of techniques that balance the need to provide efficient, safe, and timely travel with the ability to allow access to individual destinations. Implementation of access management techniques will promote reduced congestion, reduced crash rates, less need for roadway widening, and reduced air pollution.

Access management involves the control of access allowed on arterial and collector facilities to maximize their capacity and thereby preserve their functionality. Excessive driveways erode the capacity of arterial and collector roadways and introduce more conflict points, which have the potential to increase crashes and disrupt traffic flow. Preserving capacity on higher volume roadways is important for maintaining traffic flow and mobility within the city. Balancing the provision of access and good mobility can be done through various access management strategies, the first of which is to establish access management spacing standards for driveway and intersections.

City of Hood River and ODOT Access Management Spacing Standards

Both the City of Hood River and ODOT have access management spacing standards established for roadways of various functional classifications. The standards for roadways under City of Hood River jurisdiction are provided in Table 1.

TABLE 1: City of Hood River Access Management Spacing Standards[a,b]

Street Classification	Spacing between Public Streets (Min – Max)	Minimum Spacing between Driveways and other Driveways or Public Streets[c]
Minor Arterial	660 – 1,000 ft.	300 ft.
Collector Street	220 – 440 ft.	100 ft.
Local Street	200 ft.	22 ft.

[a] Exceptions may be made by the City Engineer.
[b] Measured centerline to centerline.
[c] Private access to arterial roadways shall only be granted through a requested variance of access spacing standards when access to a lower classified facility is not feasible.

The *Oregon Highway Plan* (OHP) access management spacing standards apply to roadways under ODOT jurisdiction and are implemented through OAR 734-051. Highway access spacing standards vary with highway classification, posted speed, and surrounding land use area. The standards applicable to highways within the City of Hood River urban growth boundary (UGB) are summarized in Table 2. Tables 3, 4, and 5 list supplementing access spacing standards that specifically apply to the Exit 62, Exit 63, and Exit 64 interchange areas, respectively. The standards in these tables supersede those from Table 2 where both apply.

TABLE 2: *Oregon Highway Plan* Access Management Spacing Standards

Facility	Access Spacing Standard[a] per Posted Speed (Urban Area[b])				
	≥55 mph	50 mph	40 & 45 mph	30 & 35 mph	≤25 mph
District Highway[c]	700 feet	550 feet	500 feet	350 feet	350 feet

[a] Measurement of the approach road spacing is from center to center on the same side of the roadway.
[b] The Urban standard applies within UBGs unless a management plan agreed to by ODOT and the local government(s) establishes a different standard.
[c] OR 281 and US 30 are classified as District Highways

Source: 1999 Oregon Highway Plan, as amended January 2006.

TABLE 3: I-84 Exit 62 Interchange Area Access Spacing Standards

Type of Access Point	Minimum Spacing Dimension*
Distance between ramp terminal and first major intersection on Cascade Ave. / Westcliff Dr.	1,320 feet
Distance between ramp terminal and first directional median opening on Cascade Ave. / Westcliff Dr.	1,320 feet
Distance between ramp terminal and last right-in/right-out approach on the right side of Cascade Ave. / Westcliff Dr. (when moving toward I-84)	990 feet**
Distance between ramp terminal and first right-in/right-out approach on the right side of Cascade Ave. / Westcliff Dr. (when moving away from I-84)	750 feet

* Spacing standards for Freeway Interchanges with Multi-lane Crossroads

** 990-foot spacing applies to the future improved corridor. Until the corridor is widened, the 2-lane crossroad spacing of 750 feet will apply.

TABLE 4: I-84 Exit 63 Interchange Area Access Spacing Standards

Type of Access Point	Minimum Spacing Dimension*
Distance between ramp terminal and first major intersection on 2nd St.	1,320 feet
Distance between ramp terminal and first directional median opening on 2nd St.	1,320 feet
Distance between ramp terminal and last right-in/right-out approach on the right side of 2nd St. (when moving toward I-84)	750 feet
Distance between ramp terminal and first right-in/right-out approach on the right side of 2nd St. (when moving away from I-84)	750 feet

* Spacing standards for Freeway Interchanges with Two-lane Crossroads

TABLE 5: I-84 Exit 64 Interchange Area Access Spacing Standards

Type of Access Point	Minimum Spacing Dimension*
Distance between ramp terminal and first major intersection on Button Bridge Rd.	1,320 feet
Distance between ramp terminal and first directional median opening on Button Bridge Rd.	1,320 feet
Distance between ramp terminal and last right-in/right-out approach on the right side of Button Bridge Rd. (when moving toward I-84)	990 feet
Distance between ramp terminal and first right-in/right-out approach on the right side of Button Bridge Rd. (when moving away from I-84)	750 feet

* Spacing standards for Freeway Interchanges with Multi-lane Crossroads

The OHP also includes standards for interchange spacing. There are three interchanges on I-84 which serve the City of Hood River. Currently, Exit 62 on I-84 is approximately 1.9 miles from Exit 63, and Exit 63 is 0.5 miles from Exit 64. According to the OHP access management spacing standards, interchange spacing in urban areas should be a minimum 3 miles and in rural areas spacing should not be less than 6 miles. The I-84 interchanges in the City of Hood River are closer than the urban minimum access spacing standards; therefore no additional interchanges should be considered for I-84 within the City.

Access Management Plans for the areas surrounding the I-84 interchanges were developed as part of the Hood River I-84 Exit 62, Exit 63, and Exit 64 Interchange Area Management Plans (IAMPs). The focus was on achieving a reduction in direct access to interchange area crossroads, while maintaining the accessibility of abutting properties.

The areas adjacent to the interchange crossroads were divided into “Access Blocks”, with many consisting of several parcels that have similar access constraints. For each block, recommendations for future access have been provided. As future changes in property access are proposed, the recommendations from the IAMP access management plans shall be applied through a collaborative effort between the City, ODOT, Hood River County, and affected property owners.

Access Management Strategies

In addition to spacing standards, there are access management strategies to help improve mobility and safety by limiting the number of traffic conflicts on roadways. Below is a list of access management strategies that can be implemented through local land use review to help improve roadway operations:

- Consolidate approaches between adjacent properties. This may also be facilitated over time by requiring the subject property of a land use action to establish a cross-over easement with the adjacent parcel; when the parcel re-develops, joint access may be established;
- Consolidate existing access wherever separate parcels are assembled under one purpose;

- Designate the number of driveways for each parcel subject to future partition or subdivision, to be implemented as land division occurs;
- Restrict parking on roadways adjacent to driveways to increase the speed of vehicles leaving the roadway and entering a driveway;
- Establish a policy to direct that access be taken from a lower classified street when available;
- Encourage connections between adjacent properties and the establishment of cross-over easements;
- Require that development accommodate circulation on-site, rather than utilizing the adjacent roads.

Traffic Signal Spacing

Traffic signals should be appropriately spaced and coordinated to enhance the progressive movement of traffic along a roadway. Traffic signals may increase the potential for rear-end collisions, but can reduce right-angle collisions, vehicular-pedestrian collisions, and opposing left-turn collisions. Typically the delay to the side street traffic will decrease, but the total delay at the intersection will be increased if the signal interferes with progression of traffic. The greatest opportunity to install new signals in Hood River will be along the arterial corridors. For proposed signals on ODOT facilities, approval will need to be acquired from ODOT prior to installation. Table 6 shows the optimum signalized intersection spacing for efficient traffic progression.

TABLE 6: Optimum Signalized Intersection Spacing for Efficient Traffic Progression

Cycle Length (seconds)	Speed (miles per hour)						
	25	30	35	40	45	50	55
60	1,100 ft.	1,320 ft.	1,540 ft.	1,760 ft.	1,980 ft.	2,200 ft.	2,430 ft.
70	1,280 ft.	1,540 ft.	1,800 ft.	2,050 ft.	2,310 ft.	2,500 ft.	2,820 ft.
80	1,470 ft.	1,760 ft.	2,050 ft.	2,350 ft.	2,640 ft.	2,930 ft.	3,220 ft.
90	1,630 ft.	1,980 ft.	2,310 ft.	2,640 ft.	2,970 ft.	3,300 ft.	3,630 ft.
120	2,200 ft.	2,640 ft.	3,080 ft.	3,520 ft.	3,960 ft.	4,400 ft.	4,840 ft.

Source: *Technical Guidelines for the Control of Direct Access to Arterial Highways – Volumes I and II*, Federal Highway Administration (FHWA-RD-76-86)

Neighborhood Traffic Management (NTM)

Neighborhood Traffic Management (NTM) is a term used to describe strategies to slow down traffic and potentially reduce volumes with the intent of improving safety for pedestrians and bicyclists. NTM typically includes traffic calming techniques to improve neighborhood livability on local streets. As traffic volumes increase into the future, protecting the livability of neighborhoods may become a need that requires mitigation.

To address neighborhood impacts, the City of Hood River should require that in addition to assessing impacts to the entire transportation network, traffic studies for new developments must also assess impacts to residential streets and identify mitigation when developments are anticipated to add significant traffic volumes or increase vehicle speeds on nearby residential streets. A recommended threshold to determine if this additional analysis is needed is if the proposed project is expected to increase through traffic volumes on a residential local street by 20 or more vehicles in the evening peak hour or 200 vehicles per day. Once the analysis is performed, thresholds used to determine if residential streets are impacted should be:

- Local residential street volumes should not increase above 1,200 average daily trips
- Local residential street speeds should not exceed 28 miles per hour (85th percentile speeds)

Mitigation measures for neighborhood traffic impacts must balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers (e.g., emergency response). Table 7 lists common NTM applications with a corresponding photo log included in the appendix. Any NTM project should include coordination with emergency response staff to ensure public safety is not compromised. An initial response from Hood River Fire and EMS to the proposed NTM strategies are provided in Table 7.

TABLE 7: Summary of Traffic Calming Strategies

NTM Application	Use by Functional Classification			Impact		Hood River Fire and EMS Approval of Traffic Calming Strategy
	Arterial	Collector	Local	Speed Reduction	Traffic Diversion	
Chicanes			✓	✓	✓	No
Chokers			✓	✓	✓	No
Curb Extensions	✓	✓	✓	✓		Yes
Diverters (with emergency vehicle pass-through)		✓	✓		✓	Yes
Median Islands	✓	✓	✓	✓		Yes
Raised Crosswalks			✓	✓	✓	Yes
Speed Cushions (with emergency vehicle pass-through)			✓	✓	✓	No
Speed Hump			✓	✓	✓	No
Traffic Circles			✓	✓	✓	Yes

Source: City of Sandy Neighborhood Traffic Management Program
Metropolitan Transportation Commission, Safety Toolbox: Engineering

The City of Sandy, Oregon has an official Neighborhood Traffic Management Program[1] that Hood River could use as template if they decide that an official NTM program is desired. When the City of Sandy initially implemented their program, approximately $10,000 was set aside in the budget each year to run the program, which started in 1998. However, it has been found that the needed budget is variable from year to year and is no longer a budgeted item. In Sandy the basic format of the program is a 13-step process where citizens make a request for a petition, which they fill out and then collect signatures from their neighbors. If the request is completed, data can then be collected and if a problem does exist, a solution is then identified. Typically, the City of Sandy completes one project every one to two years. Sandy's NTM program does not address traffic studies for new developments and the resulting NTM strategies, however Hood River could combine these two efforts in one program.

Local Street Connectivity

Providing local street connectivity as required by the state Transportation Planning Rule (OAR 660-012) is an important objective for the City of Hood River. A lack of connectivity can result in the need for investments in wider roads, traffic signals, and turn lanes that could otherwise be avoided. However, providing connectivity between neighborhoods can reduce vehicle miles traveled (VMT), enhance the attractiveness of other travel modes, balance the traffic load on the network, and reduce public safety response times. Improvement to local street connectivity is easier to implement in newly developing areas, however, retrofitting existing areas to provide greater connectivity should also be attempted.

The existing street connectivity in Hood River can be summarized into two general conditions: the northern and eastern portions of the city (including downtown) are primarily developed with a fairly connected grid of streets, limited in some cases by topography; areas in the west are still predominately undeveloped with a lack of system connectivity, and present the majority of opportunities to extend streets as new development occurs.

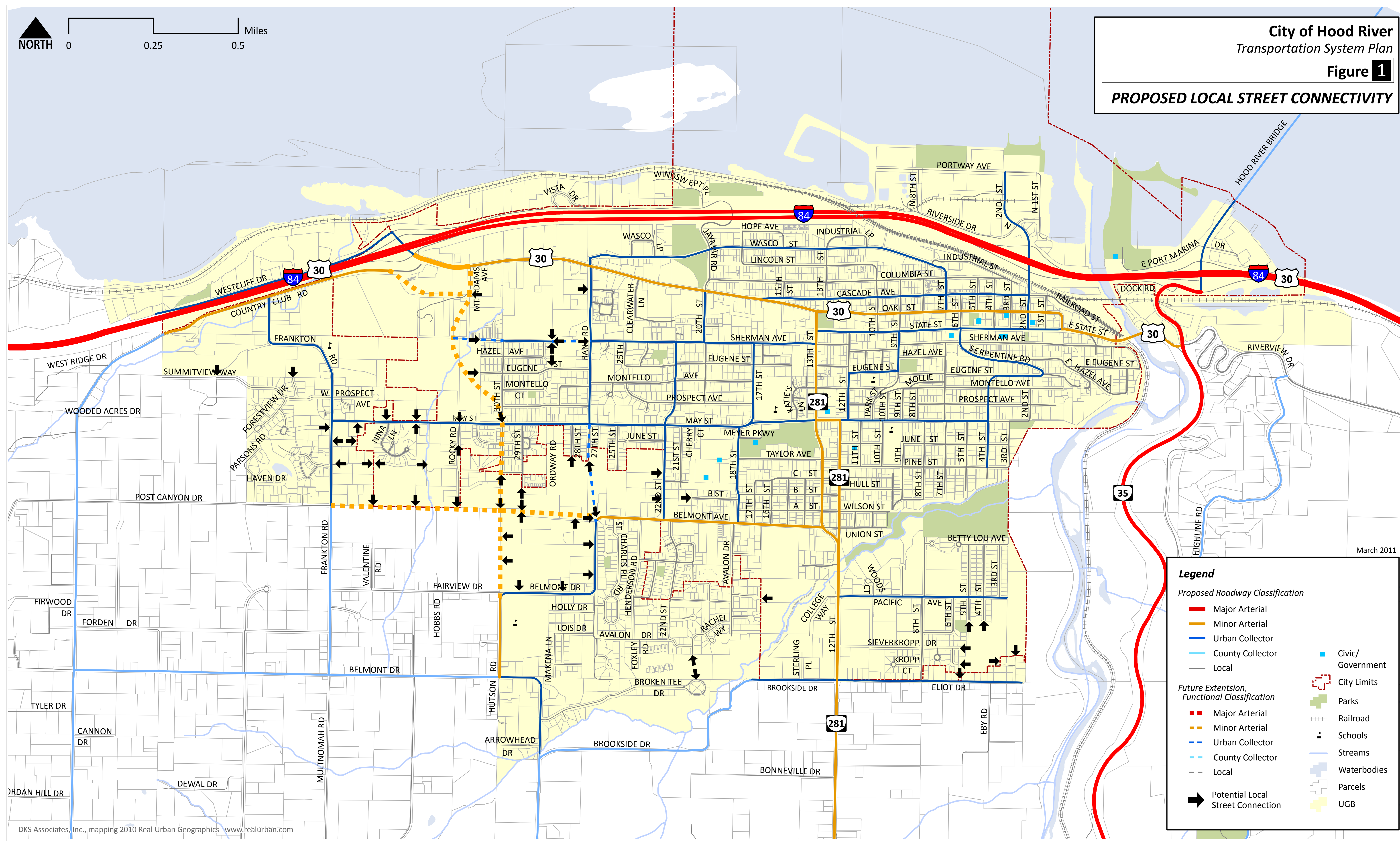
Figure 1 shows The Local Street Connectivity Plan and specifies the general locations where new local street connections should be installed as areas develop. The connector alignments are approximate and are aimed at reducing potential neighborhood traffic impacts by better balancing traffic flows on neighborhood routes. Consideration has also been given to environmental features, topography, and the existing built environment. The following are established objectives to consider when creating a local street system within Hood River's urban growth boundary:

- In the central business district, a compact block pattern has been established and should be retained; the maximum block length and perimeter should not exceed 400 feet and 1,200 feet respectively.
- In residential zones, a block pattern that supports good pedestrian connectivity should be maintained; the maximum block length and perimeter should not exceed 600 feet and 1,600 feet.

[1] City of Sandy Neighborhood Traffic Management Program. Kimley-Horn and Associates, Inc., January 1998.

- In industrial zones, large blocks may be necessary to support industrial development; no maximum block length or perimeter should be established, except where new collector or arterial roadways are planned.
- In all other zones, the maximum block length and perimeter should not exceed 800 feet length and 2,600 feet perimeter, respectively.
- Pathways (for pedestrians and bicycles) should be provided at or near mid-block where the block length exceeds 600 feet in length. Pathways should also be provided where cul-de-sacs or dead-end streets are planned, to connect the ends of the streets together, to other streets, and/or to other developments, as applicable.
- Dead-end streets or cul-de-sacs should be no more than 200 feet long and should only be used when environmental or topographical constraints, existing development patterns, or compliance with other standards in this code preclude street extension and through circulation.

To protect existing neighborhoods from the potential traffic impacts caused by extending stub end streets, the design and construction of connector roadways should evaluate if neighborhood traffic management strategies are necessary. In addition, when a development constructs stub streets, the city requires the installation of signs indicating the potential for future connectivity to increase awareness of residents.


City of Hood River
Transportation System Plan
Figure 1
PROPOSED LOCAL STREET CONNECTIVITY
NORTH
0
0.25
0.5
Miles
March 2011
Legend
Proposed Roadway Classification
Major Arterial
Minor Arterial
Urban Collector
County Collector
Local
Future Extentsion, Functional Classification
Major Arterial
Minor Arterial
Urban Collector
County Collector
Local
Potential Local Street Connection
Civic/ Government
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com

Functional Classification

Street functional classification is an important tool for managing public facilities. It is based on a hierarchal system of roads that designates the level of access versus mobility that different roads should provide. Functional classification also supports future construction and planning efforts by providing design and connectivity guidance. For example, street design and access management spacing standards are provided based on functional classification.

The management objectives for each functional class, criteria for future classification changes, and proposed classifications of City of Hood River roadways are described below. The proposed functional classification map is provided in Figure 2, including new streets considered as part of the motor vehicle alternatives analysis and updated functional classifications of existing roadways.

Functional Classification Management Objectives

Major Arterial Streets

Major arterials in Hood River provide regional connections to and through the city. They are generally designed and managed to maintain high-speed, continuous-flow travel for longer trips. The only major arterials within the City of Hood River are I-84 and OR 35, which are both under ODOT jurisdiction.

Minor Arterial Streets

Minor arterial streets provide service between major arterials and collectors. They should generally be spaced approximately one mile apart to maintain citywide accessibility and reduce through traffic on collectors and local streets, which can negatively impact safety and livability. Because they primarily serve longer trips within the city, they should be provided in continuous lengths of multiple miles, not in short segments. Minor arterials typically serve higher volumes of traffic at moderate to high speeds, with posted speeds generally no lower than 30 mph. Access control is a key feature.

Collector Streets

Collector streets provide both access and circulation within and between residential, commercial, industrial, and mixed land uses. Collectors differ from arterials in that they provide more of a citywide circulation function and penetrate residential neighborhoods, distributing trips from the local street system to minor and major arterials. They are intended to carry between 1,200 and 10,000 vehicles per day, including limited through traffic, at a minimum posted speed of 25 mph. The maximum interval for collector roadways should be approximately 1,500 feet. While access and mobility are more balanced than on arterials, new driveways serving single or multi-family homes should not be permitted where traffic volume forecasts exceed 5,000 vehicles per day.

Local Streets

Local streets have the sole function of providing immediate access to adjacent land. These streets should be designed to enhance the livability of the neighborhood as well as to generally accommodate less than 2,000 vehicles per day. When traffic volumes reach 1,000 to 1,200 vehicles per day through residential areas, safety and livability can be degraded. A well-connected grid system of relatively short blocks can minimize excessive volumes of motor vehicles and encourage more use by pedestrians and bicyclists. Speeds are not normally posted, with a statutory 25-mph speed limit in effect.

Special Local Street Designs

Cul-de-sac, or "dead end" residential streets are intended to serve only the adjacent land in residential neighborhoods. These streets should be short, serving a maximum of 20 single-family houses. Because the streets are short and the traffic volumes relatively low, the street width can be narrower than a standard residential street, allowing for the passage of two lanes of traffic when no vehicles are parked at the curb or one lane of traffic when vehicles are parked at the curb. Cul-de-sacs should only be used where topographical or other environmental constraints prevent street connections. Pedestrian and bicycle connections to adjacent cul-de-sacs or through streets shall be included.

Alleys can be a useful way to diminish street width by providing rear access and parking to residential areas. Including alleys in a subdivision design allows homes to be placed closer to the street and eliminates the need for garages to be the dominant architecture feature. This pattern, once common, has been recently revived as a way to build better neighborhoods. In addition, alleys can be useful in commercial and industrial areas, allowing access by delivery trucks that are off of the main streets. Alleys are encouraged when appropriate in the urban areas of Hood River and can provide a place for utilities and access to parking.

Proposed Functional Classification Changes in Hood River

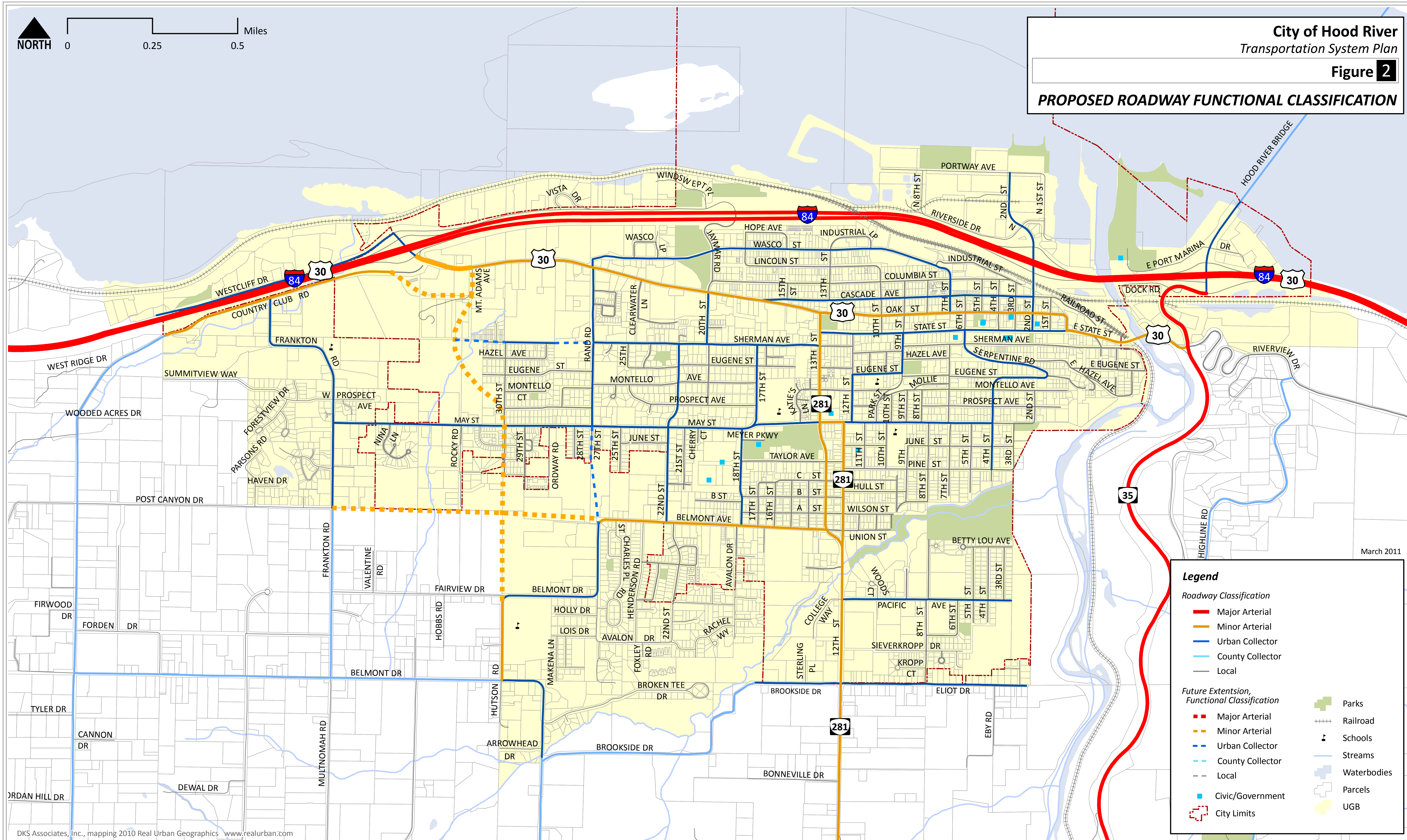
The following changes to street functional classifications are proposed as part of this TSP update to improve the network design, circulation, and mobility throughout the City of Hood River.

Existing classifications applied to future road extensions:

- Country Club Road realignment (Minor Arterial)
- Sherman Avenue (Collector)
- Rand Road (Collector)

Changes to existing functional classifications:

- Belmont Avenue from Fairview Drive to Hutson Road changes from a Local Street to a Minor Arterial
- Rand Road from Sherman Avenue to May Street changes from a Local Street to a Collector
- Sherman Avenue from Mt. Adams Avenue to Rand Road changes from a Local Street to a Collector


City of Hood River
Transportation System Plan
Figure 2
PROPOSED ROADWAY FUNCTIONAL CLASSIFICATION
NORTH
0
0.25
0.5
Miles
March 2011
Legend
Roadway Classification
Major Arterial
Minor Arterial
Urban Collector
County Collector
Local
Future Extentsion, Functional Classification
Major Arterial
Minor Arterial
Urban Collector
County Collector
Local
Civic/Government
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
DKS Associates, Inc., mapping 2010 Real Urban Geographics www.realurban.com
84
30
281
35
HOOD RIVER BRIDGE
WESTCLIFF DR
COUNTRY CLUB RD
WEST RIDGE DR
FRANKTON RD
SUMMITVIEW WAY
WOODED ACRES DR
FORESTVIEW DR
PARSONS RD
HAVEN DR
POST CANYON DR
W PROSPECT AVE
MAY ST
NINA LN
ROCKY RD
29TH ST
30TH ST
MT. ADAMS AVE
HAZEL AVE
EUGENE ST
MONTELLO CT
RAND RD
ORDWAY RD
28TH ST
27TH ST
25TH ST
JUNE ST
CLEARWATER LN
MONTELLO AVE
PROSPECT AVE
20TH ST
SHERMAN AVE
21ST ST
CHERRY CT
MEYER PKWY
TAYLOR AVE
22ND ST
18TH ST
17TH ST
16TH ST
BELMONT AVE
VISTA DR
WINDSWEPT PL
WASCO LP
JAYMAR RD
HOPE AVE
WASCO ST
LINCOLN ST
INDUSTRIAL LP
15TH ST
13TH ST
CASCADE AVE
COLUMBIA ST
OAK ST
STATE ST
KATIE'S LN
12TH ST
C ST
B ST
A ST
HULL ST
WILSON ST
UNION ST
PARK ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
4TH ST
3RD ST
2ND ST
1ST ST
11TH ST
JUNE ST
PINE ST
HAZEL AVE
MOLLIE
SERPENTINE RD
MONTELLO AVE
PROSPECT AVE
BETTY LOU AVE
PORTWAY AVE
N 8TH ST
N 2ND ST
N 1ST ST
RIVERSIDE DR
INDUSTRIAL ST
RAILROAD ST
E STATE ST
E EUGENE ST
E HAZEL AVE
DOCK RD
E PORT MARINA DR
RIVERVIEW DR
HIGHLINE RD
VALENTINE RD
FAIRVIEW DR
BELMONT DR
HOBBS RD
HOLLY DR
LOIS DR
MAKENA LN
AVALON DR
FOXLEY RD
22ND ST
RACHEL WY
CHARLES ST
HENDERSON RD
PL
COLLEGE WAY
WOODS CT
STERLING PL
12TH ST
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
BROOKSIDE DR
ELIOT DR
EBY RD
BROKEN TEE DR
HUTSON RD
ARROWHEAD DR
BONNEVILLE DR
FIRWOOD DR
FORDEN DR
TYLER DR
CANNON DR
MULTNOMAH RD
DEWAL DR
RDAN HILL DR

Typical Roadway Standards

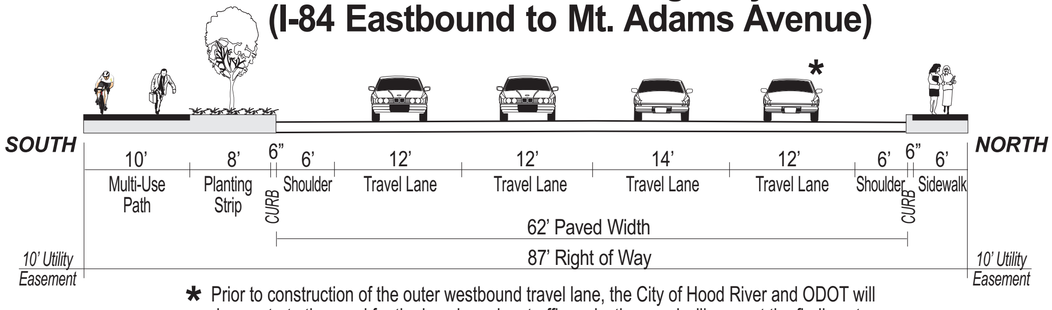
Typical roadway standards consist of cross-sections that are required for city roadways based on their functional classification. The cross-sections identify how city roadways will meet the necessary demand and multi-modal functions associated with their functional classification and provide consistency in roadway design throughout the city.

Actual roadway designs can vary depending on available right of way, adjacent land use, bike routes, and pedestrian corridors among other factors. Having identified cross-sections helps the city know what they should be striving to achieve or require of new development as roadways are constructed or modified.

Specific design considerations have also been identified for the Historic Columbia River Highway (HCRH), and OR 281. The *Historic Columbia River Highway Programmatic Agreement* defines the cross section for the HCRH travel lanes, and the state highway design parameters are defined in the *Oregon Highway Plan (OHP)* and in the *Highway Design Manual (HDM)*. Deviations from the standards in these documents would require ODOT approval of design exceptions.

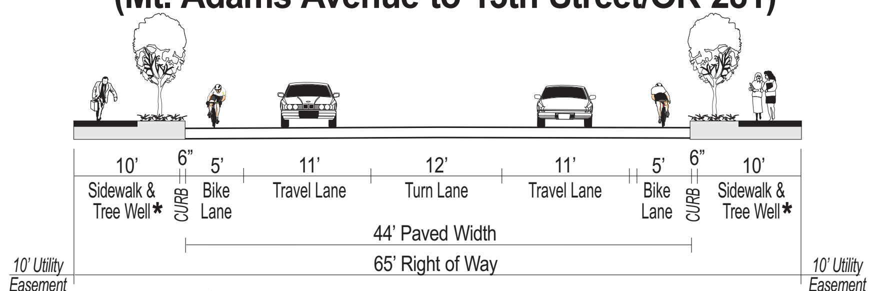
The proposed cross-section standards are provided in Figure 3A for the HCRH, Figure 3B for OR 281, Figure 3C for Minor Arterials, Figure 3D for Collectors, Figure 3E for Local Streets, Figure 3F for Alley/Cul-de-sac/Industrial Streets, Figure 3G for private streets, and Figure 3H for the Classic Street Light standard. The cross-section standards have been coordinated with City of Hood River staff and are subject to City Staff approval. Cross-sections on state highways are subject to ODOT as well as City approval.

Historic Columbia River Highway - US 30
(I-84 Eastbound to Mt. Adams Avenue)



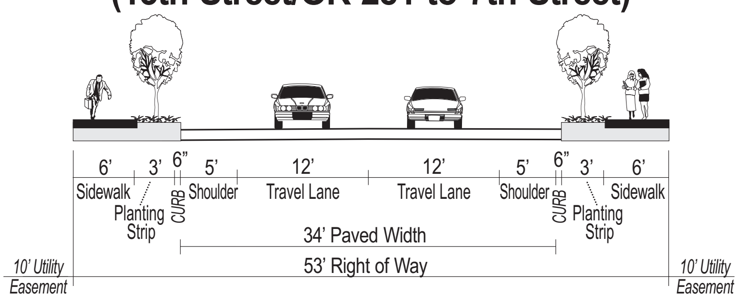
* Prior to construction of the outer westbound travel lane, the City of Hood River and ODOT will demonstrate the need for the lane based on traffic projections and will present the findings to the Historic Columbia River Highway Advisory Committee.

Historic Columbia River Highway - US 30
(Mt. Adams Avenue to 13th Street/OR 281)

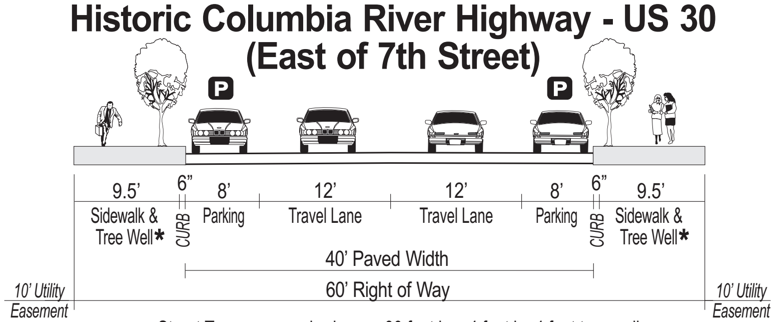


* Street Trees are required every 30 feet in a 4 foot by 4 foot tree well.

Historic Columbia River Highway - US 30
(13th Street/OR 281 to 7th Street)



Historic Columbia River Highway - US 30
(East of 7th Street)



* Street Trees are required every 30 feet in a 4 foot by 4 foot tree well.

General Notes:

1. Drawings represent the standard required cross-section. Modifications to be reviewed by ODOT and the City Engineer, and may be permitted.

LEGEND

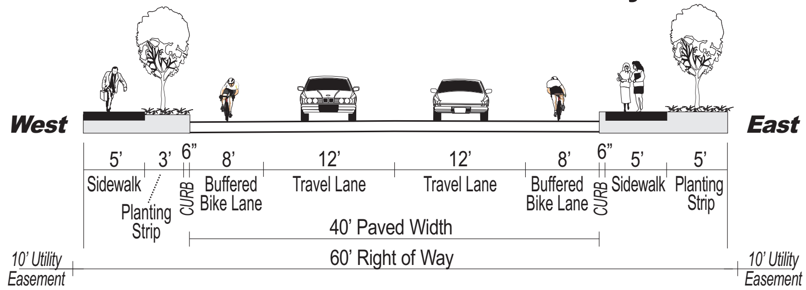
P - On-Street Parking Lane

City of Hood River
Transportation System Plan

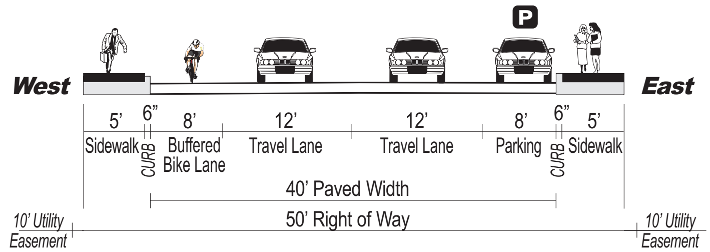
Figure 3A

HISTORIC COLUMBIA RIVER HIGHWAY - US 30 STANDARD DIAGRAM

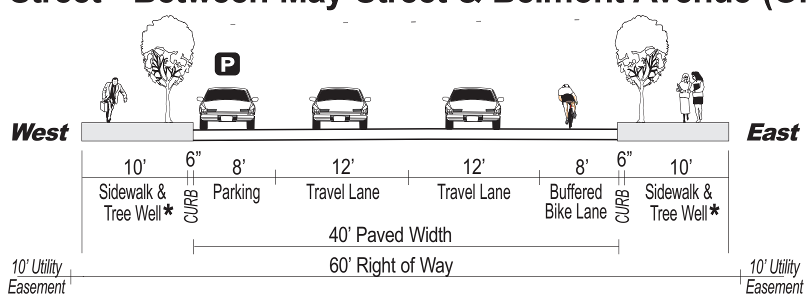
OR 281- Between Oak Street & May Street



OR 281/13th Street - Between May Street & Belmont Avenue (One-Way Street)

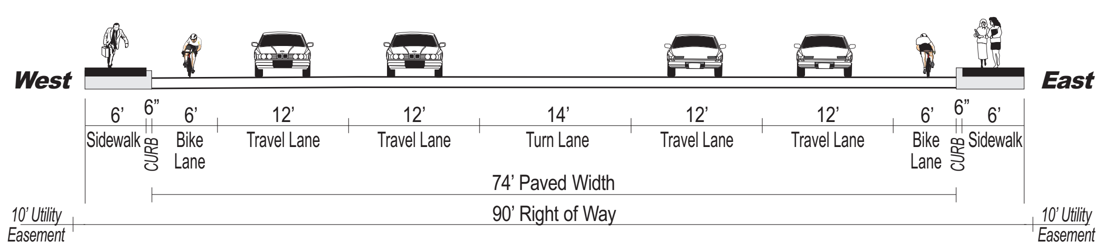


OR 281/12th Street - Between May Street & Belmont Avenue (One-Way Street)



* Street Trees are required every 30 feet in a 4 foot by 4 foot tree well.

OR 281 - Between Belmont Avenue & Brookside Drive



General Notes:

1. Drawings represent the standard required cross-section. Modifications to be reviewed by ODOT and the City Engineer, and may be permitted.

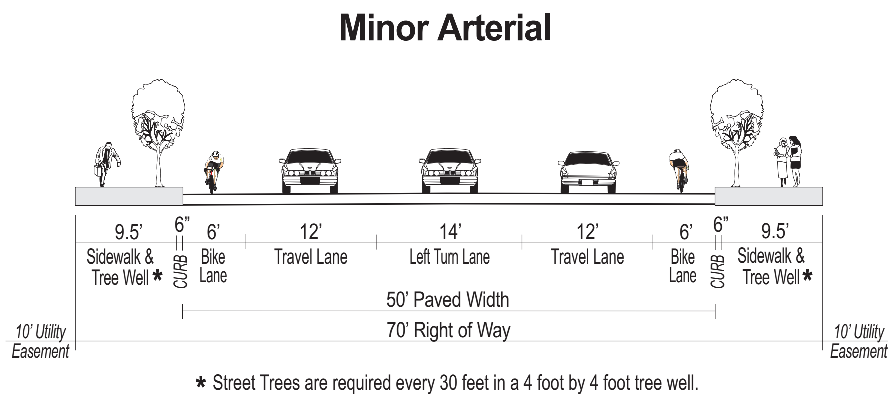
LEGEND

P - On-Street Parking Lane

City of Hood River
Transportation System Plan

Figure 3B

OR 281 STANDARD DIAGRAM



General Notes:

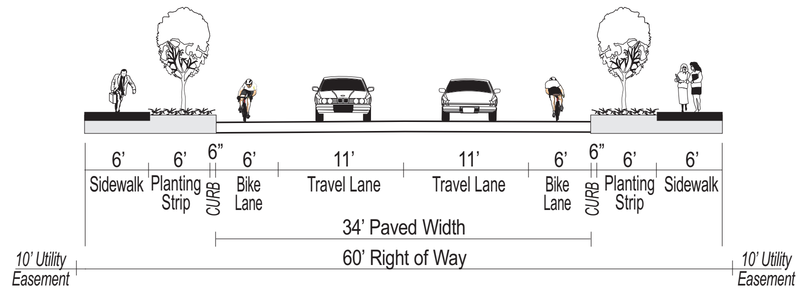
1. Drawing represents the standard required cross-section. Modifications may be permitted by the City Engineer.

City of Hood River
Transportation System Plan

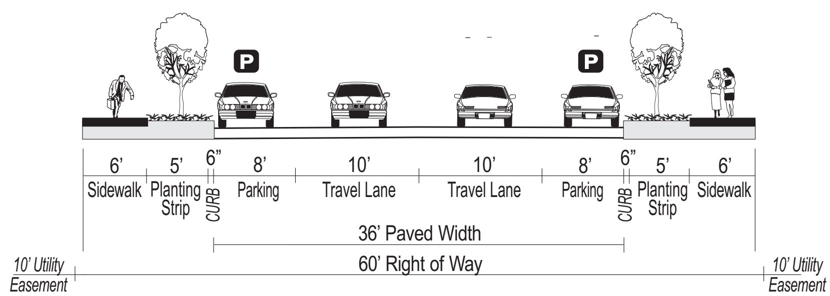
Figure 3C

ARTERIAL STREETS STANDARD DIAGRAM

Commercial/Residential Collector



Neighborhood Collector



General Notes:

1. Drawings represent the standard required cross-section. Modifications may be permitted by the City Engineer.

LEGEND

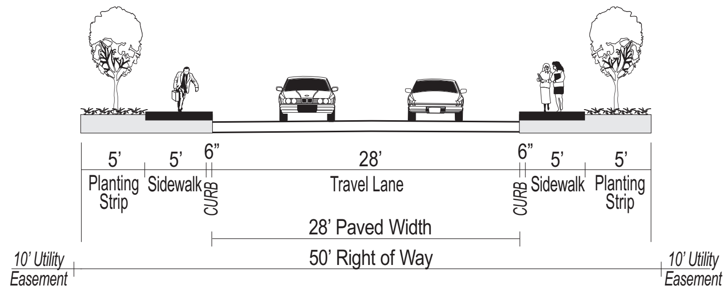
P - On-Street Parking Lane

City of Hood River
Transportation System Plan

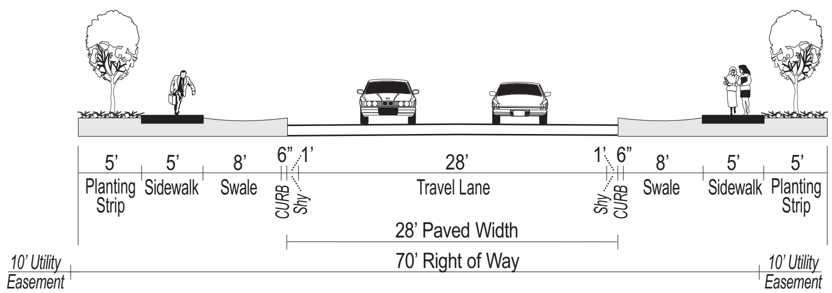
Figure 3D

COLLECTOR STREETS STANDARD DIAGRAM

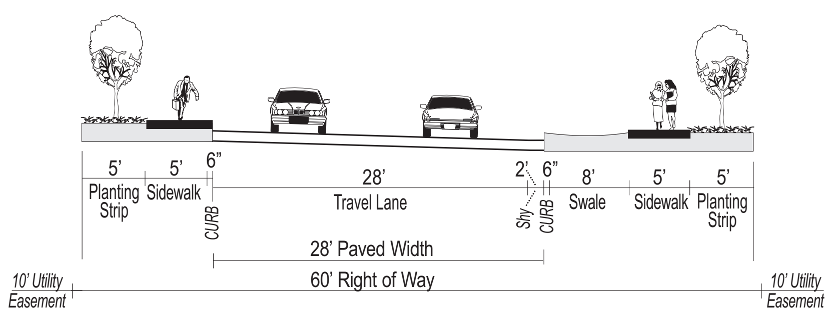
Local Residential - Option A



Local Residential - Option B



Local Residential - Option C



City of Hood River

Transportation System Plan

Figure 3E

LOCAL STREETS STANDARD DIAGRAM

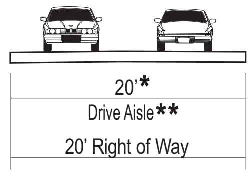
General Notes:

1. Drawings represent the minimum required cross-section. Modifications may be permitted by the City Engineer.

LEGEND

P - On-Street Parking Lane

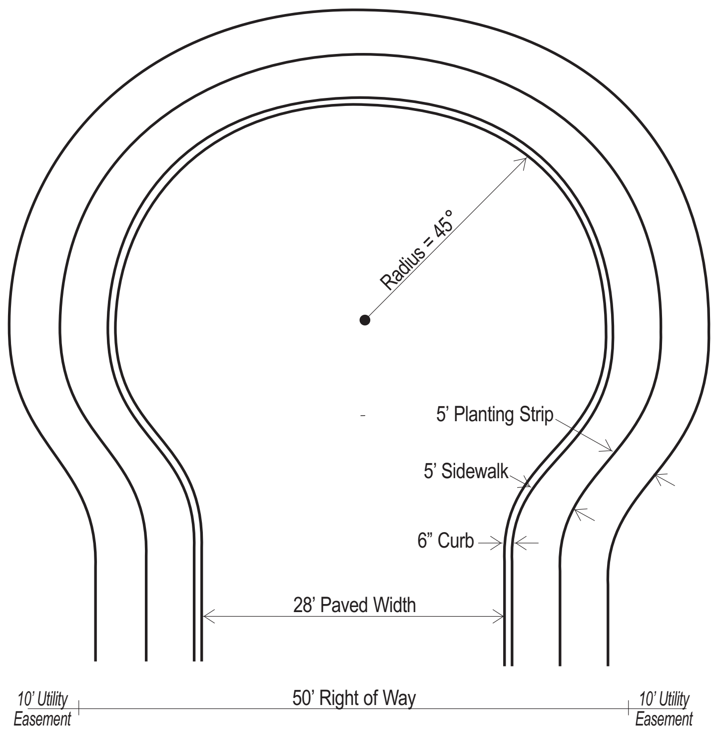
Alley



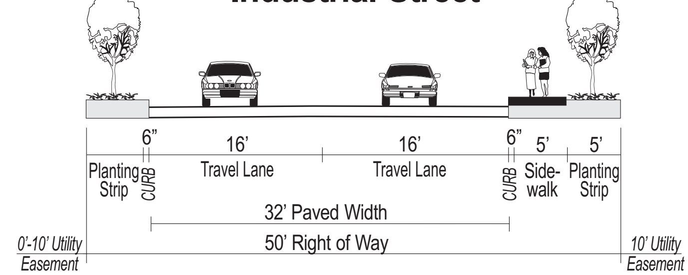
* Recommend 16-feet of paving with 2-foot-wide gravel shoulder on each side, except where alley abuts existing or proposed hard surfacing (e.g. driveway or other parking area). Where alley abuts existing or proposed hard surfacing, alley pavement should tie into abutting hard surfacing (eliminating gravel shoulder).

* On-Street Parking prohibited.

Cul-de-sac



Industrial Street



General Notes:

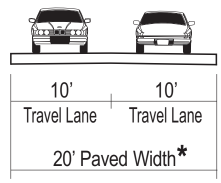
1. Drawings represent the standard required cross-section. Modifications may be permitted by the City Engineer.

City of Hood River
Transportation System Plan

Figure 3F

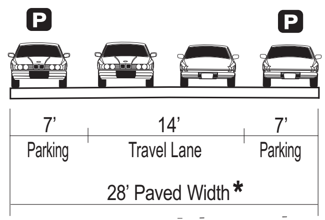
ALLEY, CUL-DE-SAC & INDUSTRIAL STREETS STANDARD DIAGRAMS

Six Home Private Street [1.]



1. 20 foot private street may be used for up to 6 homes.

Private Street [2., 3.]



2. Cross-Section applies to PUD streets that serve more than 6 homes. An additional 0.50 parking spaces shall be added for each additional unit beyond 6 homes.

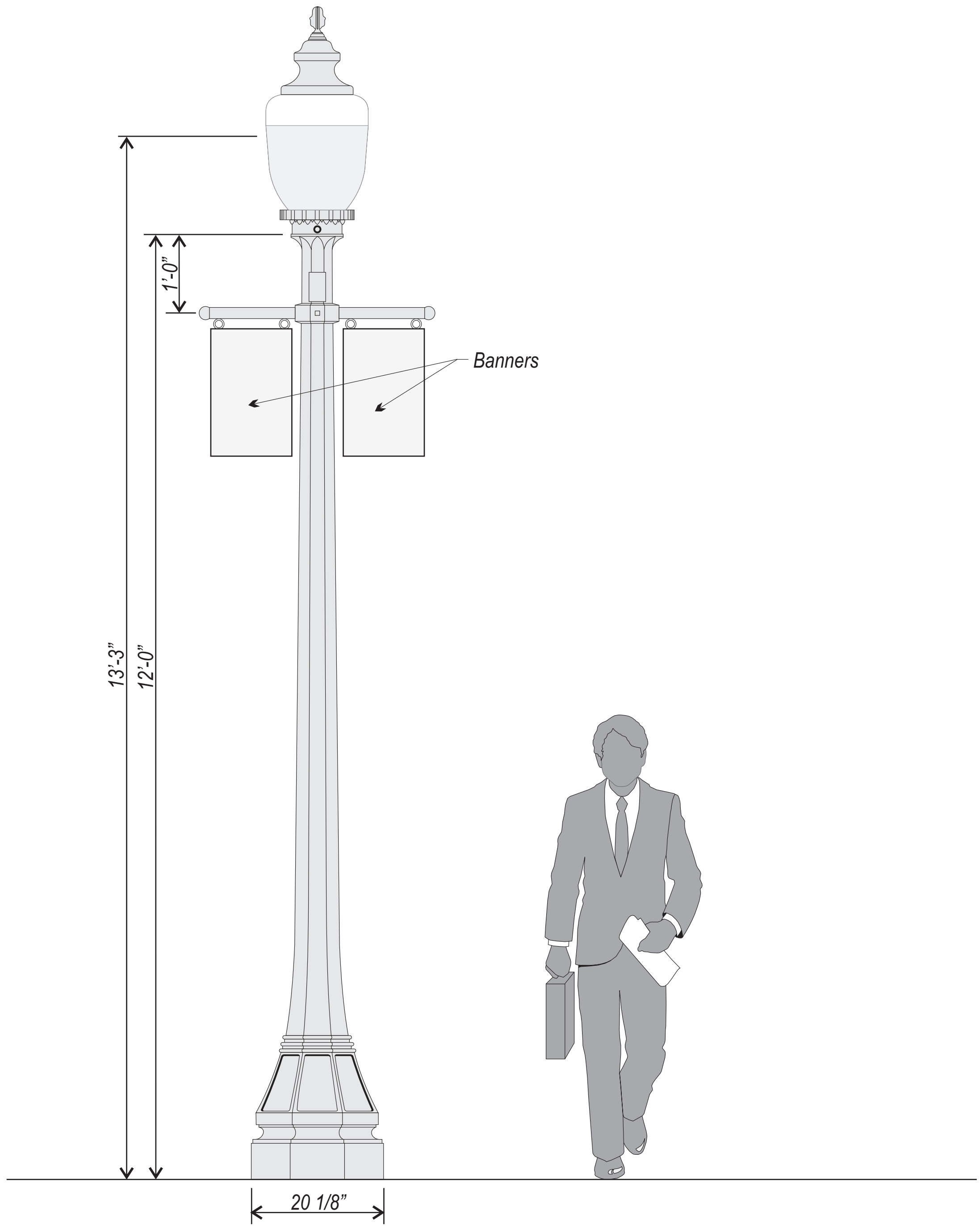
3. Parking shall be staged to allow room for passing vehicles.

***** Recommend 2-foot-wide gravel shoulder on each side, except where private road abuts existing or proposed hard surfacing (e.g. driveway or other parking area).

City of Hood River
Transportation System Plan

Figure 3G

PRIVATE STREET STANDARD DIAGRAM



General Notes:

Application: Classic lights on Oak Street and Second Street.
Description: Acorn post top luminaire with a Type 3 distribution that is dark sky friendly. Light pole shall have a cast iron cross bar for banner attachment.

City of Hood River
Transportation System Plan

Figure 3H

CLASSIC STREET LIGHT STANDARD DIAGRAM

TRANSPORTATION DEMAND MANAGEMENT (TDM)

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. TDM focuses on reducing vehicle miles traveled (VMT) and promoting alternative modes of travel. By shifting peak travel demands on roadways, the roadway capacity can be used more efficiently, and Hood River may avoid or delay building new or wider roadways. A wide variety of TDM strategies exist, however many are tailored to urban areas and measures for rural or smaller communities require special development and planning. Below in Table 8 is a list of potential transportation demand management strategies and their potential for trip reduction during peak travel periods.

TABLE 8: Potential Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Telecommuting	Employees perform regular work duties at home rather than commuting from home to work. This may be full time or on selected work days. This can require computer equipment to be most effective.	82-91% (Full Time) 14-36% (1-2 Days/Week)
Compressed Work Week	Schedule where employees work their regular scheduled number of hours in fewer days per week.	7-9% (9 day/80 hr) 16-18% (4 day/40 hr) 32-36% (3 day/36 hr)
Transit Pass Subsidy	For employees who take transit to work on a regular basis, the employer pays for all or part of the cost on a monthly transit pass.	19-32% (Full subsidy of cost, high transit service) 4-6% (Full subsidy of cost, medium transit service) 0.5-1% (Full subsidy of cost, low transit service) 10-16% (Half subsidy of cost, high transit service) 2-3% (Half subsidy of cost, medium transit service) 0-0.5% (Half subsidy of cost, low transit service)
Reduced Cost or Preferential Parking for HOVs	Parking costs charged to employees are reduced for carpools and or vanpools. Employer provides reserved prime location parking spots for HOV commuters.	1-3%
Alternate Mode Subsidy	For those employees that commute to work by a mode other than driving alone, the employer provides a monetary bonus to the employee.	21-34% (Full subsidy, high transit service) 5-7% (Full subsidy, medium transit service) 1-2% (Full subsidy, low transit service) 10-17% (Half subsidy, high transit service) 2-4% (Half subsidy, medium transit service) 0.5-1% (Half subsidy, low transit service)
On-Site Services	Provide services at the work side that are frequently used by the employees of that work site. Examples include cafes/restaurants, dry cleaners, day care centers, and bank machines.	1-2%
Bicycling Program	Provides support services to those employees	0-10%

Strategy	Description	Potential Trip Reduction
	that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities, and subsidy of commute bicycle purchase.	
On-Site or Public Rideshare Matching for Carpools and Vanpools	On-Site: Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator on staff regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together. Public: Public entity (city, transit agency, region, state) provides an interactive website for carpool matching.	1-2% (Without support strategies) 6-8% (With support strategies)
Provide Vanpools	Employees that live near each other are organized by their employer into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintain the van.	15-25% (Company-provided vans with a fee) 30-40% (Company-subsidized vans)
Gifts/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving along.	0-3%
Employer Bus	Employer provides a bus service specifically to transport employees to work.	3-11%
Walking Program	Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.	0-3%
Time Off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	1-2%
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day.	0-1%
Guaranteed Ride Home Program	A company owned or lease vehicle or taxi fare is provided in the case of an emergency for employees that use alternative modes.	1-3%

Source: *Employee Commute Options (ECO) Sample Trip Reduction Plan, Oregon Department of Environmental Quality*, October 2006.

Hood River County has a Coordinated Transportation Plan that was prepared by the Mid-Columbia Economic Development District for 2009-2012.[2] The plan looks at the existing transportation service options in Hood River County, which includes the TDM strategies of carpool/rideshare and vanpools. Several interviews were done on the existing service and common origins and destinations throughout Hood River County were identified and could be useful in determining common routes used by the community.

[2] *Hood River County Coordinated Transportation Plan, 2009-2012*. Mid-Columbia Economic Development District. Hood River County, Oregon.

Another report was also released by the Gorge TransLink Coordination Project[3] in 2008, which evaluates the transit provided in Skamania, Klickitat, Hood River, and Wasco counties. In addition to the available transit service in these areas, vanpools were identified as a strategy to help move people more efficiently through the area instead of fixed route services. The report identified corridors that could be serviced by vanpools. The corridors pertaining to Hood River were:

- Hood River to The Dalles
- Bingen to White Salmon, Hood River, and The Dalles
- Klickitat County into Goldendale and out to Yakima, The Dalles, and Hood River

The report gives information regarding the organizational types of vanpools, an extensive benefit list for vanpools, and discusses different subsidy options for the service. This report is a good resource when considering addition of or expansion of vanpool services. Currently three vanpools exist in the Gorge TransLink service area and all of them have stops in Hood River. The three existing vanpool programs are listed below:

- **Army Corps of Engineers Vanpool**: There are three vanpools serving the Army Corps of Engineers John Day Dam in Rufus. They begin in different locations including: Goldendale, The Dalles, and Hood River. The vanpool is operated by VPSI, a local private vanpool provider.

- **Hood River-Lloyd District, Portland**: A vanpool operated between Hood River and the Lloyd District. It is organized through Metro, Portland's regional governmental organization, and operated by Enterprise Van, a private operator.

- **Google Shuttles**: Google subsidizes two vanpools that bring employees to its facility in The Dalles. One begins in Beaverton and the other in Hood River.

The City of Hood River shall support efforts to establish new vanpools either leaving or arriving in the city. An example of this could be Carpool NW, which may be available statewide in the future.

PEDESTRIAN FACILITY IMPROVEMENTS

Future pedestrian needs in Hood River were identified by evaluating the existing pedestrian system and recognizing the need for balance between all modes of transportation. The deficiencies in the pedestrian system identified include:

- Lack of sidewalks or adequate shoulders for walking on arterial and collector streets in less-developed areas of the urban growth boundary;
- Difficult crossings at busy non-signalized intersections;

[3] *Gorge TransLink Coordination Project Final Report January 2008*. Community Transportation Association of America. 2008. Nelson/Nygaard Consulting Associates.

- Under-controlled intersections near schools;
- Lack of sidewalks along key routes to schools;
- Lack of curb ramps and other deficiencies in sidewalk or path construction outside of downtown which make access difficult for persons in wheelchairs and other mobility-impaired persons;
- Lack of connection between the northern and southern segments of the Indian Creek Trail southwest of Columbia Gorge Community College;
- Low connectivity of local streets (requiring longer travel distances to reach key destinations) due to topographical barriers.

Improvements to the pedestrian network include sidewalk infill along key arterial and collector street corridors. Proposed priority sidewalk infill projects are listed in Table 9 below, and can be viewed in Figure 4: Proposed Pedestrian Network. Construction of new roadways identified in the motor vehicle sections of this document are not included in Table 9, but will include construction of sidewalks or pedestrian facilities appropriate to the street classification of the new roadway.

Many other pedestrian projects also benefit bicycle transportation, such as intersection and crossing improvements, connectivity improvements, and multi-use paths. These shared pedestrian and bicycle improvement concepts are included in the Pedestrian Facility Improvements section, but affect both modes.

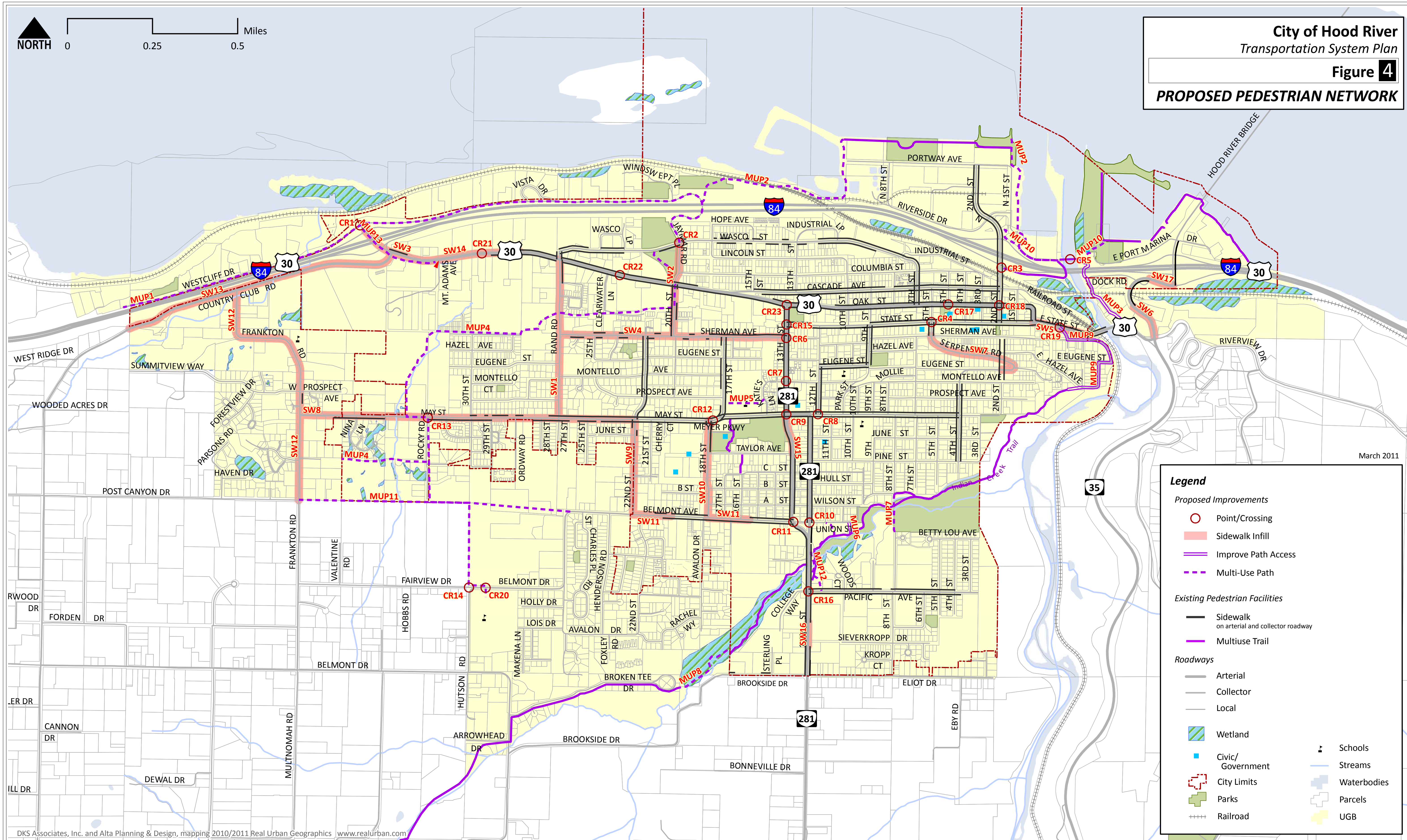
TABLE 9: Proposed Priority Sidewalk Infill Corridors

Project ID	Name/Location	Cost Estimate* (High)	Cost Estimate* (Low)	Note
SW1	Rand Road	$1,010,000	$460,000	Low estimate assumes sidewalks on east side of street only.
SW2	20th Street	$420,000	$155,000	Low estimate assumes sidewalks on west side of street only.
SW3	Cascade Avenue/HCRH-Westcliff Drive to Mt. Adams	$125,000	$125,000	Estimate includes 6' sidewalk on the north side of the roadway. See MUP 13 for proposed 10' multiuse path on the south side.
SW4	Sherman Avenue	$1,075,000	$420,000	Low estimate assumes sidewalks on north side of street only.
SW5	State Street	$280,000	$140,000	Low estimate includes sidewalk on south side of street (sidewalk already exists on north side).
SW6	OR 35 (north of US 30)	$0	$0	This project is included as part of project MV16.
SW7	Serpentine Road/Eugene Street	$270,000	$270,000	Community input indicated that sidewalks on only one side of this street would be sufficient.
SW8	May Street	$1,245,000	$470,000	Low estimate assumes sidewalks on south side of street only.
SW9	22nd Street	$640,000	$315,000	Low estimate assumes sidewalks on west side of street only.

Project ID	Name/Location	Cost Estimate* (High)	Cost Estimate* (Low)	Note
SW10	18th Street	$575,000	$240,000	Low estimate assumes sidewalks on east side of street only.
SW11	Belmont Avenue	$505,000	$245,000	Low estimate assumes sidewalks on north side of street only.
SW12	Frankton Road	$1,855,000	$310,000	Low estimate assumes sidewalks on one side of street from May Street south to city limits (Post Canyon Road).
SW13	Country Club Rd	$705,000	$705,000	Sidewalk proposed for south side of the street only.
SW14	Cascade Avenue/HCRH (between Mt. Adams and Rand)	$225,000	$90,000	Widen sidewalks to 6' on both sides of the road, as adjacent development occurs.
SW15	13th Street/OR281	$100,000	$100,000	This project is to complete a sidewalk gap present on the east side of the street only.
SW16	12th/OR 281	$60,000	$60,000	This project is to complete a sidewalk gap present on the east side of the street only.
SW17	OR 35 (near I-84)	$60,000	$60,000	This project is to complete a sidewalk gap present on the east side of the street only.
	Total Cost	**$9,150,000**	**$4,165,000**	

* Cost estimates for sidewalk infill assume 6' curb- tight sidewalk with curb, gutter and drainage, and include project administration, mobilization, engineering/design and contingency. In areas where drainage improvements already exist, costs may be significantly lower. Cost estimates include planter strips only for projects along streets where adopted City standard cross sections indicate planter strips are required. Cost estimates are planning-level and do not include topographical/other site-specific issues that may increase overall cost. High estimates assume completion of sidewalks on both sides of the street; low estimates assume completion of sidewalk on one side of the street or other design as noted. For low estimates, the side of the street with the most existing sidewalks was used.

The proposed pedestrian facility improvement projects and programs were evaluated against the goals and policies developed to guide the Hood River TSP process. This evaluation is shown in Table 10, where each project or program was rated as being supportive, neutral, or contradictory relative to the established goals and policies. As shown, all improvements for pedestrian facilities are generally supportive of Hood River's transportation goals. Upgrading existing facilities for ADA compliance (e.g., improving curb ramps) best aligns with these goals, followed closely by sidewalk infill, trail/multi-use path construction, and improving accessibility surrounding transit stops.


City of Hood River
Transportation System Plan
Figure 4
PROPOSED PEDESTRIAN NETWORK
NORTH
0
0.25
0.5
Miles
March 2011
Legend
Proposed Improvements
Point/Crossing
Sidewalk Infill
Improve Path Access
Multi-Use Path
Existing Pedestrian Facilities
Sidewalk
on arterial and collector roadway
Multiuse Trail
Roadways
Arterial
Collector
Local
Wetland
Schools
Civic/ Government
Streams
City Limits
Waterbodies
Parks
Parcels
Railroad
UGB
HOOD RIVER BRIDGE
PORTWAY AVE
RIVERSIDE DR
INDUSTRIAL ST
E PORT MARINA DR
DOCK RD
RIVERVIEW DR
WESTCLIFF DR
COUNTRY CLUB RD
FRANKTON RD
WEST RIDGE DR
SUMMITVIEW WAY
WOODED ACRES DR
FORESTVIEW DR
PARSONS RD
HAVEN DR
POST CANYON DR
W PROSPECT AVE
MAY ST
SHERMAN AVE
EUGENE ST
MONTELLO AVE
PROSPECT AVE
HAZEL AVE
CASCADE AVE
OAK ST
STATE ST
COLUMBIA ST
WASCO ST
LINCOLN ST
HOPE AVE
INDUSTRIAL LP
MEYER PKWY
TAYLOR AVE
JUNE ST
PINE ST
HULL ST
WILSON ST
UNION ST
BELMONT AVE
BETTY LOU AVE
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
BROOKSIDE DR
BONNEVILLE DR
FAIRVIEW DR
BELMONT DR
HOLLY DR
LOIS DR
AVALON DR
RACHEL WY
COLLEGE WAY
BROKEN TEE DR
ARROWHEAD DR
HUTSON RD
MAKENA LN
FOXLEY RD
MULTNOMAH RD
CANNON DR
DEWAL DR
FORDEN DR
VALENTINE RD
HOBBS RD
ROCKY RD
RAND RD
ORDWAY RD
Indian Creek Trail
MUP1
MUP2
MUP3
MUP4
MUP5
MUP6
MUP7
MUP8
MUP9
MUP10
MUP11
MUP12
MUP13
SW1
SW2
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SW5
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CR7
CR8
CR9
CR10
CR11
CR12
CR13
CR14
CR15
CR16
CR17
CR18
CR19
CR20
CR21
CR22
CR23
84
30
281
35
DKS Associates, Inc. and Alta Planning & Design, mapping 2010/2011 Real Urban Geographics www.realurban.com

TABLE 10: Proposed Pedestrian Project Evaluation Matrix

Projects/Programs (Hood River Goals)	**GOAL 1:** A balanced transportation system.	**GOAL 2:** Transportation facilities designed, constructed, and maintained in a manner that enhances Hood River's livability.	**GOAL 3:** A safe transportation system.	**GOAL 4:** An efficient transportation system that reduces the number of trips made by single occupancy vehicles and limits congestion.	**GOAL 5:** Transportation facilities, which are accessible to all members of the community and reduce trip length.	**GOAL 6:** Transportation facilities, which provide efficient movement of goods.	**GOAL 7:** Implement the transportation plan by working cooperatively with federal, state, regional and local governments, private sector and residents, and by creating a stable, flexible financial system.	**GOAL 8**: Protect the function and operation of the interchanges, interstate highway and local street network consistent with the following interchange functions and their relationship to the community and broader transportation system.	**GOAL 9**: Provide a sustainable transportation system that meets the needs of present and future generations.	**Total Goals Met**
Sidewalk Infill; SW1-SW17	+1	+1	+1	+1	+1	-	-	+1	+1	+7
Crosswalk Striping and Advanced Warning Signs; CR2, CR6, CR7, CR10, CR13, CR15, CR19, CR20	+1	+1	+1	+1	-	-	-	-	+1	+5
Modification of Intersection Control; CR1, CR3, CR4,CR8, CR11, CR12, CR14	+1	+1	+1	+1	-	-	-	+1	+1	+6
Pedestrian Crossings (Mid-Block or Refuge Islands); CR9, CR16, CR21, CR22	+1	+1	+1	+1	+1	-	-	-	+1	+6
Curb Extensions and Paving; CR5, CR17, CR18	+1	+1	+1	+1	-	-	-	-	+1	+5
Indian Creek Bridge; MUP7	+1	+1	+1	+1	+1	-	-	-	+1	+6
Trail Improvements/Multi-use Paths; MUP1-MUP12	+1	+1	+1	+1	+1	-	-	+1	+1	+7
ADA/Curb Ramp Upgrade Program	+1	+1	+1	+1	+1	-	+1	+1	+1	+8
"Smart Trips" Individualized Marketing Program	+1	+1	+1	+1	-	-	+1	-	+1	+6
Bicycle/Pedestrian Connections to Transit	+1	+1	+1	+1	+1	-	+1	-	+1	+7
Safe Routes to Schools Curriculum	+1	+1	+1	+1	-	-	+1	-	+1	+6

Key: +1 = supportive of goal; - neutral relative to goal; -1 = contradictory to goal

Shared Pedestrian and Bicycle Improvements

The projects proposed below will provide benefits to both bicycle and pedestrian travel in Hood River. Intersection improvements that reduce crossing distances and increase visibility can make crossing busy streets easier for all non-motorized modes. These improvement alternatives can be viewed on both Figure 4: Proposed Pedestrian Network and Figure 5: Proposed Bicycle Network, and are listed in Table 11 below.

In addition to the improvements described in Table 9, each of these intersections should be prioritized for ADA-compliant curb ramp replacement as necessary. At unsignalized intersections, transverse crosswalks should also be replaced with high-visibility continental crosswalks, when applicable. Exhibit 1 and 2 show examples of existing transverse and continental crosswalks in Hood River.

Exhibit 1: Transverse Crosswalk across 12th Street at June Street

Exhibit 2: Continental Crosswalk across Belmont Street near Westside School

In general, marked crosswalks at unsignalized approaches should only be considered when an engineering study demonstrates their need and the location meets the following criteria:

- There is good visibility of the crosswalk from all directions, or it can be obtained. Stopping sight distance is a minimum.
- There is no reasonable alternative crossing location.
- There is established pedestrian usage. Considerations include: volume of pedestrians, opportunity for safe crossing (i.e., sufficient gaps in traffic), percentage of elderly or young children, and the nature of the land uses on both sides of the road. Lower pedestrian volumes would be acceptable for areas where there are greater proportion of less experienced and less agile pedestrians (e.g., near schools)
- Posted speeds are 35 mph or less.
- Traffic Volumes should be 10,000 or less ADT. If above 10,000 ADT raised median islands should be considered.
- On multi-lane highways, pedestrian crossing enhancements (curb extensions and/or pedestrian refuges/raised medians) should be considered.

The following crossing improvements are conceptual. Improvement feasibility and design would be determined through an engineering study required by City (local roads) or ODOT (state highways) prior to installation of improvements. The establishment of marked crosswalks at unsignalized approaches or mid-block crossings, or modification of existing approaches/crossings of state highways will require the completion of an engineering study and approval by the State Traffic Engineer and ODOT.*

TABLE 11: Proposed Point/Crossing Improvement Alternatives

Project ID	Name/Location	Description	Cost Estimate*
CR1	*Westcliff Drive & Cascade Avenue-HCRH	• When signal is constructed as proposed, stripe crosswalks with protected crossing phase for pedestrians, and also provide crossings .	n/a
CR2	Wasco Avenue & 20th Street/ Jaymar Road	• Stripe crosswalks on all legs of intersection and add advance warning signage.	$5,000
CR3	*2nd Avenue (I-84 overpass)	• Add advance stop bar on the northbound approach to protect pedestrian and bicyclists crossing the south leg of the intersection.	$5,000
CR4	6th Street & State Street	• Add stop signs to State Street to make this intersection an all-way stop to reduce wait time and exposure of cyclists making a left turn onto 6th Street southbound. Given the potential impacts on downtown motor vehicle circulation, an engineering investigation should be completed prior to implementation. • Consider adding curb extension on State Street westbound on the NE corner of the intersection with a curb cut to help cyclists make a left turn using the crosswalk.	$15,000

Project ID	Name/Location	Description	Cost Estimate*
CR5	Hood River Bicycle & Pedestrian Bridge	• Pave approaches to bridge ramps on either side of bridge.	$15,000
CR6	*OR 281-13th Street & Sherman Street	• Considered striped crosswalks on north and/or south legs of intersection across 13th Street and add advance warning signage.	$5,000
CR7	*OR 281-13th Street & Montello Avenue	• Add advance warning signage to existing crosswalk.	$5,000
CR8	12th Street (North Leg) & May Street	• Consider adding curb extensions on the east leg of the intersection to reduce pedestrian crossing distance.	$35,000
CR9	*OR 281-13th Street & May Street	• Consider interim improvement: Install a refuge island for pedestrians to help cross the right turn slip lane from westbound May Street onto 13th Street northbound. • Consider interim improvement: Revise striping of crosswalk between new refuge island and northeast corner at an angle perpendicular to the slip lane and add advance warning signage to increase visibility. • Interim improvement: Stripe new crosswalk on east leg of intersection between southeast corner and new refuge island. • Interim improvement: Install pedestrian-activated rectangular rapid-flash beacons (RRFB) on east leg of intersection. • Ultimate Improvement: Consider signalizing intersection (not included in cost estimate).	$55,000 ($30,000 if RRFB is not included)
CR10	*OR 281-12th Street & Belmont Avenue	• Stripe crosswalks on north and/or south legs of intersection across 12th Street and add advance warning signage.	$5,000
CR11	*OR 281-13th Street & Belmont Avenue	• Interim Improvement: Stripe crosswalks on north and/or south legs of intersection across 13th Street and add advance warning signage. • Interim Improvement: Consider installing a curb extension on one side of 13th Street to reduce crossing distances (pending reconfiguration of 13th Street). • Ultimate Improvement: Traffic signal to be added to reduce motor vehicle delay will also improve pedestrian crossings	$15,000
CR12	17th Street & May Street	• Extend curb on west to reduce turn radius and pedestrian crossing distance on 17th Street (southbound approach will be stopped with motor vehicle improvements, and stop sign will be removed from May Street).	$45,000
CR13	Rocky Road & May Street	• Stripe crosswalks on east and/or west legs of intersection across May Street and add advance warning signage to assist crossing for future Westside Community Trail.	$5,000

Project ID	Name/Location	Description	Cost Estimate*
CR14	Fairview Drive & Belmont Drive	• Add stop signs to Belmont Drive to make this intersection an all-way stop (future north-south extension of Mt. Adams Avenue will not have stop signs when street is extended). • Stripe crosswalks on all legs of the intersection. • Reconfigure intersection geometry to reduce the radius of the curve on Belmont Drive, to lower vehicle speeds. • Consider installing curb extensions or refuge islands to reduce crossing distances.	$45,000
CR15	*OR 281-13th Street & State Street-HCRH	• Consider striping crosswalks on east side of intersection across State Street.	$5,000
CR16	*OR-281-12th Street & Pacific Avenue	• Add pedestrian countdown signal to help Indian Creek Trail users cross 12th Street safely. • Install directional signage to encourage trail users to use the signalized intersection when crossing between segments of the Indian Creek Trail. • Consider widening the sidewalk at the northeast and northwest corners to increase queuing capacity for bicyclists and pedestrians waiting to cross 12th Street (acquire right of way if necessary).	$5,000
CR17	*5th Street & Oak Street-HCRH	• Consider adding curb extension if SHPO approval can be obtain on east leg of intersection at existing crosswalk to reduce crossing distance and improve visibility.	$15,000
CR18	*2nd Street & Oak Street-HCRH	• As part of future signalization project, consider installing curb extensions to reduce crossing distances and improve sight distance on corners where it would not interfere with truck movements if SHPO approval can be obtained.	$25,000
CR19	2nd Street & State Street	• Stripe crosswalks on east side of intersection across State Street and add advance warning signage.	$5,000
CR20	(Future) Westside Community Trail & Belmont Drive	• Add advance stop bars before crosswalk. • Consider relocating crossing or closing school parking lot driveway in order to reduce complication of turning movements at the crossing. • Complete project CR 14 (described previously) to improve nearby intersection at Fairview Drive and Belmont Drive, with the goal of reducing the speed of motorists approaching the crossing eastbound on Belmont Drive.	$5,000
CR21	*Cascade Avenue-HCRH (midblock between Mt. Adams Avenue and Rand Road)	• Consider installing midblock crosswalk with advance warning signage. • Consider installing rectangular rapid flash beacons to improve motorist compliance if necessary after an observation period.	$25,000

Project ID	Name/Location	Description	Cost Estimate*
CR22	*Cascade Avenue near-HCRH (midblock between Rand Road and 20th Street)	• Consider installing midblock crosswalk with median refuge island and advance warning signage. • Consider installing rectangular rapid flash beacons to improve motorist compliance if necessary after an observation period.	$25,000
CR23	OR281-13th Street & Oak Street-HCRH	• Install advanced stop bar and advance warning signage for the eastbound right turn lane on the west leg of the intersection to encourage motor vehicles to yield to users.	$5,000
	Total Cost		**$370,000**

* All cost estimates include project administration, mobilization, engineering/design and contingency costs. Cost estimates are planning-level and do not include right of way acquisition costs or topographical/other site-specific issues that may increase overall cost.

In addition to point and intersection improvements, facilities such as multi-use paths and trails can create both efficient commuter routes and recreational opportunities for bicycling and walking users. Proposed off-street facilities are listed in Table 12 below and can be viewed on both Figure 4: Proposed Pedestrian Network and Figure 5: Proposed Bicycle Network.

TABLE 12: Proposed Off-Street Bicycle & Pedestrian Facilities

Project ID	Name/Location	Cost Estimate*	Note
MUP1	Westcliff Drive	Future design refinement by City will be needed; no cost estimate available at this time.	Westcliff provides an east west pedestrian and bicycle connection through Hood River connecting to the HCRH trail.
MUP2	Waterfront Path	$1,125,000	Proposed multi-use path connecting Westcliff Drive to the existing paths along the Columbia River.
MUP3	Waterfront Path Access from US 30	$230,000	Proposed alternative access to the Waterfront Path from east of downtown.
MUP4	Westside Community Trail	Project already funded by Hood River Valley Parks & Recreation	This previously proposed multi-use path being pursued by Hood River Valley Parks & Recreation would create a key link in Hood River's bicycle and pedestrian networks.
MUP5	Hood River Middle School Path	$25,000	This previously proposed connection through the Hood River Middle School campus being pursued by the Hood River County School District through the school's Safe Routes to Schools program would create a key link in Hood River's bicycle and pedestrian networks.

Project ID	Name/Location	Cost Estimate*	Note
MUP6	Indian Creek Trail Access from Union Street	$5,000	Soft surface trail improvements to formalize access to the Indian Creek Trail from Union Street.
MUP7	Indian Creek Bridge at 8th Street	$4,200,000	Bicycle and pedestrian bridge connecting 8th Street over Indian Creek.
MUP8	Indian Creek Trail, Segment 2	Pending future easement, project will be funded by Hood River Valley Parks & Recreation	This previously proposed segment of the Indian Creek Trail being pursued by Hood River Valley Parks & Recreation would create a key link in Hood River's bicycle and pedestrian networks.
MUP9	Indian Creek Trail Access from Sherman Street	$360,000	Improvements to connection between 2nd Street & State Street and the northern end of the Indian Creek Trail. Cost estimate assumes construction of a sidewalk on one side of the street along this route.
MUP10	Port of Hood River Path	$265,000	The Port of Hood River is actively pursuing construction of this new multi-use path that would improve the connection between the Hood River Bicycle & Pedestrian Bridge and the existing Waterfront Path.
MUP11	Post Canyon Path	$660,000	A road extension of Belmont Avenue to Post Canyon Drive is proposed. Sidewalk and bike lane would be included as part of that construction. However, this project to construct an east-west multi-use path between Belmont Avenue and Frankton Road, aligned with Post Canyon Drive, could be constructed as an interim improvement or as a complimentary one.
MUP12	Indian Creek Trail (segment parallel to 12th Street/OR 281)	$215,000	Proposed multi-use path along an existing segment of the Indian Creek Trail to improve access across Indian Creek east of 12th Street/OR 281.
MUP 13	Cascade Avenue between Mt Adams Avenue and Westdliff Drive	$255,000	Proposed 10' multiuse path along the south side of Cascade between Mt Adams Avenue and Westcliff Drive. See SW 3 for sidewalk on north side of the roadway.
	Total Cost	**$7,340,000**	

* All cost estimates include project administration, mobilization, engineering/design and contingency costs. Cost estimates are planning-level and do not include right of way acquisition costs or topographical/other site-specific issues that may increase overall cost.

Citywide and Programmatic Improvements

Several types of bicycle and pedestrian needs in Hood River are not related to specific corridors, but pertain to city policy or conditions found in widespread locations. The improvement alternatives listed in Table 13 below address these types of bicycle and pedestrian needs.

TABLE 13: Proposed Citywide and Programmatic Improvement Alternatives

Name	Description	Cost Estimate
ADA/Curb Ramp Upgrade Program	Upgrade curb ramps and eliminate gaps in ADA access along prioritized pedestrian routes near key destinations.	Example: $20,000/year. Fixed or percentage amount annually for capital improvements.
"Smart Trips" Individualized Marketing Program	Develop an outreach program targeted at residents in neighborhoods receiving new bicycle and pedestrian infrastructure to encourage them to walk and bike more often. Distribute walking and bicycling maps; partner with local businesses for coupon incentives; organize group walks and rides to local recreational and commercial destinations. Administer before/after travel survey to evaluate effectiveness.	Example: $20,000. (Variable by size; assume ~$10/person in program area).
Bicycle/Pedestrian Connections to Transit	Coordinate infrastructure upgrades near transit stops and park and rides to improve access and amenities targeted at increasing ridership.	Example: $20,000/year. Fixed or percentage amount annually for capital improvements.
Safe Routes to Schools Curriculum	Leverage ODOT Safe Routes Program with local investment to bring Safe Routes curriculum to all area K-8 schools.	Example: $20,000/year. Fixed or percentage amount annually for capital improvements.
Bicycle Wayfinding Signage	Implement a bicycle wayfinding signage program to assist new bicyclists in choosing comfortable routes, and to help visiting bicyclists navigate through the city.	Example: $100,000. Assumes one sign every 800 feet each direction along the ~20 mile proposed bicycle network, including 30% for design/engineering.
Bicycle Parking Program	Implement bicycle rack design and placement standards; review development applications for compliance; coordinate with sidewalk installation by developments or in city projects.	Example: $5,000/year. Can be funded through fees for developments requesting related design variances.

BICYCLE FACILITY IMPROVEMENTS

Improvements to the bicycle network include completion of bike lanes by restriping streets where space is available and through roadway expansion on streets in outer Hood River where shoulders are narrow or do not exist. Several streets in and near downtown are proposed to be treated with shared lane markings (also known as "sharrows") and signs where space is not available to add bike lanes. One steep street in Hood River is proposed to be treated with a combination of a bike lane in the uphill direction and shared lane markings downhill (Serpentine Road). On hilly roads where space restrictions prohibit bike lanes in both directions, this treatment offers the protection of a bike lane to cyclists as they are more vulnerable traveling slowly uphill, and encourages motorists to share the road with cyclists as they take the lane traveling near the normal speed of traffic when traveling downhill. In many Hood River neighborhoods, streets are proposed for bike boulevards: comfortable, low traffic streets where bicycles share the road with vehicles. Bike boulevards can be treated with a wide range of wayfinding signage and traffic calming techniques in order to emphasize that they are neighborhood streets where walking, bicycling and local access are prioritized above vehicle mobility. Additional analysis will be necessary to identify specific treatments on each bicycle boulevard corridor.

Proposed bicycle alternatives can be viewed in Figure 5: Proposed Bicycle Network, and are listed in Table 14 below. Construction of new roadways identified in the motor vehicle sections of this document are not included in Table 14, but will include construction of bicycle facilities appropriate to the street classification of the new roadway.

Many other bicycle improvement projects also benefit pedestrian transportation, such as intersection and crossing improvements, connectivity improvements and multi-use paths. These shared pedestrian and bicycle improvement concepts were previously described in the Pedestrian Facility Improvements section.

TABLE 14: Proposed Bicycle Improvement Alternatives

Project ID	Name/Location	Facility Type	Cost Estimate*	Note
BL1	Country Club Road	Bike Lanes	$365,000	Roadway expansion.
BL2	Frankton Road	Bike Lanes	$340,000	Roadway expansion.
BL3	Cascade Avenue-Oak Street-HCRH	Bike Lanes	$135,000	Intermittent bike lanes exist; assumes restriping along half of corridor length.
BL4	State Street	Bike Lanes	$80,000	Restriping.
BL5	OR 35/Hood River Bridge	Bike Lanes	$65,000	Restriping.
BL6	May Street	Bike Lanes	$890,000	Roadway expansion.
BL7	Rand Rd	Bike Lanes	$210,000	Roadway expansion.
BL8	12th Street/13th Street/HCRH	Bike Lanes	$245,000	Restriping.
BL9	Belmont Avenue	Bike Lanes	$110,000	Restriping.
BL10	Belmont Drive/ Hudson Rd	Bike Lanes	$115,000	Roadway expansion.
BL11	Indian Creek Road	Bike Lanes	$155,000	Roadway expansion.
BL12	Brookside Drive/Eliot Drive	Bike Lanes	$360,000	Roadway expansion.
BL13	13th Street	Bike Lanes	$70,000	Restriping.
BLSLM1	Serpentine Road/6th Street/Eugene Street	Uphill Bike Lane/ Downhill Shared Lane Markings	$40,000	Restriping.
SLM1	Wasco Street/7th Street	Shared Lane Markings	$35,000	
SLM2	Industrial Street/3rd Street/2nd Street	Shared Lane Markings	$10,000	
SLM3	Oak Street/Front Street	Shared Lane Markings	$20,000	
SLM4	Cascade Avenue	Shared Lane Markings	$20,000	
SLM5	State Street	Shared Lane Markings	$20,000	
SLM6	Sherman Avenue	Shared Lane Markings	$40,000	
SLM7	9th Street/Park Street	Shared Lane Markings	$5,000	
SLM8	May Street	Shared Lane Markings	$10,000	
SLM9	22nd Street	Shared Lane Markings	$15,000	
BLVD1	20th Street/Jaymar Rd	Bike Boulevard	$25,000	

Project ID	Name/Location	Facility Type	Cost Estimate*	Note
BLVD2	Sherman Avenue	Bike Boulevard	$10,000	
BLVD3	Montello Avenue/Eugene Street	Bike Boulevard	$115,000	
BLVD4	9th Street	Bike Boulevard	$25,000	
BLVD5	4th Street	Bike Boulevard	$15,000	
BLVD6	18th Street/17th Street/Avalon Way/Avalon Drive	Bike Boulevard	$80,000	
BLVD7	8th Street	Bike Boulevard	$60,000	
	Total Cost		**$3,685,000**	

* All cost estimates include project administration, mobilization, engineering/design and contingency costs. Cost estimates are planning-level and do not include right of way acquisition costs or topographical/other site-specific issues that may increase overall cost. Bike lane cost estimates include striping removal, restriping, pavement markings, and signs. When applicable, roadway expansion assumes 6' shoulder in each direction. Shared lane marking cost estimates include pavement markings and signs. Bike boulevard cost estimates include pavement markings, signs, traffic control modifications (ex. turning stop signs) and example traffic calming treatments.

The proposed bicycle facility improvement projects and programs were evaluated against the goals and policies previously developed to guide the Hood River TSP process. This evaluation is shown in Table 15, where each project or program was rated as being supportive, neutral, or contradictory relative to the established goals and policies. As shown, all improvements for bicycle facilities are generally supportive of Hood River's transportation goals. The installation of bicycle lanes and shared lane markings best align with these goals, followed closely by the establishment of bicycle boulevards.

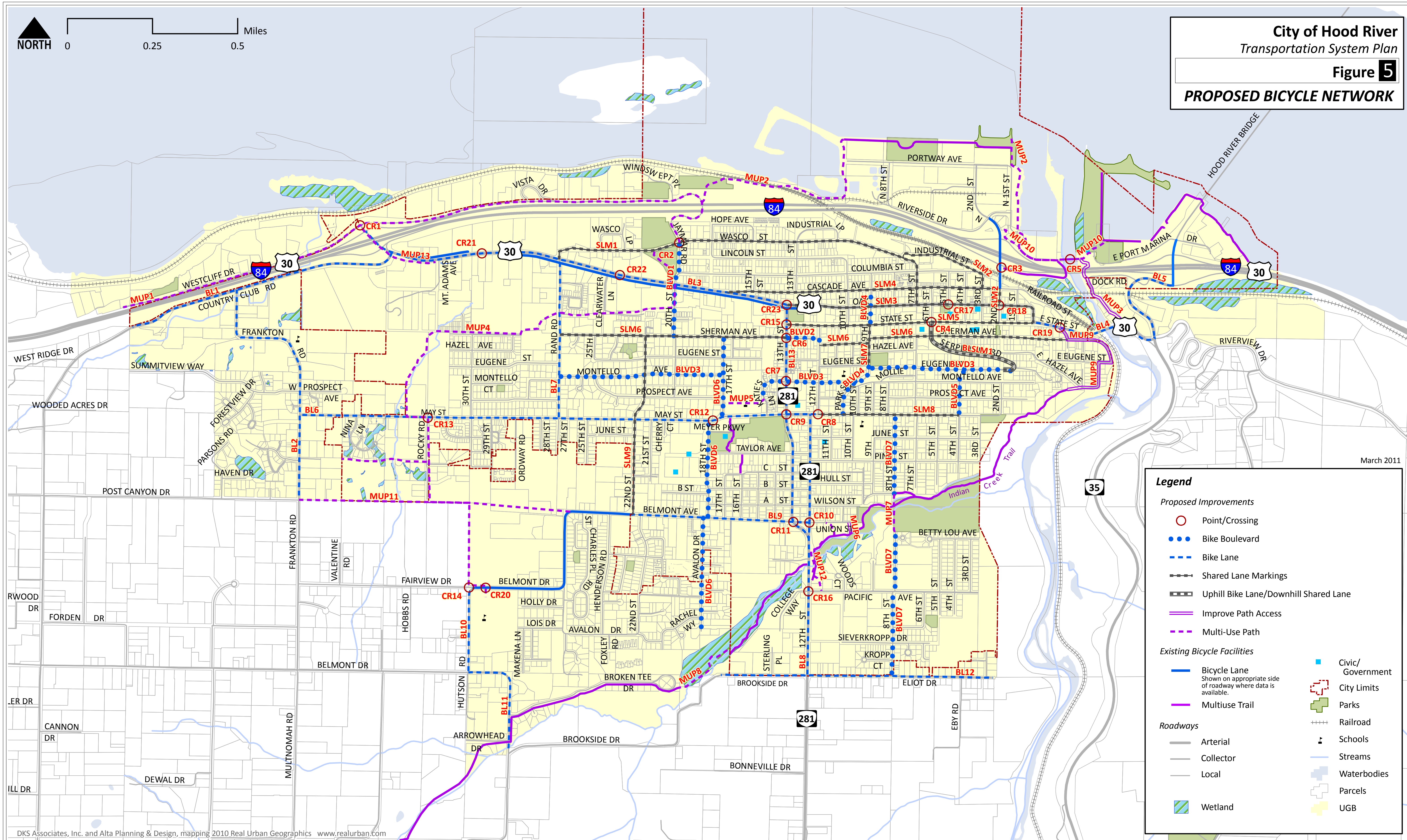

City of Hood River
Transportation System Plan
Figure 5
PROPOSED BICYCLE NETWORK
NORTH
0
0.25
0.5
Miles
March 2011
Legend
Proposed Improvements
Point/Crossing
Bike Boulevard
Bike Lane
Shared Lane Markings
Uphill Bike Lane/Downhill Shared Lane
Improve Path Access
Multi-Use Path
Existing Bicycle Facilities
Bicycle Lane
Shown on appropriate side of roadway where data is available.
Multiuse Trail
Roadways
Arterial
Collector
Local
Wetland
Civic/ Government
City Limits
Parks
Railroad
Schools
Streams
Waterbodies
Parcels
UGB
DKS Associates, Inc. and Alta Planning & Design, mapping 2010 Real Urban Geographics www.realurban.com
HOOD RIVER BRIDGE
PORTWAY AVE
RIVERSIDE DR
INDUSTRIAL LP
HOPE AVE
WASCO ST
LINCOLN ST
COLUMBIA ST
CASCADE AVE
STATE ST
SHERMAN AVE
HAZEL AVE
EUGENE ST
MONTELLO AVE
PROSPECT AVE
MAY ST
JUNE ST
MEYER PKWY
TAYLOR AVE
BELMONT AVE
BELMONT DR
FAIRVIEW DR
POST CANYON DR
COUNTRY CLUB RD
WESTCLIFF DR
WEST RIDGE DR
WOODED ACRES DR
SUMMITVIEW WAY
FRANKTON RD
HAVEN DR
BROOKSIDE DR
BONNEVILLE DR
ELIOT DR
PACIFIC AVE
SIEVERKROPP DR
BETTY LOU AVE
WILSON ST
UNION ST
HULL ST
RIVERVIEW DR
E PORT MARINA DR
DOCK RD
E EUGENE ST
Indian Creek Trail
MUP1
MUP2
MUP3
MUP4
MUP5
MUP6
MUP7
MUP8
MUP9
MUP10
MUP11
MUP12
MUP13
BL1
BL2
BL3
BL4
BL5
BL6
BL7
BL8
BL9
BL10
BL11
BL12
BL13
BLVD1
BLVD2
BLVD3
BLVD4
BLVD5
BLVD6
BLVD7
SLM1
SLM2
SLM3
SLM4
SLM5
SLM6
SLM7
SLM8
SLM9
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
CR11
CR12
CR13
CR14
CR15
CR16
CR17
CR18
CR19
CR20
CR21
CR22
CR23
84
30
281
35

TABLE 15: Proposed Bicycle Project Evaluation Matrix

Projects/Programs / **Hood River Goals**	**GOAL 1:** A balanced transportation system.	**GOAL 2:** Transportation facilities designed, constructed, and maintained in a manner that enhances Hood River's livability.	**GOAL 3:** A safe transportation system.	**GOAL 4:** An efficient transportation system that reduces the number of trips made by single occupancy vehicles and limits congestion.	**GOAL 5:** Transportation facilities, which are accessible to all members of the community and reduce trip length.	**GOAL 6:** Transportation facilities, which provide efficient movement of goods.	**GOAL 7:** Implement the transportation plan by working cooperatively with federal, state, regional and local governments, private sector and residents, and by creating a stable, flexible financial system.	**GOAL 8**: Protect the function and operation of the interchanges, interstate highway and local street network consistent with the following interchange functions and their relationship to the community and broader transportation system.	**GOAL 9**: Provide a sustainable transportation system that meets the needs of present and future generations.	**Total Goals Met**
Bicycle Lanes; BL1-BL13	+1	+1	+1	+1	+1	-	-	+1	+1	+7
Uphill Bike Lane/Downhill Shared Lane Markings; BLSLM1	+1	+1	+1	+1	+1	-	-	-	+1	+6
Shared Lane Markings; SLM1-SLM9	+1	+1	+1	+1	+1	-	-	+1	+1	+7
Bicycle Boulevards; BLVD1-BLVD6	+1	+1	+1	+1	+1	-	-	-	+1	+6
Bicycle Wayfinding Signage	+1	+1	-	+1	+1	-	-	-	+1	+5
Bicycle Parking Program	+1	+1	-	+1	+1	-	-	-	+1	+5

Key: +1 = supportive of goal; - neutral relative to goal; -1 = contradictory to goal

MOTOR VEHICLE IMPROVEMENTS

The following section presents transportation improvements to address motor vehicle travel needs, including an overview of the analysis process, a summary of system needs, a description of projects considered, projected intersection operations with the improvements in place, and cost estimates.

Analysis Methodology & Overview

The following are key components of the process used to develop projects that address the motor vehicle transportation needs.

- **Interchange Area Management Plans (IAMPs)** - Transportation system planning has already been advanced for the areas surrounding the I-84 interchanges through the Exit 62 Interchange Area Management Plan and the Exits 63 & 64 Interchange Area Management Plan (currently both in draft form).[4] These recommendations were carried over to the Transportation System Plan, with no further investigation into improvement needs performed for these areas. Therefore, the process of identifying transportation system solution concepts began with the assumption that the Interchange Area Management Plan recommendations would be in place.
- **Future Transportation Needs –** Future development and traffic growth through 2031 were projected and the future transportation system needs were assessed (summarized in Chapter 4).
- **Preliminary Concepts** - Preliminary concepts were developed to address the “big-picture” system-wide issues identified in the needs analysis – namely improved mobility through the development of parallel routes to Cascade Avenue and OR 281.
- **Initial Screening of Concepts** - The preliminary concepts were reviewed by several stakeholder groups that provided feedback that served as an initial screening process.
- **Identify Additional Projects** - Additional improvements were identified to address specific mobility needs that were identified at various locations around the city. These improvements focused on localized deficiencies (generally consisting of intersection control and lane channelization).
- **Project Cost Considerations** - Planning level cost estimates were developed for the package of improvements to be compared to the projected revenue available for transportation funding. A sensitivity test of revenue streams was performed to determine the approximate increase that would be needed for several key sources to fund the entire scope of transportation projects identified (funding all projects identified in the 20-year TSP is not required).

[4] Draft Interstate 84 Exit 62 Interchange Area Management Plan, July 2010 and Draft Interstate 84 Exit 63 & 64 Interchange Area Management Plan, July 2010.

Summary of Needs

The City of Hood River's transportation system deficiencies were previously documented in Chapter 4. Most of the future traffic growth and congestion were forecast to occur along routes such as Cascade Avenue (HCRH), Oak Street, 13th Street (OR 281), 12th Street (OR 281), May Street, and Country Club Road, which carry the most traffic today. Without improvements in city-wide connectivity to allow for a balanced use of the roadway network, future demand will remain within these few corridors where roadway widening may be necessary to provide sufficient capacity.

City-wide, 13 study intersections currently do not meet adopted mobility standards, with a total of 19 intersections failing to meet mobility standards by 2031. Unless mitigated, these intersections will increase delay for travel through the city and could be an obstacle for new land development opportunities.

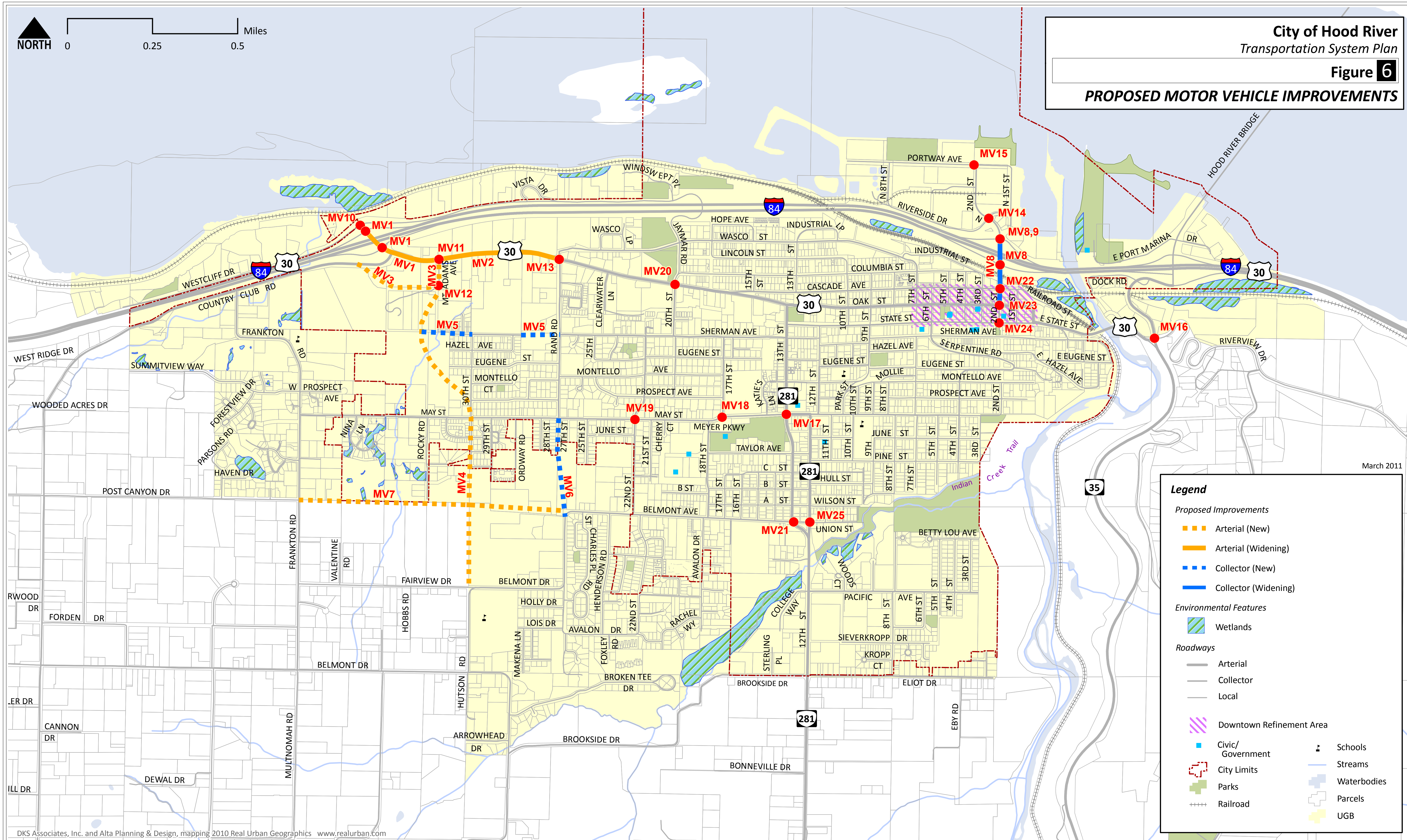
Motor Vehicle Capacity Improvements

The motor vehicle improvements are divided into the following subsections:

A. *Interchange Areas* – these improvements reflect the recommendations from the Draft IAMPs.
B. *System Circulation* – improvements focused on enhancing city-wide connectivity, primarily new roadways and road extensions.
C. *Downtown Circulation* – taking a closer look at how improvements along the 2nd Street corridor affect downtown circulation for all travel modes.
D. *Targeted Intersection Improvements* – addressing capacity needs at intersections around the city where bottlenecks remain after system circulation enhancements are complete.

Together, these improvements would represent the Preferred Plan for motor vehicle modal projects. The Preferred Plan includes all improvements needed to address identified needs across the city and is not limited by the availability of funding to construct projects. In subsequent stages of the TSP development process, projects from the Preferred Plan will be prioritized, with a subset of projects selected for the Strategic Plan, which must align with a reasonable funding strategy. Projects from these lists will then be selected by the City for inclusion on the Capital Improvement Plan.

All motor vehicle improvement projects proposed for consideration are illustrated in Figure 6 and listed in Table 16, which includes planning-level cost estimates. The planning-level cost estimates provided are based on general unit costs for key project elements, using aerial photos, topography maps, and environmental resource maps, with only light field reconnaissance. Each of these project costs will need further refinement as projects are advanced and are for budgeting purposes only. More detailed descriptions of these projects and how they affect the transportation system follow Table 16.



City of Hood River
Transportation System Plan
Figure 6
PROPOSED MOTOR VEHICLE IMPROVEMENTS
NORTH
0
0.25
0.5
Miles
March 2011
Legend
Proposed Improvements
Arterial (New)
Arterial (Widening)
Collector (New)
Collector (Widening)
Environmental Features
Wetlands
Roadways
Arterial
Collector
Local
Downtown Refinement Area
Civic/ Government
Schools
Streams
City Limits
Waterbodies
Parks
Parcels
Railroad
UGB
MV1
MV2
MV3
MV4
MV5
MV6
MV7
MV8
MV8,9
MV10
MV11
MV12
MV13
MV14
MV15
MV16
MV17
MV18
MV19
MV20
MV21
MV22
MV23
MV24
MV25
84
30
281
35
WESTCLIFF DR
COUNTRY CLUB RD
FRANKTON RD
WEST RIDGE DR
SUMMITVIEW WAY
WOODED ACRES DR
FORESTVIEW DR
PARSONS RD
HAVEN DR
POST CANYON DR
W PROSPECT AVE
MAY ST
HAZEL AVE
EUGENE ST
MONTELLO CT
RAND RD
30TH ST
ROCKY RD
ORDWAY RD
JUNE ST
MEYER PKWY
TAYLOR AVE
BELMONT AVE
BELMONT DR
FAIRVIEW DR
VALENTINE RD
HOBBS RD
HOLLY DR
LOIS DR
AVALON DR
BROKEN TEE DR
MAKENA LN
HUTSON RD
ARROWHEAD DR
BROOKSIDE DR
BONNEVILLE DR
MULTNOMAH RD
CANNON DR
DEWAL DR
FORDEN DR
VISTA DR
WINDSWEPT PL
WASCO
JAYMAR RD
HOPE AVE
INDUSTRIAL LP
LINCOLN ST
COLUMBIA ST
CASCADE AVE
OAK ST
STATE ST
SHERMAN AVE
SERPENTINE RD
MONTELLO AVE
PROSPECT AVE
PORTWAY AVE
RIVERSIDE DR
INDUSTRIAL ST
E PORT MARINA DR
DOCK RD
RAILROAD ST
E STATE ST
RIVERVIEW DR
HOOD RIVER BRIDGE
UNION ST
WILSON ST
HULL ST
PINE ST
BETTY LOU AVE
PACIFIC AVE
SIEVERKROPP DR
KROPP CT
ELIOT DR
EBY RD
COLLEGE WAY
STERLING PL
RACHEL WY
Indian Creek Trail
DKS Associates, Inc. and Alta Planning & Design, mapping 2010 Real Urban Geographics www.realurban.com

TABLE 16: Proposed Motor Vehicle System Projects – Preferred Plan

Project ID	Location	Description	Planning Level Cost
MV1*	I-84 Exit 62 Interchange	<u>I-84 Westbound Ramps/Terminal</u> • Construct traffic signal • Construct northbound left turn lane (full length of bridge) • Construct second southbound through lane • Construct westbound left turn lane • Construct shared westbound through/left turn lane • Construct westbound right turn lane <u>I-84 Eastbound Ramps/Terminal</u> • Construct traffic signal • Construct northbound right turn lane (drop lane from Cascade Ave.) • Construct second southbound through lane • Construct southbound left turn lane • Construct eastbound right turn lane	$20,800,000
MV2*	Cascade Ave (HCRH): I-84 Exit 62 Interchange to Rand Rd.	• Construct second eastbound lane from I-84 eastbound ramp terminal to Mt. Adams Ave. (ends as right turn lane) • Construct second westbound lane from Mt. Adams Ave. to I-84 eastbound ramp terminal (ends as right turn lane) • Widen Cascade Ave. between Mt. Adams Ave. and Rand Rd. to include one travel lane in each direction and a center turn lane *(Traffic signal on Cascade Ave. at Mt. Adams Ave. listed as separate project – MV11)*	$2,700,000

Project ID	Location	Description	Planning Level Cost
MV3*	Country Club Rd. Realignment/ Mt. Adams Ave.	• Realign Country Club Road to intersect with Mt. Adams Ave., disconnecting the existing intersection on Cascade Ave. with Country Club Rd. to motor vehicle traffic • Construct Mt. Adams Ave. from Cascade Ave. to realigned Country Club Rd. Cascade Ave. at Mt. Adams Ave. • Construct two northbound left turn lanes on inside, full length to Country Club Rd. on outside) • Construct northbound right turn lane • Install yield control for eastbound right turn lane (constructed as part of MV2) *(Traffic signal on Cascade Ave. at Mt. Adams Ave. listed as separate project – MV11)* Mt. Adams Ave. at Country Club Rd. • When Mt. Adams Ave. is extended to the south (MV4), construct northbound left turn lane • When Mt. Adams Ave. is extended to the south (MV4), construct northbound shared through/right turn lane • Construct channelized southbound right turn lane under yield control (drop lane from Mt. Adams Ave.) • Construct southbound through lane • Construct southbound left turn lane serving property access on east approach • Construct eastbound left turn lane • Construct eastbound shared through/right turn lane • Construct east approach for property access, including a westbound left turn lane, and a shared westbound through/right turn lane *(Traffic signal on Mt. Adams Ave. at Country Club Rd. listed as separate project – MV12)*	$3,700,000
MV4	Mt. Adams Ave.: Country Club Rd. to Fairview Dr.	• Construct Mt. Adams Ave. as a 3-lane minor arterial from Country Club Rd. to Fairview Dr. along the existing 30th St. alignment and the south/west edge of the urban growth boundary (UGB). This project would be an extension of the Mt. Adams Ave. segment constructed under MV3. • Construct a traffic signal at the intersection of Mt. Adams Avenue/ May Street, two-way-stop-control at Mt. Adams Avenue/Fairview Drive, and a roundabout at Hutson Road/ Belmont Drive.	$11,940,000
MV5	Sherman Ave.: Rand Rd. to Mt. Adams Ave.	• Extend Sherman Ave. from Rand Rd. to Mt. Adams Ave. (middle segment of this extension exists)	$2,145,000
MV6	Rand Rd.: May St. to Belmont Ave.	• Extend Rand Rd./27th St. from the current stub south of May St. to Belmont Ave.	$3,220,000

Project ID	Location	Description	Planning Level Cost
MV7	Belmont Ave.: Rand Rd. to Frankton Rd.	• Extend Belmont Ave. to Frankton Rd., opposite Post Canyon Dr. The alignment of Belmont Ave. would fall within the southern UGB.	$8,605,000
MV8**	I-84 Exit 63 Interchange	I-84 Westbound Ramps/Terminal • Widen westbound off-ramp approach to include a right turn lane, shared through/left lane, and a left turn lane I-84 Eastbound Ramps/Terminal • Lengthen the I-84 Exit 63 off-ramp • Modify the eastbound approach to include a shared through/left turn lane and right turn lane 2nd Street • Widen the 2nd St. overcrossings of I-84 and the Union Pacific Railroad to add a second southbound through lane. Widening is recommended to occur on the east side to fit available right of way and provide an opportunity to correct the existing sight distance problem for pedestrians on the southeast corner of the 2nd St./ I-84 eastbound intersection. • Remove parking on 2nd St. between Cascade Ave. and Oak St. and restripe the roadway to provide a second southbound through lane, dropping as a right turn lane at Oak St.	$8,000,000
MV9**	I-84 Exit 63 westbound off-ramp queue management	• Install queue detection devices on the I-84 Exit 63 westbound off-ramp, communications with ODOT's Traffic Management Operations Center, and surveillance cameras for viewing the off-ramp. This will allow for operators to post warning messages on the variable message sign on I-84 westbound entering Hood River when deemed warranted by conditions on the Exit 63 westbound off-ramp. *(This project is intended to be an interim improvement if recurring congestion and unsafe ramp queues become a problem before the improvements from project MV8 can be funded and constructed.)*	$230,000
MV10*	Cascade Ave. (HCRH) / Westcliff Dr.	• Construct traffic signal • Construct eastbound right turn lane	$950,000
MV11*	Mt. Adams Ave./ Cascade Ave.(HCRH)	• Construct traffic signal *(Assumes complimentary road improvements constructed as part of MV2 and MV3)*	$350,000
MV12*	Mt. Adams Ave./Country Club Rd.	• Construct traffic signal *(Assumes complimentary road improvements constructed as part of MV3 and MV4)*	$350,000

Project ID	Location	Description	Planning Level Cost
MV13*	Rand Rd./ Cascade Ave. (HCRH)	• Construct traffic signal • Modify northbound approach to include a left turn lane and a shared through/right turn lane • Modify southbound approach to include a left turn lane and a shared through/right turn lane • Construct eastbound right turn lane	$1,000,000
MV14**	2nd St./ Riverside Dr.	• Restrict turning movements to allow only right-in and right-out turning movements on the Riverside Dr. approaches, in addition to allowing southbound lefts from 2nd Street to Riverside Dr. • Remove stop control from 2nd Street approaches	$310,000
MV15**	2nd St./ Portway Ave.	• All-way stop control (as needed based on implementation of turn restrictions at 2nd St./ Riverside Dr.)	$3,000
MV16**	OR 35/ State St.	• Construct traffic signal • Construct northbound left turn lane • Construct northbound shared through/right turn lane • Construct southbound left turn lane • Construct southbound through lane • Construct southbound right turn lane • Construct westbound left turn lane • Construct westbound shared through/right turn lane • Construct eastbound left turn lane • Construct eastbound through lane • Construct eastbound right turn lane separated from intersection (as existing)	$1,100,000
MV17	May St./ 13th St. (OR 281)	• Construct traffic signal • Construct eastbound right turn lane	$775,000
MV18	May St./17th St.	• Reconfigure the stop sign placement so that all southbound movements on 18th St. must stop, while May St. would not be required to stop	$3,000
MV19	May St./ 22nd St.	• Convert the intersection to two-way stop control by removing the stop signs on the May St. approaches	$3,000
MV20	Cascade Ave. (HCRH) / 20th St.	• Construct a traffic signal	$350,000
MV21	Belmont Ave./ 13th St. (OR 281)	• Construct a traffic signal	$350,000
MV22**	2nd St./ Cascade Ave. (HCRH)	• Restrict turning movements to allow only right-in and right-out turning movements on the Cascade Ave. approaches. *(Improvements at this intersection may be subject to further consideration as part of a Downtown Refinement Area.)*	$5,000
MV23**	2nd St./ Oak St.(HCRH)	• Construct traffic signal *(Improvements at this intersection may be subject to further consideration as part of a Downtown Refinement Area.)*	$350,000

Project ID	Location	Description	Planning Level Cost
MV24	2nd St./State St.	• Construct a traffic signal with protective/permissive phasing for the eastbound approach. A southbound right turn overlap phase would run concurrently with the protected eastbound movement. *(Improvements at this intersection may be subject to further consideration as part of a Downtown Refinement Area.)*	$350,000
MV25	Belmont Ave./ 12th St (OR 281)	• Add signs limiting the westbound approach to right out movements only	$5,000
		Total Cost	**$67,594,000**

* Included in Draft Hood River I-84 Exit 62 Interchange Area Management Plan
** Included in Draft Hood River I-84 Exit 63 & Exit 64 Interchange Area Management Plan

A. Interchange Areas

The following project descriptions are excerpts from the Exit 62 Interchange Area Management Plan and the Exits 63 & 64 Interchange Area Management Plan (currently both in draft form).

Exit 62 Interchange Area

MV1 I-84 Exit 62 Interchange

The I-84 Exit 62 interchange is a key regional and local gateway, providing access to high growth areas in the western and southern areas of the city. Significant modernization of this interchange will be needed to maintain adequate levels of safety and mobility through the year 2031. Improvements needed include signalization of both ramp terminals and widening and lengthening of the eastbound and westbound off-ramps. To accommodate the turn lane requirements at these intersections, the I-84 overcrossing structure would need to be replaced with a wider five-lane bridge, plus bike lanes and sidewalks.

MV2 Cascade Avenue (HCRH): I-84 Exit 62 Interchange to Rand Road

With Country Club Road realigned to intersect with Mt. Adams Avenue (MV3), there will be increased traffic demand on the segment of Cascade Avenue (HCRH) between I-84 and the new intersection with Mt. Adams Avenue. To adequately accommodate this demand, Cascade Avenue will need to be widened to include two travel lanes in each direction within the segment, with the added lanes dropping as right turn lanes to Mt. Adams Avenue and the I-84 eastbound on-ramp. Prior to construction of the four-lane cross-section, the HCRH Advisory Committee requests that the City of Hood River demonstrate the need for an additional westbound lane based on current traffic projections and present these findings to the HCRH Advisory Committee.

Once east of Mt. Adams Avenue, the cross-section of Cascade Avenue (HCRH) can return to only one travel lane in each direction with a center turn lane, as planned in the current City of Hood River TSP and consistent with the Historic Columbia River Highway programmatic agreement.

MV3 Country Club Road Realignment / Mt. Adams Avenue

The realignment of Country Club Road from Cascade Avenue (HCRH) to a future Mt. Adams Avenue extension is a critical improvement for the I-84 Exit 62 interchange area. This project significantly improves intersection spacing in the vicinity of the I-84 interchange ramp terminals, which allows all other elements of the transportation system to function adequately.

While sidewalk should be provided on both sides of Country Club Road in the realigned section, topography may make this infeasible. At a minimum, sidewalk should be constructed along the north side of this section, which is adjacent to existing and future development. In addition, bicycle and pedestrian access to Cascade Avenue (HCRH) should remain from the closed intersection with Country Club Road.

MV10 Cascade Avenue (HCRH) / Westcliff Drive

When the I-84 Exit 62 interchange westbound ramp terminal is signalized in the future, the current stop/yield control configuration of this intersection will no longer be appropriate. Therefore, it is proposed to be signalized in combination with the I-84 westbound ramp terminal. This represents the long-range improvement and the timing of implementation is uncertain. Prior to gaining ODOT approval for signalization, an engineering investigation must be completed and it must be demonstrated that signal warrants are met.

Even with signalized control, this intersection is shown to operate at a LOS D, which does not comply with city mobility standards. Signal timing changes could achieve a LOS C, which would meet city standards, but such changes would cause operations at the I-84 westbound ramp terminal to fall out of compliance with ODOT design standards. Therefore, either an exception from ODOT’s design standards will be required or the city will need to amend its mobility standards to allow for LOS D operation at this location.

MV11 Mt. Adams Avenue / Cascade Avenue (HCRH)

This intersection would require a traffic signal to serve the traffic demand between Mt. Adams and the realigned Country Club Road and Cascade Avenue (HCRH). In addition to the traffic signal, a key element of the intersection improvements includes the construction of a separate eastbound right turn lane that is channelized and operates with yield control. The use of yield control maximizes the capacity of this movement, but as an alternative, it could also function adequately if signalized with right turn overlap phasing (i.e., eastbound right turn would have a green light at the same time as the northbound left turn).

MV12 Mt. Adams Avenue / Country Club Road

The proposed realignment of Country Club Road will create a new intersection with the future Mt. Adams Avenue extension. A key element of this improvement is the channelized southbound right turn lane that operates under yield control. The use of yield control was implemented to maximize capacity for the high demand movement and was critical for avoiding queue spillback into Cascade Avenue (HCRH).

MV13 Rand Road / Cascade Avenue (HCRH)

Key elements of the proposed improvements include the construction of a traffic signal and a separate eastbound right turn lane to serve high volumes of traffic destined to the south. Additionally, modification of the north and south approaches to include separate left turn lanes would allow for greater flexibility in signal phasing. However, the modifications to the north and south approaches may require some road realignment to ensure the opposing through lanes are appropriately aligned.

Exit 63 Interchange Area

MV8 I-84 Exit 63 Interchange

While the ramp terminal intersections will have sufficient capacity to serve future demand, there will be a nearby bottleneck at the intersection on 2nd Street with Oak Street (HCRH). Even under signal control, queues from Oak Street (HCRH) are projected to spill back toward the interchange, affecting queue lengths on the off-ramps. Therefore, improvements recommended for this interchange are primarily targeted at queue management and safety on the freeway off-ramps.

Key elements of this project include lengthening of the I-84 eastbound off-ramp and widening the I-84 westbound off-ramp to safely store longer vehicle queues. In addition, a second southbound lane on 2nd Street will be needed from the I-84 westbound ramps to Oak Street (HCRH). This would be constructed by widening the existing bridges over I-84 and the Union Pacific Railroad and by restriping the segment of 2nd Street from Cascade Avenue(HCRH) to Oak Street (HCRH), which requires parking removal.

MV9 I-84 Exit 63 westbound off-ramp queue management

If recurring congestion and unsafe ramp queues become a problem before the improvements described in MV8 can be funded and constructed, this interim solution includes installing queue detection devices on the I-84 Exit 63 westbound off-ramp, communications with ODOT's Traffic Management Operations Center, and surveillance cameras for viewing the off-ramp. This will allow for operators to post warning messages on the variable message sign on I-84 westbound entering Hood River when deemed warranted by conditions on the Exit 63 westbound off-ramp.

MV14 2nd Street / Riverside Drive

The recommended turning restrictions will need to be applied at such time as mobility standards can no longer be met at this intersection or when northbound vehicle queues are found to regularly spill back into the I-84 westbound ramp terminal. Supplemental local street enhancements east of 2nd Street are being considered to restore connectivity with the turning restrictions in place.

MV15 2nd Street / Portway Avenue

When turning restrictions are implemented at the intersection on 2nd Street at Riverside Drive (MV15), the intersection of 2nd Street at Portway Avenue may require all-way stop control to better accommodate the change in traffic flow resulting from diverted vehicles.

MV22 2nd Street / Cascade Avenue(HCRH)

Restricting turning movements to allow only right-in and right-out turns to and from the Cascade Avenue (HCRH) approaches will eliminate key conflicts at this intersection, including the eastbound left turn from Cascade Avenue (HCRH), which experiences high delays under existing conditions.

MV23 2nd Street / Oak Street (HCRH)
Signalization will improve congested conditions, however, ODOT's mobility standards will still not be met. Increasing capacity further by adding turning lanes is not feasible without significant parking removal or property purchases to expand the right of way. The installation of a traffic signal will also improve pedestrian crossing safety.

ODOT's Highway Design Manual mobility standards are not met during the weekday p.m. peak hour by only a small margin (one hundredth of a volume to capacity ratio). However, because the mobility standards from the Oregon Highway Plan would be met, it may be possible to gain approval for a design exception from ODOT.

Through the Exit 63 & Exit 64 Interchange Area Management Plan project, it was also found that this intersection will fail to comply with mobility standards during the Sunday p.m. peak hour, which relates most directly to the design period used for ODOT facilities (i.e., the 30th highest hour of the year). During this time period, the intersection was found to operate at a volume to capacity ratio of 0.96, which is much higher than the mobility standards from the Oregon Highway Plan or the Highway Design Manual (0.90 and 0.80, respectively). Therefore, rather than seek a design exception or approval of an alternate mobility standard, consideration should be given to adopting a Special Transportation Area (STA) designation for the downtown area. With an STA designation in place, volume to capacity ratios as high as 0.95 would be allowed, which is very close to anticipated operations.

STAs are described in ODOT's 1999 Oregon Highway Plan and are intended to be applied to areas within urban growth boundaries where downtowns, central business districts, or community centers straddle a highway. The primary objective of managing highways in STAs is to provide access to community activities, businesses, and residences and to accommodate pedestrian movement along and across the highway. Within the City of Hood River's downtown district, the current land uses, development patterns, and transportation infrastructure are consistent with what would be expected in a STA – low travel speeds, pedestrian-oriented development, on-street parking, etc. Therefore, no changes would need to be made to the downtown to achieve the intended application of the STA designation. The benefit of adopting this designation would be the provision of more lenient ODOT highway design standards, mobility standards, and access spacing standards.

Exit 64 Interchange Area

MV16 OR 35 / State Street
The current project to reconstruct the I-84 Exit 64 interchange will address a majority of the motor vehicle needs in this area through the year 2031. However, the intersection of OR 35 at State Street will require additional improvements including a traffic signal and additional turn lanes that would have right of way impacts. However, a traffic signal will allow different timing plans to be implemented in response to changing demands during seasonal and event peak traffic times. The type of traffic control used for the eastbound right turn from State Street to OR 35 (e.g., signalized, yield, free movement) was assumed to be a free right turn movement into the

existing second southbound lane on OR 35. However, should conflicts with bicycles and pedestrians become a concern, this movement could be signalized as well.

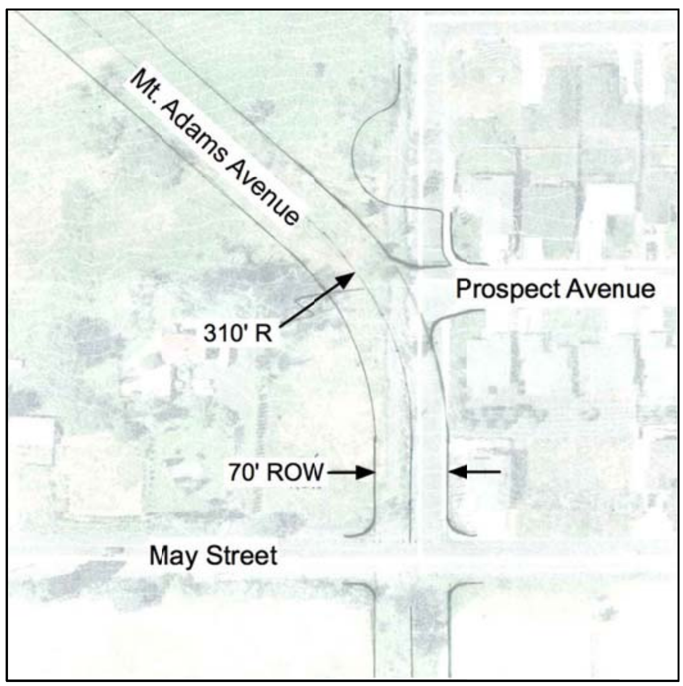
B. System Circulation

The following improvements were developed to address the overall traffic circulation needs of Hood River by improving connectivity along alternative routes and improving side street access to major facilities (OR 281 and Cascade Avenue -HCRH). These improvements are critical elements of the overall transportation system in the city, providing connectivity to support future growth areas, reducing trip lengths, and balancing travel demands to avoid overbuilding existing roadways.

MV 4 Mt. Adams Avenue Extension

Through the Exit 62 Interchange Area Management Plan, Country Club Road is to be realigned so the existing intersection on Cascade Avenue (HCRH) can be removed and replaced with a new intersection approximately 800 feet further to the east. This new intersection would be with a new north-south roadway called Mt Adams Avenue. Country Club Road would be realigned to intersect with Mt. Adams Avenue, approximately 450 feet south of Cascade Avenue (HCRH).

Mt. Adams Avenue would be extended from Country Club Road to Fairview Drive at the intersection with Belmont Drive as a 35 mile per hour minor arterial facility, providing an additional north-south connection through the city. The alignment would intersect May Street at 30th Street, use the existing 30th Street alignment, and continue south following the west edge of the UGB (Exhibit 3). An alternative alignment could be along Rocky Road (which may involve land in the National Scenic Area), rather than 30th Street. Assumed traffic control at key intersections along the corridor includes a traffic signal at Mt. Adams Avenue/May Street, two-way stop control at Mt. Adams Avenue/Fairview Drive, and a roundabout at Hutson Road/Belmont Drive.



The Mt. Adams Avenue extension would provide needed connectivity in the west side of the city where a significant amount of future growth is anticipated. Because of a lack of connectivity under existing conditions, this extension would divert a significant amount of traffic away from other routes such as Country Club Road, Frankton Road, Cascade Avenue (HCRH), Rand Road, and

13th Street. By better balancing the use of the city's overall roadway network, reductions in congestion and vehicle-miles traveled may occur over a large area.

Because of the reduced reliance on Cascade Avenue (HCRH), the Mt. Adams Avenue extension would be a key contributor to the ability to keep Cascade Avenue (HCRH) no wider than the existing three lanes. With the reduced reliance on Country Club Road and Frankton Road, improvements previously found to be needed at the intersections on Frankton Road with Country Club Road and May Street would no longer be necessary.

A potential first phase of this improvement could be extending Mt. Adams Avenue from Country Club Road to only May Street. Less overall traffic would shift from other facilities (compared to the full extension) and benefits would generally be limited to the area north of May Street, however, it would still represent a substantial improvement to the overall transportation system.

MV5 Sherman Road Extension

Extending Sherman Road west to Mt. Adams Avenue would provide additional east-west connectivity between Cascade Avenue (HCRH) and May Street. While this concept would improve connectivity, the influence of the capacity benefits would be localized and would primarily provide relief to May Street, and would not attract a significant amount of traffic from Cascade Avenue (HCRH). Extending Sherman Road west of Mt. Adams Avenue to Frankton Road would have a minimal amount of additional benefit and may be difficult and expensive to construct given the topography. Therefore, the extension is recommended to end at Mt. Adams Avenue.

Extending Mt. Adams Avenue between Cascade Avenue (HCRH) and May Street is a critical complimentary project for realizing any benefit from the Sherman Road extension.

MV6 Rand Road Extension

Extending Rand Road from May Street to Belmont Avenue as a collector facility would improve the north-south connectivity in the west side of the city. Traffic signals are assumed to be needed at the intersections of Rand Road/May Street and Rand Road/Cascade Avenue (HCRH), while two-way stop control is assumed at the intersection of Rand Road/Belmont Avenue. While this extension would improve overall connectivity, the benefits would be localized and would primarily provide relief to 22nd Street.

MV7 Extend Belmont Avenue to Post Canyon Drive

Extending Belmont Avenue to Post Canyon Drive would improve connectivity in the western portion of the urban growth area and provide an alternative east-west route to Cascade Avenue (HCRH) and May Street. While the extension would improve connectivity and has the potential to reduce vehicle-miles traveled, traffic shifts would be primarily localized and benefit May Street, improving the operations of intersections along the corridor. However, such benefits are important, since the lack of right of way and the adjacent development along May Street make the facility difficult to widen for turn lanes. Therefore, the Belmont Drive extension would facilitate future traffic growth as the southwest portion of Hood River continues to develop and May Street reaches capacity.

The design of Belmont Avenue should be a minor arterial to enhance the 1-mile arterial grid spacing in Hood River. Right of way needs to be preserved for the future expansion as the UGB is likely to expand to the west and south as the city grows. The facility would be constructed as a minor arterial along the new segments with the old segments modernized as needed (considering the existing constraints). This extension may also involve land in the National Scenic Area.

C. Downtown Circulation

While improvements to the intersections along 2nd Street at Cascade Avenue (HCRH), Oak Street (HCRH), and State Street have been proposed, their impacts on overall downtown circulation may require further investigation. Improvements within this corridor must provide for safe and efficient operation of the adjacent I-84 Exit 63 interchange, but must also be compatible with the function of the downtown beyond 2nd Street. Within the downtown, there are a number of important issues that must be considered, such as the preservation of parking, provision of a safe and convenient walking environment, truck access to the industrial area north of Columbia Street, and reasonable motor vehicle circulation and access to businesses.

Some of the issues have recently been explored at a preliminary level through the consideration of four alternatives for treating failing levels of service at the intersections on 2nd Street at Cascade Avenue (HCRH) and Oak Street (HCRH), including an evaluation of the impacts to intersection operations, truck accessibility, and circulation on surrounding local streets. All alternatives assume that a traffic signal is included at the 2nd Street intersection at Oak Street (HCRH). The unique elements of each alternative include:

- Alternative 1: No-Build Scenario – the intersection on 2nd Street at Cascade Avenue (HCRH) remains in its current configuration
- Alternative 2: Restrict movements to/from Cascade Avenue (HCRH) to right-in/right-out only at 2nd Street (currently proposed improvement)
- Alternative 3: Cascade Avenue (HCRH) becomes a one-way westbound facility between 2nd Street and 3rd Street
- Alternative 4: An additional traffic signal on 2nd Street at Cascade Avenue (HCRH)

Further discussion and analysis of these and any other alternatives will be required to fully understand how they impact both the interchange and downtown. The City of Hood River is in favor of Alternative 4, however, it is recommended that the downtown area be designated as a Refinement Area in the TSP until these issues can be adequately addressed. If this approach is taken, the currently proposed improvements along 2nd Street at Cascade Avenue (HCRH), Oak Street (HCRH), and State Street would not be included in the TSP at this time. Instead, the solution set that is selected for this area after further study and discussion between the city and ODOT would be included in the TSP through a later amendment.

In the meantime, public input on these any other alternatives to address 2nd Street safety and operations within the downtown is being sought through this TSP update process.

D. Targeted Intersection Improvements

Several improvements to key intersections in the city were still required to meet mobility standards following the application of system-level enhancements (i.e., street extensions and new roads).

MV17 May Street / 13th Street (OR 281)

Adding a traffic signal at the intersection of May Street/13th Street (OR 281) is primarily intended to improve side street movements (i.e., May Street), improving overall east-west connectivity in the area. Several benefits would result from the addition of a traffic signal at this location. First, intersection delay would be significantly reduced for the May Street approaches. Additionally, improving accessibility at this location helps balance the use of the local transportation system by making travel along May Street more attractive. In addition to the benefits for motor vehicles, a traffic signal at May Street would provide a protected crossing for pedestrians. However, mobility standards would not be achieved without additional improvements beyond a traffic signal.

In addition to the traffic signal, the eastbound and westbound approaches would require additional capacity to meet City of Hood River and ODOT mobility standards. The construction of a westbound left turn lane would enhance capacity, but is likely not feasible given the limited right of way and proximity to existing development. Constructing an eastbound right turn lane would have fewer overall impacts but would require some right of way from the adjacent park (and parking) on the south side of May Street. The addition of the eastbound right turn lane and the traffic signal would allow the intersection to meet the city of Hood River mobility standards, however the v/c ratio of 0.85 would still exceed the ODOT standard for this location.

In order to meet mobility standards at this intersection, either a second southbound through lane or left turn lanes on May Street would be needed – both improvements would have significant right of way impacts and costs.

MV18 May Street / 17th Street

As described in the pedestrian projects, the extension of the northwest curb would remove the southbound right turn lane and would reduce the distance for pedestrians crossing 17th Street. In addition, reconfiguring the intersection stop sign configuration to stop traffic on 17th Street and allow traffic on May Street to proceed without stopping would improve the mobility along the May Street corridor.

MV19 May Street / 22nd Street

May Street is an important route for east-west travel in the city. Removing the stops signs on May Street reduces delay for east-west travel and will attract some trips from Cascade Avenue (HCRH), helping to keep it at its current width. However, this will come at the expense of higher side street delays on 22nd Street.

The extensions of Rand Road south to Belmont Avenue (MV6) and Belmont Avenue west to Frankton Road (MV7) provide alternative routes in the area and will reduce some of the delay experienced on the 22nd Street approaches. However, even with this improvement, the intersection will operate at a level of service D, which does not meet city mobility standards (level of service C is required). Two proposed alternatives to mitigate this include: 1) widen May Street to add a center left turn lane or 2) amend the city mobility standards to allow for a level of service D.

The addition of a center left turn lane on May Street would be a significant enhancement for safety and operations through the corridor, but would require at least 60 feet of right of way to construct. The right of way through this area currently varies between 50 and 60 feet. Therefore, this project would require right of way acquisition from multiple properties.

Changing the city mobility standard to allow for a level of service D rather than C would result in a relatively small increase in delay allowed at intersections throughout the city – approximately 10 seconds on average at stop signs and approximately 20 seconds on average at signals. In comparison, most cities in Oregon use level of service D as their mobility standard. As an alternative to increasing the allowed delay citywide, consideration could be given to only changing the mobility standard at selected locations or areas of the city.

MV20 Cascade Avenue (HCRH) / 20th Street

The intersection on Cascade Avenue (HCRH) at 20th Street was identified as a location that would not meet mobility standards in the future and is difficult for pedestrians to cross. Adding a traffic signal would allow for compliance with mobility standards and would provide for controlled pedestrian crossings. However, due to low side street traffic volumes, it may be difficult to meet required warrants for signalization and approval for such action may be difficult to obtain from ODOT in the near term. Therefore, and interim pedestrian crossing treatment could be considered for immediate installation to improve access to the Rotary Skate Park to the north. Additional lane channelization on the minor street (20th Street) approaches would not sufficiently improve the capacity to meet mobility standards without the addition of a traffic signal.

MV21 Belmont Avenue / 13th Street (OR 281)

The intersection of Belmont Avenue/13th Street (OR 281) was identified as a location that would not meet mobility standards in the future. In addition, this intersection is located along a state highway route (OR 281), has been noted as having poor sight distance, and has been identified as a location that is difficult for pedestrians to cross. Adding a traffic signal would reduce intersection delay for the Belmont Avenue approaches and allow the intersection to meet mobility standards. Additional lane channelization for the westbound approach would not sufficiently improve the capacity to meet mobility standards and would not improve pedestrian crossing safety without the addition of a traffic signal.

MV24 2nd Street / State Street

While a traffic signal is currently proposed as mitigation for this intersection, the appropriate improvement will depend on what solutions are ultimately implemented at the nearby intersections on 2nd Street at Cascade Avenue (HCRH) and Oak Street (HCRH). Therefore, the intersection of 2nd Street at State Street should be included as part of the Downtown Refinement

Area, with the solution selected after further consideration of its impacts on the downtown and compatibility with other improvements to 2nd Street.

MV25 Belmont Avenue-Union Street / 12th Street (OR 281)
This intersection will continue to have high side-street delay for the Belmont Avenue approaches in the future. However, the volumes are not projected to be sufficient to meet traffic signal warrants. Most traffic on Belmont Avenue is turning left onto 12th Street (OR 281), which has one-way northbound travel. Vehicles will be able to wait for available gaps in the traffic stream before turning left, similar to a right turn at a traffic signal during a red indication. Unlike the intersection of 13th Street (OR 281)/ Belmont Avenue, the major side-street traffic is not crossing the major traffic stream, and sight distance issues are not as prominent. Restricting westbound movements from Union Street to right turns onto 12th Street would (OR 281) allow the intersection to meet ODOT mobility standards and would reduce vehicle conflicts with the eastbound left turn traffic. Vehicles traveling west on Belmont Avenue from Union Street would turn right to travel north on block on 12th Street (OR 281), turn left on A Street, left on 13th Street, and then right on Belmont Avenue to continue heading west.

Intersection Operations (Preferred Plan Improvements)

The study intersection operations were analyzed with the addition of the Preferred Plan projects, with the results shown in Table 17 alongside of the results under the No Build scenario. Most study intersections would meet both the city of Hood River and ODOT mobility standard (as applicable) with the addition of the various improvements. However, there are still a few intersections that fail to meet either the city's or ODOT's mobility standards even with the Preferred Plan projects in place.

The intersections on May Street at Rand Road and at 22nd Street will both operate at a level of service D on the stopped side street approaches. As noted previously, this could be mitigated by constructing a center turn lane on May Street at these intersections. However, this would require at least 60 feet of right of way, which is not available at all locations. Therefore, a significant amount of right of way acquisition would be required to implement this option. As an alternative, the city could change the mobility standard to allow for a level of service D.

The intersection on Cascade Avenue (HCRH) at the I-84 Exit 62 westbound ramps operates at a level of service D, failing to meet city mobility standards. Again, one alternative for addressing this could be to amend the city mobility standards to allow for level of service D operation. A slight adjustment in the assumed signal timing could achieve level of service C operation, but would also cause the intersection to fall out of compliance with ODOT mobility standards (from the Highway Design Manual). Therefore, if this alternative were pursued, an approval for an exception from ODOT's design standards must be obtained.

The poor operations at the intersection on 13th Street (OR 281) at State Street under No Build conditions were largely mitigated through improvements to the surrounding street network that diverted some of the traffic demand at this location. However, it is still anticipated to operate at a level of service D, which would not comply with city mobility standards. Signalization is not a viable option because of the poor spacing with the nearby signalized intersection on 13th Street at Oak Street (HCRH). Therefore, the recommended alternative is to amend the city's mobility standard to allow for a level of service D.

The proposed traffic signal and eastbound right turn lane at 13th Street (OR 281) and May Street allow this intersection to meet city mobility standards, but not ODOT's. Meeting ODOT's mobility standards would require substantial capacity improvements such as the construction of left turn lanes on the May Street approaches or a second southbound through lane on 13th Street (OR 281). However, these projects would all require right of way acquisition and would come at a significant cost because roadway widening and alignment corrections would be required well beyond what exists today. As an alternative, an exception to ODOT's design standards could be sought. It should be noted that while this intersection would not comply with ODOT's mobility standards for build conditions from the Highway Design Manual, it would continue to comply with ODOT's mobility standards from the Oregon Highway Plan, which are applied to development proposals.

Mitigation for the intersection on 12th Street (OR 281) at Belmont Avenue has been proposed to allow this location to comply with ODOT mobility standards. However, the side streets will operate at a level of service F and will not comply with city mobility standards. Enhancements to the surrounding street system were made to divert traffic away from this area, including reinstating the eastbound left turn movement at 13th Street (OR 281) / May Street, but these improvements had little influence on traffic demands at this location. Furthermore, it is unlikely that approval for a traffic signal could be obtained from ODOT because the side street demands are too low. Therefore, without substantial reconstruction of the south end of the 13th Street (OR 281)/12th Street couplet, there may be little else that can be done to improve operations here.

The intersection on 2nd Street at the I-84 Exit 63 eastbound ramp terminal will meet the city's mobility standards, but not ODOT's. Compliance with ODOT standards will be addressed through the I-84 Exit 63 & Exit 64 Interchange Area Management Plan, which may include seeking approval for a design exception.

The intersection on 2nd Street at Oak Street (HCRH) will meet the city's mobility standards, but just misses complying with ODOT's mobility standards. Since the treatment of this intersection may be subject to further refinement as part of a broader look at downtown circulation needs, this issue will be addressed at that time.

Table 17: Weekday 2031 PM Peak Hour Intersection Operations

Intersection (North-South / East-West)	Mobility Standard **	2031 "No Build"			2031 TSP Preferred Plan Improvements		
		Delay	*LOS*	*V/C*	*Delay*	*LOS*	*V/C*
City of Hood River intersections							
Frankton Rd. / Country Club Rd.	C	27.8	**A/D**	0.78	12.6	A/B	0.34
Frankton Rd. / May St.	C	35.7	**A/E**	0.70	14.6	A/B	0.36
Rand Rd. / May St.	C	21.4	A/C	0.53	34.7	**A/D**	0.61
22nd St. / May St.*	C	16.4	C	0.64	33.2	**A/D**	0.54
18th St. / May St.	C	14.4	A/B	0.39	20.3	A/C	0.55
Indian Creek Rd. / Brookside Dr.	C	14.7	A/B	0.44	16.7	A/C	0.57
2nd St. / Portway Ave.	C	12.5	A/B	0.31	14.0	B	0.59
2nd St. / State St.	C	>200	**B/F**	1.68		TBD	
12th St. (North Leg) / May St.	C	30.4	**A/D**	0.63	19.4	A/C	0.37
ODOT intersections							
Cascade Ave. (HCRH) / Westcliff Dr.	0.80	*15.8*	A/C	0.22	29.9	C	0.36
Cascade Ave. (HCRH) / I-84 WB Ramps	0.65	>200	**A/F**	**4.53**	39.0	**D**	0.65
Cascade Ave. (HCRH) / I-84 EB Ramps	0.65	129.9	**A/F**	**1.11**	14.9	B	0.50
Cascade Ave. (HCRH) / Country Club Rd.	0.80	>200	**D/F**	**>5**	*NA*	*NA*	*NA*
Cascade Ave. (HCRH) / Rand Rd.	0.80	>200	**B/F**	**NA**	22.6	C	0.79
20th St. / Cascade Ave. (HCRH)	0.80	>200	**B/F**	**NA**	9.9	A	0.64
13th St. (OR 281) / Oak St.	0.80	61.5	**E**	**1.01**	28.0	C	0.74
13th St. (OR 281) / State St.	0.80	>200	**A/F**	**2.39**	32.7	**A/D**	0.30
13th St. (OR 281) / May St.	0.80	28.4	**A/D**	**1.02**	18.9	B	**0.85**
12th St. (South Leg) (OR 281) / May St.	0.80	8.9	A	0.68	8.6	A	0.66
13th St. (OR 281) / Belmont Ave.	0.80	>200	**A/F**	**2.43**	10.5	B	0.67
12th St. (OR 281) / Belmont Ave.	0.80	85.2	**A/F**	0.83	67.7	**A/F**	0.80
12th St. (OR 281) / Brookside Dr.	0.80	10.2	B	0.67	9.4	A	0.62
2nd St. / Riverside Dr.*	0.80	26.1	**D**	**0.94**	15.7	C	0.26
2nd St. / I-84 WB On/Off Ramps	0.65	19.7	B	0.74	15.2	B	0.60
2nd St. / I-84 EB On/Off Ramps	0.65	35.2	**D**	**0.93**	15.4	B	**0.75**
2nd St. / Cascade Ave.	0.80	25.3	**A/D**	0.57	15.1	C	0.28
2nd St. / Oak St.	0.80	29.4	C	**0.98**	17.2	B	**0.81**
Button Bridge Rd. / Marina Wy.	0.80	10.7	B	0.57	11.6	B	0.58
Button Bridge Rd. / I-84 WB Ramps	0.65	7.9	A	0.46	8.4	A	0.49
Button Bridge Rd. / I-84 EB Ramps	0.65	12.5	B	0.46	17.0	B	0.59
Button Bridge Rd. / Historic Columbia River Hwy.*	0.70	30.1	**D**	**0.96**	18.7	B	0.66

Signalized & All Way Stop Intersection:
Delay = Average Intersection Delay (sec.)
LOS = Level of Service
V/C = Volume to Capacity Ratio
Shaded values do not meet standards

Unsignalized Intersection:
Delay = Critical Movement Approach Delay (sec.)
LOS = Major Street LOS / Minor Street LOS
V/C = Critical Movement Volume-to-Capacity Ratio
Shaded values do not meet standards

*all way stop control
** Highway Design Manual (HDM) mobility standards applied to ODOT facilities

Consistency with Hood River Transportation Goals

The proposed motor vehicle improvement projects were evaluated to determine consistency with the goals and policies previously developed to guide the Hood River TSP process. This evaluation is shown in Table 18, where each project was rated as being supportive, neutral, or contradictory relative to the established goals and policies. This exercise is not intended to rank projects or establish priorities, but to demonstrate that the city's transportation goals and policies are being supported by the proposed actions.

As shown, all improvements for motor vehicle facilities are generally supportive of Hood River's transportation goals. The extensions of roadways that enhance connectivity and projects that provide multimodal components (e.g., sidewalks and bicycle lanes) are the projects that best align with these goals since these projects are very effective at reducing congestion and trip lengths and building a balanced transportation system.

TABLE 18: Proposed Motor Vehicle Project Evaluation Matrix

Project	Location	**Hood River Goals** **GOAL 1:** A balanced transportation system.	**GOAL 2:** Transportation facilities designed, constructed, and maintained in a manner that enhances Hood River's livability.	**GOAL 3:** A safe transportation system.	**GOAL 4:** An efficient transportation system that reduces the number of trips made by single occupancy vehicles and limits congestion.	**GOAL 5:** Transportation facilities, which are accessible to all members of the community and reduce trip length.	**GOAL 6:** Transportation facilities, which provide efficient movement of goods.	**GOAL 7:** Implement the transportation plan by working cooperatively with federal, state, regional and local governments, private sector and residents, and by creating a stable, flexible financial system.	**GOAL 8**: Protect the function and operation of the interchanges, interstate highway and local street network consistent with the interchange functions and their relationship to the community and broader transportation system.	**GOAL 9**: Provide a sustainable transportation system that meets the needs of present and future generations.	**Total Goals Met**
MV1	I-84 Exit 62 Interchange	+1	+1	+1	+1	+1	+1	+1	+1	+1	**+9**
MV2	Cascade Ave (HCRH): I-84 Exit 62 Interchange to Rand Rd.	+1	+1	+1	+1	+1	+1	-	+1	+1	**+8**
MV3	Country Club Rd. Realignment/ Mt. Adams Ave.	+1	+1	+1	+1	-	+1	+1	+1	+1	**+8**
MV4	Mt. Adams Ave.: Country Club Rd. to Fairview Dr.	+1	+1	+1	+1	+1	+1	-	+1	+1	**+8**
MV5	Sherman Ave.: Rand Rd. to Mt. Adams Ave.	+1	+1	+1	+1	+1	-	-	-	+1	**+6**
MV6	Rand Rd.: May St. to Belmont Ave.	+1	+1	+1	+1	+1	-	-	-	+1	**+6**
MV7	Belmont Ave.: Rand Rd. to Frankton Rd.	+1	+1	+1	+1	+1	+1	-	-	+1	**+7**
MV8	I-84 Exit 63 Interchange	-	+1	+1	+1	-	+1	+1	+1	-	**+6**
MV9	I-84 Exit 63 westbound off-	-	-	+1	-	-	-	+1	+1	-	**+3**

	ramp queue management										
MV10	Cascade Ave.(HCRH) / Westcliff Dr.	+1	+1	+1	+1	+1	-	-	+1	+1	**+7**
MV11	Mt. Adams Ave./ Cascade Ave. (HCRH)	+1	+1	+1	+1	-	+1	+1	+1	+1	**+8**
MV12	Mt. Adams Ave./Country Club Rd.	+1	+1	+1	+1	-	+1	-	+1	+1	**+7**
MV13	Rand Rd./ Cascade Ave. (HCRH)	+1	+1	+1	+1	+1	-	-	+1	+1	**+7**
MV14	2nd St./ Portway Ave.	+1	-	+1	+1	-	-	-	+1	+1	**+5**
MV15	2nd St./ Riverside Dr.	-	-	+1	+1	-1	-	-	+1	+1	**+3**
MV16	OR 35/ State St.	+1	+1	+1	+1	+1	+1	+1	+1	+1	**+9**
MV17	May St./ 13th St.(OR 281)	+1	+1	+1	+1	+1	+1	-	-	+1	**+7**
MV18	May St./17th St.	-	+1	+1	+1	-	-	-	-	+1	**+4**
MV19	May St./ 22nd St.	-	+1	-	+1	-	-	-	-	+1	**+3**
MV20	Cascade Ave. (HCRH)/ 20th St.	+1	+1	+1	+1	+1	-	-	-	+1	**+6**
MV21	Belmont Ave./ 13th St.(OR 281)	+1	+1	+1	+1	+1	-	-	-	+1	**+6**
MV25	Belmont Ave/ 12th St.(OR 281)	-	+1	+1	+1	-1	-	-	-	+1	**+3**

Key: +1 = supportive of goal; - neutral relative to goal; -1 = contradictory to goal
Note: projects MV22-MV24 not included as further refinement is recommended.

FINANCIAL SUMMARY

Comparing the estimated costs associated with all desired transportation improvements (i.e., the Preferred Plan) to the city's forecasted revenue for transportation project implementation over the 20-year planning period allows for an assessment of the adequacy of current revenue streams. Ultimately, a subset of projects from the Preferred Plan that aligns with revenue that may be available through a reasonable funding strategy will be identified as the city's Strategic Plan for transportation improvements.

Revenue Forecast

Based on the revenues and costs identified in TSP Chapter 4 (Future Needs), an annual projected balance[5] of $166,500 is available to implement the projects outlined in the TSP Motor Vehicle, Bicycle and Pedestrians modal plans. Together with the existing balance, over 21 years, a total of

[5] Annual revenue of $750,500 minus annual expense of $584,000

approximately $3.7 million of city funds is forecast to be available for implementation of TSP projects.

Planning-Level Cost Estimates

Table 19 summarizes by mode the cost estimates developed for all transportation improvements. Because partnering agencies may share the costs of some projects, the projects on facilities under city jurisdiction have been identified separately to provide an indication of what the city's minimum funding need might be. The total cost of projects identified on city of Hood River facilities is approximately $50 million, which significantly exceeds the projected revenue amount of under $4 million.

While the city is not required to be able to fund all projects listed in the TSP, this difference in costs and revenue represents a substantial gap, indicating that there may be difficulty providing facilities to support new growth. Therefore, consideration should be given to reevaluating current revenue streams for transportation projects.

Table 19: Proposed Transportation Projects and Costs

	Planning-Level Cost of Preferred Plan	
Transportation Mode	**All Projects**	**City Facilities**
Pedestrian Improvements (Sidewalk Infill)	$9,150,000-$4,165,000	$8,705,000
Shared Pedestrian/Bicycle Improvements		
Point/Crossing Improvements	$370,000	$207,000
Off-Street Bicycle & Pedestrian Facilities	$7,340,000	$7,315,000
Programs (20 year total)	$1,800,000	$1,800,000
Bicycle Improvements	$3,685,000	$3,130,000
Motor Vehicle	$67,594,000	$32,114,000
Total Cost	**$89,939,000-$84,954,000**	**$53,271,000**

Appendix F: Future Preliminary Signal Warrant Analysis

Major Street:	12th Street
Minor Street:	Belmont Avenue
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	2
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	13600
Minor Approach Volume (ADT):	1300

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	12th Street	**Minor Street:**	Belmont Avenue
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)

X	100 percent of standard warrants
	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	13600	N
	Minor	1	2650	1300	
Case B	Major	2	15900	13600	N
	Minor	1	1350	1300	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	May Street
Minor Street:	12th Street
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	8650
Minor Approach Volume (ADT):	2200

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	May Street	**Minor Street:**	12th Street
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	8650	N
	Minor	1	2650	2200	
Case B	Major	1	13300	8650	N
	Minor	1	1350	2200	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	13th Street
Minor Street:	Belmont Avenue
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	2
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	15950
Minor Approach Volume (ADT):	3300

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	13th Street	**Minor Street:**	Belmont Avenue
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)

X	100 percent of standard warrants
	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	15950	Y
	Minor	1	2650	3300	
Case B	Major	2	15900	15950	Y
	Minor	1	1350	3300	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	13th Street
Minor Street:	May Street
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	10500
Minor Approach Volume (ADT):	2900

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	13th Street	**Minor Street:**	May Street
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	10500	Y
	Minor	1	2650	2900	
Case B	Major	1	13300	10500	N
	Minor	1	1350	2900	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	13th Street
Minor Street:	State Street
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	17250
Minor Approach Volume (ADT):	1700

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	13th Street	**Minor Street:**	State Street
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	17250	N
	Minor	1	2650	1700	
Case B	Major	1	13300	17250	Y
	Minor	1	1350	1700	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	2nd Street
Minor Street:	Oak Street
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	13500
Minor Approach Volume (ADT):	3100

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	2nd Street	**Minor Street:**	Oak Street
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	13500	Y
	Minor	1	2650	3100	
Case B	Major	1	13300	13500	Y
	Minor	1	1350	3100	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	2nd Street
Minor Street:	Riverside Dr
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	2
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	9100
Minor Approach Volume (ADT):	2950

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	2nd Street	**Minor Street:**	Riverside Dr
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	9100	N
	Minor	1	2650	2950	
Case B	Major	2	15900	9100	N
	Minor	1	1350	2950	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	2nd Street
Minor Street:	State Street
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	14000
Minor Approach Volume (ADT):	1625

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	2nd Street	**Minor Street:**	State Street
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River County
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	14000	N
	Minor	1	2650	1625	
Case B	Major	1	13300	14000	Y
	Minor	1	1350	1625	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Button Bridge Rd
Minor Street:	Historic Columbia Rv Hwy
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	9700
Minor Approach Volume (ADT):	3800

Oregon Department of Transportation
Transportation Development Branch
Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Button Bridge Rd	**Minor Street:**	Historic Columbia Rv Hwy
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	9700	Y
	Minor	1	2650	3800	
Case B	Major	1	13300	9700	N
	Minor	1	1350	3800	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Cascade Ave
Minor Street:	20th
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	2
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	23150
Minor Approach Volume (ADT):	1300

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Cascade Ave	**Minor Street:**	20th
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)

X	100 percent of standard warrants
	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	23150	N
	Minor	1	2650	1300	
Case B	Major	2	15900	23150	N
	Minor	1	1350	1300	

Analyst and Date:	Reviewer and Date:

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Cascade Avenue
Minor Street:	Country Club Rd
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	23050
Minor Approach Volume (ADT):	7750

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Cascade Avenue	**Minor Street:**	Country Club Rd
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	23050	Y
	Minor	1	2650	7750	
Case B	Major	1	13300	23050	Y
	Minor	1	1350	7750	

Analyst and Date:	Reviewer and Date:

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[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Cascade Avenue
Minor Street:	I-84 EB Ramps
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	20650
Minor Approach Volume (ADT):	1080

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Cascade Avenue	**Minor Street:**	I-84 EB Ramps
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	20650	N
	Minor	1	2650	1080	
Case B	Major	1	13300	20650	N
	Minor	1	1350	1080	
Analyst and Date:			Reviewer and Date:		

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[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Cascade
Minor Street:	I-84 WB Ramps
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	9150
Minor Approach Volume (ADT):	5800

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Cascade	**Minor Street:**	I-84 WB Ramps
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)

X	100 percent of standard warrants
	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	9150	Y
	Minor	1	2650	5800	
Case B	Major	1	13300	9150	N
	Minor	1	1350	5800	

Analyst and Date:	Reviewer and Date:

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[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Cascade Ave
Minor Street:	Rand Rd
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	2
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	23800
Minor Approach Volume (ADT):	1900

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Cascade Ave	**Minor Street:**	Rand Rd
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)

X	100 percent of standard warrants
	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	23800	N
	Minor	1	2650	1900	
Case B	Major	2	15900	23800	Y
	Minor	1	1350	1900	

Analyst and Date:	Reviewer and Date:

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[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	**Minor Street:**
Project:	**City/County:**
Year:	**Alternative:**

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major				
	Minor				
Case B	Major				
	Minor				
Analyst and Date:			Reviewer and Date:		

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[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Cascade Ave	**Minor Street:**	Rand Rd
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	23800	N
	Minor	1	2650	1900	
Case B	Major	2	15900	23800	Y
	Minor	1	1350	1900	
Analyst and Date:			Reviewer and Date:		

[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Country Club Rd
Minor Street:	Frankton Rd
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	11600
Minor Approach Volume (ADT):	100

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Country Club Rd	**Minor Street:**	Frankton Rd
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250

5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)

X	100 percent of standard warrants
	70 percent of standard warrants[2]

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	11600	N
	Minor	1	2650	100	
Case B	Major	1	13300	11600	N
	Minor	1	1350	100	

Analyst and Date:	Reviewer and Date:

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[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Major Street:	Frankton Rd
Minor Street:	May Street
Project Name:	Hood River TSP Update
City/County:	Hood River/ Hood River County
Analysis Year:	2031
Alternative:	Future No Build
Meet 70% Warrants?:	n
	100%
Number of Major Approach Lanes:	1
Number of Minor Approach Lanes:	1
Major Approach Volume (ADT):	8500
Minor Approach Volume (ADT):	1000

Oregon Department of Transportation

Transportation Development Branch

Transportation Planning Analysis Unit

Preliminary Traffic Signal Warrant Analysis[1]

Major Street:	Frankton Rd	**Minor Street:**	May Street
Project:	Hood River TSP Update	**City/County:**	Hood River/ Hood River Count
Year:	2031	**Alternative:**	Future No Build

Preliminary Signal Warrant Volumes

Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	70	Percent of standard warrants 100	70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
5.65% of the above ADT volumes is equal to the MUTCD vehicles per hour (vph)					
X	100 percent of standard warrants				
	70 percent of standard warrants[2]				

Preliminary Signal Warrant Calculation

	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	1	8850	8500	N
	Minor	1	2650	1000	
Case B	Major	1	13300	8500	N
	Minor	1	1350	1000	
Analyst and Date:			Reviewer and Date:		

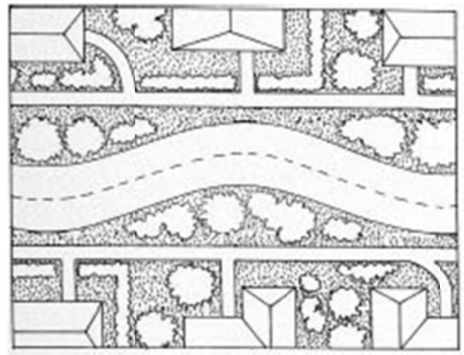
[1] Meeting preliminary signal warrants does **not** guarantee that a signal will be installed. Before a signal can be installed a traffic signal investigations must be conducted or reviewed by the Region Traffic Manager. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal can be isntalled on a state highway.

[2] Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.00

Appendix G: Neighborhood Traffic Management Photo Log

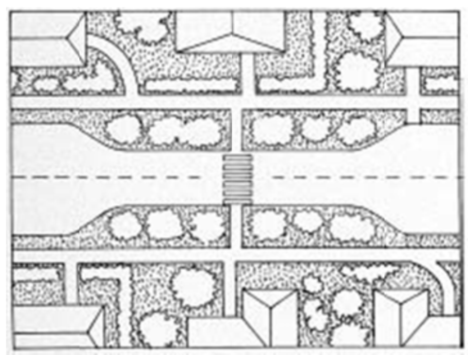
NEIGHBORHOOD TRAFFIC MANAGEMENT (NTM) STRATEGIES PHOTO LOG

Chicanes



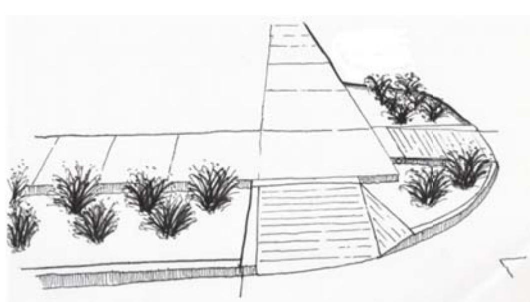
Source: Understanding the User. Chapter 9: Traffic Calming. Federal Highway Administration

Chokers

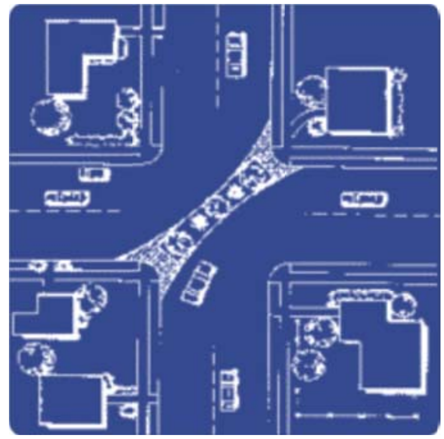


Source: Understanding the User. Chapter 9: Traffic Calming. Federal Highway Administration

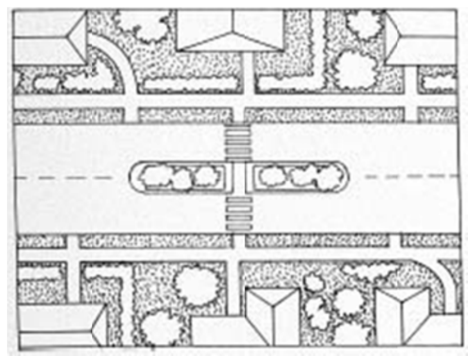
Curb Extensions



Diverters



Median Islands



Source: Understanding the User. Chapter 9: Traffic Calming. Federal Highway Administration

Raised Crosswalks

Speed Cushions (with emergency vehicle pass-through)

Speed Hump

Source: Understanding the User. Chapter 9: Traffic Calming. Federal Highway Administration

Traffic Circles

Appendix H: Project Cost Estimates

Facility		Bike Lane (Roadway Expansion)	Bike Lane (Restriping)	Sharrows	Bike Boulevard	Multi-Use Path (12', asphalt)	Accessway	Natural Surface Trail (6', difficult terrain)	Multi-Use Path Bridge (14')	Sidewalk (6')	Sidewalk Widening (SF)	Crosswalks (EA)	Signs (EA)	Stop Bar (EA)	Median Refuge Island (EA)	Curb Extension (EA)	Curb Ramp (EA)	Pedestrian Countdown Signal (EA)
Raw Construction Cost		*$48.78*	*$23.00*	*$3.00*	*$10.27*	*$89.65*	*$43.43*	*$15.00*	*$4,000.00*	*$92.67*	*$5.00*	*$500*	*$200*	*$150*	*$15,000*	*$7,500*	*$1,500*	*$1,000*
Contingency	*30%*	$14.63	$6.90	$0.90	$3.08	$26.90	$13.03	$4.50	$1,200.00	$27.80	$1.50	$150.00	$60.00	$45.00	$4,500.00	$2,250.00	$450.00	$300.00
Engineering/Design	*20%*	$9.76	$4.60	$0.60	$2.05	$17.93	$8.69	$3.00	$800.00	$18.53	$1.00	$100.00	$40.00	$30.00	$3,000.00	$1,500.00	$300.00	$200.00
Construction Overhead, Mobilization	*15%*	$7.32	$3.45	$0.45	$1.54	$13.45	$6.51	$2.25	$600.00	$13.90	$0.75	$75.00	$30.00	$22.50	$2,250.00	$1,125.00	$225.00	$150.00
Project Administration	*10%*	$4.88	$2.30	$0.30	$1.03	$8.97	$4.34	$1.50	$400.00	$9.27	$0.50	$50.00	$20.00	$15.00	$1,500.00	$750.00	$150.00	$100.00
Full Burden	***75%***	**$85.37**	**$40.25**	**$5.25**	**$17.98**	**$156.89**	**$75.99**	**$26.25**	**$7,000.00**	**$162.17**	**$8.75**	**$875.00**	**$350.00**	**$262.50**	**$26,250.00**	**$13,125.00**	**$2,625.00**	**$1,750.00**

Project ID	Name	Facility Type	Length (feet)	Bike Lane - Roadway Expansion (LF) *$85*	Bike Lane - Restriping (LF) *$40*	Shared Lane Markings (LF) *$5*	Bicycle Boulevard Treatments (LF) *$18*	ROW Acquisition (SF) *$10*	Raw Cost	Rounded Cost	Note
BL1	COUNTRY CLUB RD	Bike Lane	4,286	4,286					$365,915	$365,000	
BL2	FRANKTON RD	Bike Lane	4,003	4,003					$341,724	$340,000	
BL3	CASCADE AVE/OAK ST	Bike Lane	6,777		3,389				$136,388	$135,000	
BL4	State St	Bike Lane	2,028		2,028				$81,633	$80,000	
BL5	HIGHWAY 35/HOOD RIVER BRIDGE	Bike Lane	1,659		1,659				$66,775	$65,000	
BL6	MAY ST	Bike Lane	8,056	8,056				201,391	$687,675	$690,000	*Assumes 5' ROW acquisition along half the length of the project*
BL7	RAND RD	Bike Lane	2,466	2,466					$210,497	$210,000	
BL8	12TH ST/13TH ST	Bike Lane	6,111		6,111				$245,969	$245,000	
BL9	BELMONT AVE	Bike Lane	2,742		2,742				$110,381	$110,000	
BL10	BELMONT DR	Bike Lane	1,365	1,365					$116,534	$115,000	
BL11	INDIAN CREEK RD	Bike Lane	1,787	1,787					$152,543	$155,000	
BL12	BROOKSIDE DR/ELIOT DR	Bike Lane	4,222	4,222					$360,455	$360,000	
BL13	13TH ST	Bike Lane	1,699		1,699				$68,398	$70,000	
BLSLM1	SERPENTINE RD/6TH ST/EUGENE ST	Uphill Bike Lane/Downhill Shared Lane	1,860		930	930			$42,313	$40,000	
SLM1	WASCO ST/7TH ST/Rand RD	Shared Lane Markings	6,399			6,399			$33,596	$35,000	
SLM2	INDUSTRIAL ST/2ND ST/3RD ST	Shared Lane Markings	1,833			1,833			$9,625	$10,000	
SLM3	OAK ST/FRONT ST	Shared Lane Markings	4,054			4,054			$21,285	$20,000	
SLM4	CASCADE AVE	Shared Lane Markings	4,248			4,248			$22,302	$20,000	
SLM5	State St	Shared Lane Markings	3,830			3,830			$20,108	$20,000	
SLM6	SHERMAN AVE	Shared Lane Markings	7,369			7,369			$38,687	$40,000	
SLM7	9TH ST	Shared Lane Markings	622			622			$3,266	$5,000	
SLM8	MAY ST	Shared Lane Markings	2,188			2,188			$11,487	$10,000	
SLM9	22ND ST	Shared Lane Markings	2,818			2,818			$14,795	$15,000	
SLM10	PORTWAY AVENUE	Shared Lane Markings	2,560			2,560			$13,440	$15,000	
SLM 11	RIVERSIDE DRIVE	Shared Lane Markings	345			345			$1,811.25	$5,000	
BLVD1	20TH ST	Bike Boulevard	1,465				1,465		$26,343	$25,000	
BLVD2	SHERMAN AVE	Bike Boulevard	7,998				628		$11,290	$10,000	
BLVD3	MONTELLO AVE/EUGENE ST	Bike Boulevard	6,532				6,532		$117,422	$115,000	
BLVD4	9TH ST/PARK ST	Bike Boulevard	2,126				1,503		$27,020	$25,000	
BLVD5	4TH ST	Bike Boulevard	787				787		$14,153	$15,000	
BLVD6	18TH ST/17TH ST/AVALON WAY/AVALON DR	Bike Boulevard	4,581				4,581		$82,357	$80,000	
BLVD7	8TH ST	Bike Boulevard	3,463				3,463		$62,255	$60,000	

Project ID	Name	Crosswalks (EA) *$875*	Signs (EA) *$350*	Advance Stop Bar (EA) *$263*	Median Refuge Island (EA) *$26,250*	Curb Extension (EA) *$13,125*	Curb Ramp (EA) *$2,625*	Ped Countdown Signal (EA) *$1,750*	Multi-Use Path (LF) *$157*	Sidewalk Widening (SF) *$9*	Sidewalk (LF) *$162*	Raw Cost	Rounded Cost
CR1	Westcliff Drive & Cascade Avenue											$0	$0
CR2	Wasco Avenue & 20th Street/Jaymar Road	4										$3,500	$5,000
CR4	6th Street & State Street	4	2			1						$17,325	$15,000
CR5	Hood River Bicycle & Pedestrian Bridge								100			$15,689	$15,000
CR6	13th Street & Sherman Street	4	2									$4,200	$5,000
CR7	13th Street & Montello Avenue	1	2									$1,575	$5,000
CR8	12th Street & May Street		2	1		2					50	$35,321	$35,000
CR9	13th Street & May Street	4	4		1							$31,150	$55,000
CR10	12th Street & Belmont Avenue	2	2									$2,450	$5,000
CR11	13th Street & Belmont Avenue	3	4			1						$17,150	$15,000
CR12	17th Street & May Street	2	1	1			1			1,100	175	$42,992	$45,000
CR13	Rocky Road & May Street	2	2									$2,450	$5,000
CR14	Fairview Drive & Belmont Drive	3	2		1						100	$45,792	$45,000
CR15	13th Street & State Street	2										$1,750	$5,000
CR16	12th Street & Pacific Avenue		4					2		50		$5,338	$5,000
CR17	5th Street & Oak Street	2	2			1						$15,575	$15,000
CR18	2nd Street & Oak Street					2						$26,250	$25,000
CR19	2nd Street & State Street	1	2									$1,575	$5,000
CR20	Westside Community Trail (future) & Belmont Drive			2								$525	$5,000
CR21	Cascade Avenue (midblock between Mt. Adams Avenue and Rand Road)		2		1							$26,950	$25,000
CR22	Cascade Avenue near (midblock between Rand Road and 20th Street)		2		1							$26,950	$25,000
CR23	13th and Oak Street		1	1								$613	$5,000

PROJECT DATA

Project Name: Hood River TSP	Date:	5/22/2011
CR 3: I-84 Exit 63 EB ramp terminal at 2nd Street: realign east crosswalk to improve pedestrian visibility and reconstruct southeast corner of intersection	Completed By:	JAB
	Reviewed By:	KAS

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)

	Unit	Quantity	Unit Cost	Total cost
Pavement				
Overlay	sf	0	$ 4.00	$ -
HMAC	ton	0	$ 80.00	$ -
Agg Base	ton	0	$ 20.00	$ -
Subgrade Geotextile	sqyd	0	$ 1.75	$ -
Earthwork	cuyd	0	$ 15.00	$ -
Concrete				
Curb	sf	0	$ 15.00	$ -
Sidewalks	sf	0	$ 6.00	$ -
Inlets Type CG-2	Each	0	$ 1,500.00	$ -
Structures				
Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
Bridge Widening	sf	110	$ 300.00	$ 33,000
Existing Bridge Removal	sf	0	$ 75.00	$ -
Retaining Walls (CIP)	sf	0	$ 125.00	$ -
Overhead Sign Structure	Each	0	$ 225,000.00	$ -
Miscellaneous				
Work near rail road	LS	0	$ 25,000.00	$ -
Traffic Signals	Each	0	$ 250,000.00	$ -
Restriping for Stop Bar Setback	Each	1	$ 5,000.00	$ 5,000
Traffic Signal Modification	Each	1	$9,000.00	$ 9,000
Mobilisation (8%)	LS	1	$3,000.00	$ 3,000
Temporary Protection & Dir. of Traffic (10%)	LS	1	$3,800.00	$ 3,800
Erosion Control (4%)	LS	1	$1,500.00	$ 1,500
Pollution Control Plan (1%)	LS	1	$400.00	$ 400
Removal of Structures & Obstructions (3%)	LS	1	$1,100.00	$ 1,100
Clearing and Grubbing (1%)	LS	0	$3,800.00	$ -
Signing and Striping(1.5%)	LS	0	$600.00	$ -
Trees and Landscaping (3%)	LS	0	$1,100.00	$ -

	Unit	Quantity	Unit Cost	Cost
Barriers and Guardrail				
Type 2A Guardrail	ft	0	$ 16.25	$ -
Type 3 Guardrail	ft	0	$ 50.00	$ -
Type 4 Guardrail	ft	0	$ 36.00	$ -
Guardrail Transition	ea	0	$ 2,200.00	$ -
Guardrail Terminals	ea	0	$ 2,300.00	$ -
Project Subtotal				$ 56,800
Project Scope Contingencies		1	40%	$ 22,720
CONSTRUCTION ESTIMATE TOTAL				$ 79,520
Preliminary Engineering	%	1	20%	$ 15,904
Construction Engineering	%	1	15%	$ 11,928
Environmental Studies	LS	All	None	$ -
Right of Way	LS	All	$ -	$ -
TOTAL PROJECT ESTIMATE				***$ 107,352***

Project ID	Name	Street Class *(Collectors add $72/LF for 6' landscaping strip)*	Length (feet)	Existing Sidewalk - N/E Side	Existing Sidewalk - S/W Side	High (sidewalk on both sides) *$162*	Low (sidewalk on one side or segment) *$162*	Raw High Cost Estimate	Rounded High Cost Estimate	Raw Low Cost Estimate	Rounded Low Cost Estimate	Note
SW1	RAND RD	Collector	2,466	495	125	4,312	1,971	$1,009,647	$1,010,000	$461,503	$460,000	
SW2	20TH ST	Collector	1,465	340	800	1,791	665	$419,333	$420,000	$155,808	$155,000	
SW3	CASCADE AVE (near Exit 62)	Arterial	1,282	520	0		762	$0	$0	$123,571	$125,000	*N side only*
SW4	SHERMAN AVE	Collector	3,517	1,720	730	4,584	1,797	$1,073,471	$1,075,000	$420,823	$420,000	
SW5	State St	Arterial	866	0	0	1,731	866	$280,784	$280,000	$140,392	$140,000	
SW6	OR 35 (north of Riverview)	Arterial	593	0	0			$0	$0	$0	$0	
SW7	SERPENTINE RD/EUGENE ST	Collector	1,663	0	0		1,663	$0	$0	$269,625	$270,000	*One side only*
SW8	MAY STREET	Collector	5,199	1,890	3,190	5,317	2,009	$1,245,171	$1,245,000	$470,377	$470,000	
SW9	22ND ST	Collector	1,476	90	130	2,733	1,346	$639,927	$640,000	$315,280	$315,000	
SW10	18TH ST	Collector	1,509	485	70	2,462	1,024	$576,527	$575,000	$239,674	$240,000	
SW11	BELMONT AVE	Collector	1,241	190	130	2,162	1,051	$506,369	$505,000	$246,159	$245,000	
SW12	Frankton	Collector	4,047	164	0	7,931	1,320	$1,857,124	$1,855,000	$309,100	$310,000	*Low cost: May Street to city limits*
SW13	Country Club Rd	Arterial	4,337	0	0		4,337	$0	$0	$703,317	$705,000	*S side only*
SW14	Cascade Avenue (Mt. Adams to Rand)	Arterial	1,271	450	715	1,377	556	$223,304	$225,000	$90,165	$90,000	
SW15	13th Street	Arterial	627	0	0		627	$0	$0	$101,679	$100,000	*E side only*
SW16	12th/OR 281	Arterial	366	0	0		366	$0	$0	$59,353	$60,000	*E side only*
SW17	OR 35 (near Exit 64)	Arterial	380	0	0		380	$0	$0	$61,623	$60,000	*E side only*

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: SW18
Length (blank for intersection): 480
Project Description: Cascade Avenue: 20th to 15th North Side Sidewalk Infill (Option 1)

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement		SF	$	0.33	$	-
Clear & Grub	3840	SF	$	0.05	$	192
Remove Curb		LF	$	10.00	$	-
Remove Sidewalk		SF	$	1.50	$	-
Remove Striping		LF	$	1.00	$	-
Grading		SF	$	1.25	$	-
Pavement		SF	$	8.00	$	-
Pavement Elevated/Subgrade		SF	$	200.00	$	-
Sidewalk	2880	SF	$	6.00	$	17,280
Curb and gutter	480	LF	$	14.00	$	6,720
Landscaping		SF	$	12.00	$	-
Retaining Wall	1850	SF	$	85.00	$	157,250
Bridge < 120 ft.		SF	$	125.00	$	-
Lighting		LF	$	60.00	$	-
Full Drainage	480	LF	$	100.00	$	48,000
Drainage Modifications		LF	$	25.00	$	-
Wetland Mitigation		SF	$	-	$	-
Driveway Adjustments		Driveway	$	2,000.00	$	-
Traffic Signal Installation		LS	$	250,000.00	$	-
Traffic Signal Modification		LS	$	-	$	-
Signing and Striping		LS	$	-	$	-
Signing and Striping		LS	$	34,416.30	$	-
Building Takes		LS	$	-	$	-
Off-site improvements		LS	$	75,000.00	$	-
SUBTOTAL					$	229,442
Traffic Control				5%	$	11,472
Mobilization				10%	$	22,944
Design/Administration/Management				15%	$	34,416
Contingency				40%	$	91,777
Project Development				5%	$	11,472
Sales Tax				0.0%	$	-
Right Of Way		SF	$	20.00	$	-
PROJECT COST:					**$**	**401,524**
					$	**400,000**

Option 1 assumes all construction is on north side of Cascade Avenue and that no additional ROW is needed.

***DKS** Associates*
10/11/11 10:45

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT:	SW18
Length (blank for intersection):	450
Project Description:	Cascade Avenue: 20th to 15th North Side Sidewalk Infill (Option 2)

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement		SF	$	0.33	$	-
Clear & Grub	3600	SF	$	0.05	$	180
Remove Curb		LF	$	10.00	$	-
Remove Sidewalk		SF	$	1.50	$	-
Remove Striping		LF	$	1.00	$	-
Grading		SF	$	1.25	$	-
Pavement		SF	$	8.00	$	-
Pavement Elevated/Subgrade		SF	$	200.00	$	-
Sidewalk	2750	SF	$	6.00	$	16,500
Curb and gutter	250	LF	$	14.00	$	3,500
Retaining Wall (fill)	500	SF	$	85.00	$	42,500
Retaining Wall (cut)	800	SF	$	125.00	$	100,000
Concrete Island	500	SF	$	6.00	$	3,000
Lighting		LF	$	60.00	$	-
Full Drainage	480	LF	$	100.00	$	48,000
Drainage Modifications		LF	$	25.00	$	-
Wetland Mitigation		SF	$	-	$	-
Driveway Adjustments		Driveway	$	2,000.00	$	-
Traffic Signal Installation		LS	$	250,000.00	$	-
Traffic Signal Modification		LS	$	-	$	-
Signing and Striping		LS	$	-	$	-
Signing and Striping		LS	$	32,052.00	$	-
Building Takes		LS	$	-	$	-
Off-site improvements		LS	$	75,000.00	$	-
SUBTOTAL					$	213,680
Traffic Control				5%	$	10,684
Mobilization				10%	$	21,368
Design/Administration/Management				15%	$	32,052
Contingency				40%	$	85,472
Project Development				5%	$	10,684
Sales Tax				0.0%	$	-
Right Of Way		SF	$	20.00	$	-
	PROJECT COST:				**$**	**373,940**
					$	**375,000**

Option 2 includes crossings of Cascade, with sidewalk construction on south side of Cascade. Assumes no ROW is needed.

DKS Associates

10/11/11 10:59

Project ID	Name	Facility Type	Length (feet)	Multi-Use Path (LF) *$157*	Accessway (LF) *$76*	6' Natural Surface Path, difficult terrain (LF) *$26*	14' Bridge (LF) *$7,000*	Sidewalk widening (SF) *$9*	Sidewalk (LF) *$162*	Raw Cost	Rounded Cost	Note
MUP1	HCRH/Westcliff Drive	Proposed Multi-Use Path	10,431									*Future design refinement by City will be needed; no cost estimate available at this time.*
MUP2	Waterfront Path	Proposed Multi-Use Path	7,185	7,185						$1,127,240	$1,125,000	
MUP3	Waterfront Path Access from OR 35	Improve Path Access	1,469	1,469						$230,424	$230,000	
MUP4	Westside Community Trail	Proposed Multi-Use Path	6,777									*Project already funded by Hood River Valley Parks & Recreation*
MUP5	Hood River Middle School Path	Proposed Multi-Use Path	160	160						$25,103	$25,000	
MUP6	Indian Creek Trail Access from Union Street	Improve Path Access	174			174				$4,568	$5,000	
MUP7	Indian Creek Bridge at 8th Street	Bridge	592				592			$4,147,262	$4,200,000	
MUP8	Indian Creek Trail, Segment 2	Proposed Multi-Use Path	1,050									*Pending future easement, project will be funded by Hood River Valley Parks & Recreation*
MUP9	Indian Creek Trail Access from Sherman Street	Improve Path Access	2,221						2,221	$360,161	$360,000	
MUP10	Port of Hood River Path	Proposed Multi-Use Path	1,683	1,683						$264,089	$265,000	
MUP11	Post Canyon Path	Proposed Multi-Use Path	4,221	4,221						$662,227	$660,000	
MUP12	Indian Creek Trail Parallel to OR 281	Proposed Multi-Use Path	1,382	1,382						$216,754	$215,000	
MUP13	Cascade (HRCH) Westcliff to Mt. Adams	Proposed Multi-Use Path	1,282					5,128	1,282	$252,768	$255,000	

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	10/5/09
	Alternative: Exit 62 Alternative 3 (Interchange Only)			Completed By:	DXV
				Reviewed By:	JAB

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)

	Unit	Quantity	Unit Cost	Total cost
Pavement				
Overlay	sf	95,835	$ 4.00	$ 383,340
HMAC	ton	1,618	$ 80.00	$ 129,440
Agg Base	ton	1,114	$ 20.00	$ 22,280
Subgrade Geotextile	sqyd	5,277	$ 1.75	$ 9,235
Earthwork	cuyd	0	$ 15.00	$ -
Concrete				
Curb	sf	0	$ 15.00	$ -
Sidewalks	sf	4,800	$ 6.00	$ 28,800
Inlets Type CG-2	Each	9	$ 1,500.00	$ 13,313
Structures				
Concrete Bridge (Post Tensioned)	sf	27,000	$ 250.00	$ 6,750,000
Bridge Widening	sf	0	$ 250.00	$ -
Existing Bridge Removal	sf	300	$ 75.00	$ 22,500
Retaining Walls (CIP)	sf	0	$ 125.00	$ -
Overhead Sign Structure	Each	0	$ 225,000.00	$ -
Miscellaneous				
Traffic Signals	Each	2	$ 250,000.00	$ 500,000
Street Lights	Each	6	$ 15,000.00	$ 90,000
Traffic Signal Modification	Each	0	$100,000.00	$ -
Mobilisation(8%)	LS	1	$605,200.00	$ 605,200
Temporary Protection & Dir. of Traffic (10%)	LS	1	$756,600.00	$ 756,600
Erosion Control (4%)	LS	1	$302,600.00	$ 302,600
Pollution Control Plan (1%)	LS	1	$75,700.00	$ 75,700
Removal of Structures & Obstructions (3%)	LS	1	$227,000.00	$ 227,000
Clearing and Grubbing (1%)	LS	1	$756,600.00	$ 756,600
Signing and Striping(1.5%)	LS	1	$113,500.00	$ 113,500
Trees and Landscaping (3%)	LS	1	$227,000.00	$ 227,000

	Unit	Quantity	Unit Cost	Cost
Barriers and Guardrail				
Type 2A Guardrail	ft	300	$ 16.25	$ 4,875
Type 3 Guardrail	ft		$ 50.00	$ -
Type 4 Guardrail	ft		$ 36.00	$ -
Guardrail Transition	ea		$ 2,200.00	$ -
Guardrail Terminals	ea		$ 2,300.00	$ -
Project Subtotal				$ 10,635,520
Project Scope Contingencies		1	40%	$ 4,254,208
CONSTRUCTION ESTIMATE TOTAL				$ 14,889,728
Preliminary Engineering	%	1	20%	$ 2,977,946
Construction Engineering	%	1	15%	$ 2,233,459
Environmental Studies	LS	All	EA Typical	$ 500,000
Right of Way	LS	All	$ 260,775.00	$ 260,775.00
TOTAL PROJECT ESTIMATE				***$ 20,861,907***

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	10/5/2009
	Alternative: Exit 62 Alternative 3 (Cascade Ave. Improvements only)			Completed By:	DXV
				Reviewed By:	JAB

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)	Unit	Quantity	Unit Cost	Total cost
Pavement				
Overlay	sf	96,750	$ 4.00	$ 387,000
HMAC	ton	1,978	$ 80.00	$ 158,240
Agg Base	ton	1,793	$ 20.00	$ 35,860
Subgrade Geotextile	sqyd	8,477	$ 1.75	$ 14,835
Earthwork	cuyd	0	$ 15.00	$ -
Concrete				
Curb	sf	0	$ 15.00	$ -
Sidewalks	sf	33,000	$ 6.00	$ 198,000
Inlets Type CG-2	Each	16	$ 1,500.00	$ 23,250
Structures				
Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
Bridge Widening	sf	0	$ 250.00	$ -
Existing Bridge Removal	sf	0	$ 75.00	$ -
Retaining Walls (CIP)	sf	0	$ 125.00	$ -
Overhead Sign Structure	Each	0	$ 225,000.00	$ -
Miscellaneous				
Traffic Signals	Each	0	$ 250,000.00	$ -
Street Lights	Each	10	$ 15,000.00	$ 150,000
Traffic Signal Modification	Each	0	$100,000.00	$ -
Mobilisation(8%)	LS	1	$46,400.00	$ 46,400
Temporary Protection & Dir. of Traffic (10%)	LS	1	$58,000.00	$ 58,000
Erosion Control (4%)	LS	1	$23,200.00	$ 23,200
Pollution Control Plan (1%)	LS	1	$5,800.00	$ 5,800
Removal of Structures & Obstructions (3%)	LS	1	$17,400.00	$ 17,400
Clearing and Grubbing (1%)	LS	1	$58,000.00	$ 58,000
Signing and Striping(1.5%)	LS	1	$8,700.00	$ 8,700
Trees and Landscaping (3%)	LS	1	$17,400.00	$ 17,400
	Unit	**Quantity**	**Unit Cost**	**Cost**
Barriers and Guardrail				
Type 2A Guardrail	ft	0	$ 16.25	$ -
Type 3 Guardrail	ft		$ 50.00	$ -
Type 4 Guardrail	ft		$ 36.00	$ -
Guardrail Transition	ea		$ 2,200.00	$ -
Guardrail Terminals	ea		$ 2,300.00	$ -
Project Subtotal				$ 815,085
Project Scope Contingencies		1	40%	$ 326,034
CONSTRUCTION ESTIMATE TOTAL				$ 1,141,119
Preliminary Engineering	%	1	20%	$ 228,224
Construction Engineering	%	1	15%	$ 171,168
Environmental Studies	LS	All	EA Typical	$ 500,000
Right of Way	LS	All	$ 672,975.00	$ 672,975.00
TOTAL PROJECT ESTIMATE				***$ 2,713,485***

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	10/5/2009
	Alternative: Exit 62 Alternative 3 (Country Club Rd. Realignment with Mt. Adams from Country Club to Cascade only, no traffic signals)			Completed By:	DXV
				Reviewed By:	JAB

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)		Unit	Quantity	Unit Cost	Total cost
	Pavement				
	Overlay	sf	0	$ 4.00	$ -
	HMAC	ton	2,288	$ 80.00	$ 183,040
	Agg Base	ton	2,070	$ 20.00	$ 41,400
	Subgrade Geotextile	sqyd	9,806	$ 1.75	$ 17,161
	Earthwork	cuyd	17,000	$ 15.00	$ 255,000
	Concrete				
	Curb	sf	0	$ 15.00	$ -
	Sidewalks	sf	20,100	$ 6.00	$ 120,600
	Inlets Type CG-2	Each	8	$ 1,500.00	$ 11,250
	Structures				
	Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
	Bridge Widening	sf	0	$ 250.00	$ -
	Retaining Walls (CIP)	sf	0	$ 125.00	$ -
	Overhead Sign Structure	Each	1	$ 225,000.00	$ 225,000.00
	Miscellaneous				
	Traffic Signals	Each	0	$ 250,000.00	$ -
	Street Lights	Each	8	$ 15,000.00	$ 120,000
	Traffic Signal Modification	Each	0	$100,000.00	$ -
	Mobilisation(8%)	LS	1	$59,900.00	$ 59,900
	Temporary Protection & Dir. of Traffic (10%)	LS	1	$74,800.00	$ 74,800
	Erosion Control (4%)	LS	1	$29,900.00	$ 29,900
	Pollution Control Plan (1%)	LS	1	$7,500.00	$ 7,500
	Removal of Structures & Obstructions (3%)	LS	1	$22,500.00	$ 22,500
	Clearing and Grubbing (1%)	LS	1	$74,800.00	$ 74,800
	Signing and Striping(2%)	LS	1	$15,000.00	$ 15,000
	Trees and Landscaping (3%)	LS	1	$22,500.00	$ 22,500
		Unit	Quantity	Unit Cost	Cost
	Barriers and Guardrail				
	Type 2A Guardrail	ft	0	$ 16.25	$ -
	Type 3 Guardrail	ft		$ 50.00	$ -
	Type 4 Guardrail	ft		$ 36.00	$ -
	Guardrail Transition	ea		$ 2,200.00	$ -
	Guardrail Terminals	ea		$ 2,300.00	$ -
	Project Subtotal				$ 1,280,351
	Project Scope Contingencies		1	40%	$ 512,140
	CONSTRUCTION ESTIMATE TOTAL				$ 1,792,491
	Preliminary Engineering	%	1	20%	$ 358,498
	Construction Engineering	%	1	15%	$ 268,874
	Environmental Studies	LS	All	EA Typical	$ 500,000
	Right of Way	LS	All	$ 794,304.00	$ 794,304.00
	TOTAL PROJECT ESTIMATE				***$ 3,714,166***

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	11/5/09
	Alternative: Exit 63/64 Alternative 7: Extended I-84 EB off-ramp with Added 2nd St. SB Lane from I-84 WB to Oak St.			Completed By:	MLW
				Reviewed By:	JAB

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)		Unit	Quantity	Unit Cost	Total cost
	Pavement				
	Overlay	sf	23,000	$ 4.00	$ 92,000
	HMAC	ton	1,270	$ 80.00	$ 101,600
	Agg Base	ton	1,149	$ 20.00	$ 22,980
	Subgrade Geotextile	sqyd	5,444	$ 1.75	$ 9,527
	Earthwork	cuyd	0	$ 15.00	$ -
	Concrete				
	Curb	sf	0	$ 15.00	$ -
	Sidewalks	sf	0	$ 6.00	$ -
	Inlets Type CG-2	Each	0	$ 1,500.00	$ -
	Structures				
	Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
	Bridge Widening	sf	4,900	$ 250.00	$ 1,225,000
	Retaining Walls (CIP)	sf	9,000	$ 125.00	$ 1,125,000
	Overhead Sign Structure	Each	1	$ 225,000.00	$ 225,000.00
	Miscellaneous				
	Work near rail road	LS	1	$ 100,000.00	$ 100,000
	Traffic Signals	Each	0	$ 250,000.00	$ -
	Street Lights	Each	4	$ 15,000.00	$ 60,000
	Traffic Signal Modification	Each	3	$100,000.00	$ 300,000
	Mobilisation(8%)	LS	1	$203,500.00	$ 203,500
	Temporary Protection & Dir. of Traffic (10%)	LS	1	$254,400.00	$ 254,400
	Erosion Control (4%)	LS	1	$101,800.00	$ 101,800
	Pollution Control Plan (1%)	LS	1	$25,400.00	$ 25,400
	Removal of Structures & Obstructions (3%)	LS	1	$76,300.00	$ 76,300
	Clearing and Grubbing (1%)	LS	1	$254,400.00	$ 254,400
	Signing and Striping(1.5%)	LS	1	$38,200.00	$ 38,200
	Trees and Landscaping (3%)	LS	1	$76,300.00	$ 76,300
		Unit	**Quantity**	**Unit Cost**	**Cost**
	Barriers and Guardrail				
	Type 2A Guardrail	ft	0	$ 16.25	$ -
	Type 3 Guardrail	ft		$ 50.00	$ -
	Type 4 Guardrail	ft		$ 36.00	$ -
	Guardrail Transition	ea		$ 2,200.00	$ -
	Guardrail Terminals	ea		$ 2,300.00	$ -
	Project Subtotal				$ 4,199,407
	Project Scope Contingencies		1	40%	$ 1,679,763
	CONSTRUCTION ESTIMATE TOTAL				$ 5,879,170
	Preliminary Engineering	%	1	20%	$ 1,175,834
	Construction Engineering	%	1	15%	$ 881,875
	Environmental Studies	LS	All	None	$ -
	Right of Way	LS	All	$ 75,000.00	$ 75,000.00
	TOTAL PROJECT ESTIMATE				***$ 8,011,879***

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	10/6/09
	Alternative: Exit 63/64 Queue Detection (includes 1 CCTV camera)			Completed By:	DXV
				Reviewed By:	JAB

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)

	Unit	Quantity	Unit Cost	Total cost
Pavement				
HMAC	ton	0	$ 80.00	$ -
Agg Base	ton	0	$ 20.00	$ -
Subgrade Geotextile	sqyd	0	$ 1.75	$ -
Earthwork	cuyd	0	$ 15.00	$ -
Concrete				
Curb	sf	0	$ 15.00	$ -
Sidewalks	sf	0	$ 6.00	$ -
Inlets Type CG-2	Each	0	$ 1,500.00	$ -
Structures				
Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
Bridge Widening	sf	0	$ 250.00	$ -
Retaining Walls (CIP)	sf	0	$ 125.00	$ -
Miscellaneous				
CCTV camera	Each	1	$ 30,000.00	$ 30,000
Detection loops	Each	8	$ 500.00	$ 4,000
Conduit	ft	4,000	$ 25.00	$ 100,000
Work near rail road	LS	0	$ 100,000.00	$ -
Traffic Signals	Each	0	$ 250,000.00	$ -
Street Lights	Each	0	$ 15,000.00	$ -
Traffic Signal Modification	Each	0	$ 100,000.00	$ -
Mobilisation(8%)	LS	1	$10,700.00	$ 10,700
Temporary Protection & Dir. of Traffic (10%)	LS	1	$8,300.00	$ 8,300
Erosion Control (4%)	LS	1	$8,000.00	$ 8,000
Pollution Control Plan (1%)	LS	0	$0.00	$ -
Removal of Structures & Obstructions (3%)	LS	0	$0.00	$ -
Clearing and Grubbing (1%)	LS	0	$900.00	$ -
Signing and Striping(1.5%)	LS	0	$1,500.00	$ -
Trees and Landscaping (3%)	LS	0	$2,200.00	$ -

	Unit	Quantity	Unit Cost	Cost
Barriers and Guardrail				
Type 2A Guardrail	ft	0	$ 16.25	$ -
Type 3 Guardrail	ft		$ 50.00	$ -
Type 4 Guardrail	ft		$ 36.00	$ -
Guardrail Transition	ea		$ 2,200.00	$ -
Guardrail Terminals	ea		$ 2,300.00	$ -
Project Subtotal				$ 161,000
Project Scope Contingencies	%	1	10%	$ 16,100
CONSTRUCTION ESTIMATE TOTAL				$ 177,100
Preliminary Engineering	%	1	15%	$ 26,565
Construction Engineering	%	1	15%	$ 26,565
Environmental Studies	LS	All	None	$ -
Right of Way	LS	All	$ -	$ -
TOTAL PROJECT ESTIMATE				***$ 230,230***

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	2/6/2011
	Alternative: Exit 62 Alternative 3 (Westcliff Only)			Completed By:	JAB
				Reviewed By:	JAB

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)		Unit	Quantity	Unit Cost	Total cost
	Pavement				
	Overlay	sf	18,875	$ 4.00	$ 75,500
	HMAC	ton	148	$ 80.00	$ 11,840
	Agg Base	ton	133	$ 20.00	$ 2,660
	Subgrade Geotextile	sqyd	632	$ 1.75	$ 1,106
	Earthwork	cuyd	0	$ 15.00	$ -
	Concrete				
	Curb	sf	0	$ 15.00	$ -
	Sidewalks	sf	0	$ 6.00	$ -
	Inlets Type CG-2	Each	1	$ 1,500.00	$ 1,313
	Structures				
	Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
	Bridge Widening	sf	0	$ 250.00	$ -
	Existing Bridge Removal	sf	0	$ 75.00	$ -
	Retaining Walls (CIP)	sf	750	$ 125.00	$ 93,750
	Overhead Sign Structure	Each	0	$ 225,000.00	$ -
	Miscellaneous				
	Traffic Signals	Each	1	$ 250,000.00	$ 250,000
	Street Lights	Each	0	$ 15,000.00	$ -
	Traffic Signal Modification	Each	0	$100,000.00	$ -
	Mobilisation(8%)	LS	1	$28,900.00	$ 28,900
	Temporary Protection & Dir. of Traffic (10%)	LS	1	$36,100.00	$ 36,100
	Erosion Control (4%)	LS	1	$14,400.00	$ 14,400
	Pollution Control Plan (1%)	LS	1	$3,600.00	$ 3,600
	Removal of Structures & Obstructions (3%)	LS	1	$10,800.00	$ 10,800
	Clearing and Grubbing (1%)	LS	1	$36,100.00	$ 36,100
	Signing and Striping(1.5%)	LS	1	$5,400.00	$ 5,400
	Trees and Landscaping (3%)	LS	1	$10,800.00	$ 10,800
		Unit	**Quantity**	**Unit Cost**	**Cost**
	Barriers and Guardrail				
	Type 2A Guardrail	ft		$ 16.25	$ -
	Type 3 Guardrail	ft		$ 50.00	$ -
	Type 4 Guardrail	ft		$ 36.00	$ -
	Guardrail Transition	ea		$ 2,200.00	$ -
	Guardrail Terminals	ea		$ 2,300.00	$ -
	Project Subtotal				$ 506,769
	Project Scope Contingencies		1	40%	$ 202,707
	CONSTRUCTION ESTIMATE TOTAL				$ 709,476
	Preliminary Engineering	%	1	20%	$ 141,895
	Construction Engineering	%	1	15%	$ 106,421
	Environmental Studies	LS	All	None	$ -
	Right of Way	LS	All	$ -	$ -
	TOTAL PROJECT ESTIMATE				***$ 957,792***

PROJECT DATA					
Project Name: Hood River Interchange Area Management Plans			**Date:**	11/5/2009	
Alternative: 2nd St./Riverside R-in/R-out			**Completed By:**	JAB	
			Reviewed By:	MLW	

SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)

	Unit	Quantity	Unit Cost	Total cost
Pavement				
Overlay	sf	15,000	$ 4.00	$ 60,000
HMAC	ton	189	$ 80.00	$ 15,120
Agg Base	ton	128	$ 20.00	$ 2,560
Subgrade Geotextile	sqyd	404	$ 1.75	$ 707
Earthwork	cuyd	0	$ 15.00	$ -
Concrete				
Curb	sf	200	$ 15.00	$ 3,000
Sidewalks	sf	1,200	$ 6.00	$ 7,200
Inlets Type CG-2	Each	0	$ 1,500.00	$ -
Islands & Apron	sf	1,250	$ 5.00	$ 6,250
Structures				
Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
Bridge Widening	sf	0	$ 250.00	$ -
Retaining Walls (CIP)	sf	0	$ 125.00	$ -
Overhead Sign Structure	Each	0	$ 225,000.00	$ -
Miscellaneous				
Trees and Landscaping	sf	0	$12.00	$ -
Traffic Signals	Each	0	$ 250,000.00	$ -
Street Lights	Each	2	$ 15,000.00	$ 30,000
Traffic Signal Modification	Each	0	$100,000.00	$ -
Mobilization(8%)	LS	1	$4,700.00	$ 4,700
Temporary Protection & Dir. of Traffic (10%)	LS	1	$5,900.00	$ 5,900
Erosion Control (4%)	LS	1	$2,300.00	$ 2,300
Pollution Control Plan (1%)	LS	1	$600.00	$ 600
Removal of Structures & Obstructions (3%)	LS	1	$1,800.00	$ 1,800
Clearing and Grubbing (1%)	LS	1	$5,900.00	$ 5,900
Signing and Striping(3%)	LS	1	$1,800.00	$ 1,800

	Unit	Quantity	Unit Cost	Cost
Barriers and Guardrail				
Type 2A Guardrail	ft	0	$ 16.25	$ -
Type 3 Guardrail	ft	0	$ 50.00	$ -
Type 4 Guardrail	ft	0	$ 36.00	$ -
Guardrail Transition	ea	0	$ 2,200.00	$ -
Guardrail Terminals	ea	0	$ 2,300.00	$ -
Project Subtotal				$ 147,837
Project Scope Contingencies		1	40%	$ 59,135
CONSTRUCTION ESTIMATE TOTAL				$ 206,972
Preliminary Engineering	%	1	20%	$ 41,394
Construction Engineering	%	1	15%	$ 31,046
Environmental Studies	LS	All	None	$ -
Right of Way	LS	All	$ 28,800.00	$ 28,800.00
TOTAL PROJECT ESTIMATE				***$ 308,212***

PROJECT DATA	Project Name: Hood River Interchange Area Management Plans			Date:	10/6/09
	Alternative: OR 35/ State St. - Intersection Improvements with Traffic Signal			Completed By:	DXV
				Reviewed By:	JAB
		Unit	**Quantity**	**Unit Cost**	**Total cost**
SQUARE FOOT' COSTS FROM STUDY PROJECTS (Costs Indexed to August 2009 Dollars)	**Pavement**				
	Overlay	sf	75,508	$ 4.00	$ 302,032
	HMAC	ton	651	$ 80.00	$ 52,080
	Agg Base	ton	589	$ 20.00	$ 11,780
	Subgrade Geotextile	sqyd	2,789	$ 1.75	$ 4,881
	Earthwork	cuyd	0	$ 15.00	$ -
	Concrete				
	Curb	sf	0	$ 15.00	$ -
	Sidewalks	sf	7,800	$ 6.00	$ 46,800
	Inlets Type CG-2	Each	0	$ 1,500.00	$ -
	Structures				
	Concrete Bridge (Post Tensioned)	sf	0	$ 250.00	$ -
	Bridge Widening	sf	0	$ 250.00	$ -
	Retaining Walls (CIP)	sf	0	$ 125.00	$ -
	Overhead Sign Structure	Each	0	$ 225,000	$ -
	Miscellaneous				
	Traffic Signals	Each	1	$ 250,000.00	$ 250,000
	Street Lights	Each	0	$ 15,000.00	$ -
	Mobilisation(8%)	LS	1	$29,200.00	$ 29,200
	Temporary Protection & Dir. of Traffic (10%)	LS	1	$36,600.00	$ 36,600
	Erosion Control (4%)	LS	1	$14,600.00	$ 14,600
	Pollution Control Plan (1%)	LS	1	$3,700.00	$ 3,700
	Removal of Structures & Obstructions (3%)	LS	1	$11,000.00	$ 11,000
	Clearing and Grubbing (1%)	LS	1	$36,600.00	$ 36,600
	Signing and Striping(1.5%)	LS	1	$5,500.00	$ 5,500
	Traffic Signal Modification	Each	0	$100,000.00	$ -
	Trees and Landscaping (3%)	LS	1	$11,000.00	$ 11,000
		Unit	**Quantity**	**Unit Cost**	**Cost**
	Barriers and Guardrail				
	Type 2A Guardrail	ft	0	$ 16.25	$ -
	Type 3 Guardrail	ft		$ 50.00	$ -
	Type 4 Guardrail	ft		$ 36.00	$ -
	Guardrail Transition	ea		$ 2,200.00	$ -
	Guardrail Terminals	ea		$ 2,300.00	$ -
	Project Subtotal				$ 513,741
	Project Scope Contingencies		1	40%	$ 205,496
	CONSTRUCTION ESTIMATE TOTAL				$ 719,237
	Preliminary Engineering	%	1	20%	$ 143,847
	Construction Engineering	%	1	15%	$ 107,886
	Environmental Studies	LS	All	None	$ -
	Right of Way	LS	All	$ 125,500.00	$ 125,500.00
	TOTAL PROJECT ESTIMATE				***$ 1,096,470***

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV4
Length (blank for intersection): 4750
Project Description: Construct Mt. Adams as a 3-lane arterial from Cascade to Fairview

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	332500	SF	$	0.05	$	16,625
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	332500	SF	$	1.25	$	415,625
Rock Blasting	3629.63	CY	$	45.00	$	163,333
Pavement	237500	SF	$	8.00	$	1,900,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	57000	SF	$	4.00	$	228,000
Curb and gutter	9500	LF	$	14.00	$	133,000
Landscaping	38000	SF	$	12.00	$	456,000
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Culvert (8' dia. fish passage)	60	LF	$	1,500.00	$	90,000
Lighting	4750	LF	$	60.00	$	285,000
Full Drainage	4750	LF	$	100.00	$	475,000
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Cul-de-sac Existing Streets	2	EA	$	50,000.00	$	100,000
Driveway Adjustments	1	Driveway	$	2,000.00	$	2,000
Traffic Signal Installation	2	LS	$	250,000.00	$	500,000
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping (1.5%)	1	LS	$	714,687.50	$	714,688
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	5,479,271
Traffic Control				5%	$	273,964
Mobilization				10%	$	547,927
Design/Administration/Management				15%	$	821,891
Contingency				30%	$	1,643,781
Project Development				5%	$	273,964
Sales Tax				0.0%	$	-
Right Of Way	332500	SF	$	8.00	$	2,660,000
Utility Easement	47500	SF	$	5.00	$	237,500

PROJECT COST:	**$**	**11,938,297**
	$	**11,940,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV4
Length (blank for intersection): 2150
Project Description: Construct Mt. Adams as a 3-lane arterial from Cascade to May

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	150500	SF	$	0.05	$	7,525
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	150500	SF	$	1.25	$	188,125
Rock Blasting	3629.63	CY	$	45.00	$	163,333
Pavement	107500	SF	$	8.00	$	860,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	25800	SF	$	4.00	$	103,200
Curb and gutter	4300	LF	$	14.00	$	60,200
Landscaping	17200	SF	$	12.00	$	206,400
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Culvert (8' dia. fish passage)	60	LF	$	1,500.00	$	90,000
Lighting	2150	LF	$	60.00	$	129,000
Full Drainage	2150	LF	$	100.00	$	215,000
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Cul-de-sac Existing Streets	2	EA	$	50,000.00	$	100,000
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	1	LS	$	250,000.00	$	250,000
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping (1.5%)	1	LS	$	355,917.50	$	355,918
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	2,728,701
Traffic Control				5%	$	136,435
Mobilization				10%	$	272,870
Design/Administration/Management				15%	$	409,305
Contingency				30%	$	818,610
Project Development				5%	$	136,435
Sales Tax				0.0%	$	-
Right Of Way	150500	SF	$	8.00	$	1,204,000
Utility Easement	21500	SF	$	5.00	$	107,500

PROJECT COST:	**$**	**5,815,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV4
Length (blank for intersection): 2600
Project Description: Construct Mt. Adams as a 3-lane arterial from May to Fairview

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	182000	SF	$	0.05	$	9,100
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	182000	SF	$	1.25	$	227,500
Rock Blasting	0	CY	$	45.00	$	-
Pavement	130000	SF	$	8.00	$	1,040,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	31200	SF	$	4.00	$	124,800
Curb and gutter	5200	LF	$	14.00	$	72,800
Landscaping	20800	SF	$	12.00	$	249,600
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Culvert (8' dia. fish passage)	0	LF	$	1,500.00	$	-
Lighting	2600	LF	$	60.00	$	156,000
Full Drainage	2600	LF	$	100.00	$	260,000
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Cul-de-sac Existing Streets	0	EA	$	50,000.00	$	-
Driveway Adjustments	1	Driveway	$	2,000.00	$	2,000
Traffic Signal Installation	1	LS	$	250,000.00	$	250,000
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping (1.5%)	1	LS	$	358,770.00	$	358,770
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	2,750,570
Traffic Control				5%	$	137,529
Mobilization				10%	$	275,057
Design/Administration/Management				15%	$	412,586
Contingency				30%	$	825,171
Project Development				5%	$	137,529
Sales Tax				0.0%	$	-
Right Of Way	182000	SF	$	8.00	$	1,456,000
Utility Easement	26000	SF	$	5.00	$	130,000
PROJECT COST:					**$**	**6,124,441**
					$	**6,125,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV5
Length (blank for intersection): 1150
Project Description: Extend Sherman from existing stub west of 30th to Mt Adams and Max to Rand

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	69000	SF	$	0.05	$	3,450
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	69000	SF	$	1.25	$	86,250
Pavement	39100	SF	$	8.00	$	312,800
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	13800	SF	$	4.00	$	55,200
Curb and gutter	2300	LF	$	14.00	$	32,200
Landscaping	13800	SF	$	12.00	$	165,600
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	1150	LF	$	60.00	$	69,000
Full Drainage	1150	LF	$	100.00	$	115,000
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	0	LS	$	-	$	-
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping (1.5%)	1	LS	$	125,925.00	$	125,925
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	965,425
Traffic Control				5%	$	48,271
Mobilization				10%	$	96,543
Design/Administration/Management				15%	$	144,814
Contingency				30%	$	289,628
Project Development				5%	$	48,271
Sales Tax				0.0%	$	-
Right Of Way	69000	SF	$	8.00	$	552,000
Utility Easement	11500	SF	$	-	$	-
	PROJECT COST:				**$**	**2,144,951**
					$	**2,145,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT:	MV6a	
Length (blank for intersection):	450	widened portion
Project Description:	Extend Rand/27th from existing stub south of May to Fairview	

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	9000	SF	$	0.05	$	450
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	12600	SF	$	1.25	$	15,750
Pavement	15300	SF	$	8.00	$	122,400
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	5400	SF	$	4.00	$	21,600
Curb and gutter	900	LF	$	14.00	$	12,600
Landscaping	5400	SF	$	12.00	$	64,800
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	450	LF	$	60.00	$	27,000
Full Drainage	450	LF	$	100.00	$	45,000
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	6	Driveway	$	2,000.00	$	12,000
Traffic Signal Installation	0	LS	$	-	$	-
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping (1.5%)	1	LS	$	48,240.00	$	48,240
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	369,840
Traffic Control				5%	$	18,492
Mobilization				10%	$	36,984
Design/Administration/Management				15%	$	55,476
Contingency				30%	$	110,952
Project Development				5%	$	18,492
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-
Utility Easement	0	SF	$	-	$	-
PROJECT COST:					**$**	**610,236**
					$	**611,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*

4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV6b
Length (blank for intersection): 1100 new R/W only
Project Description: Extend Rand/27th from existing stub south of May to Fairview

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	66000	SF	$	0.05	$	3,300
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	66000	SF	$	1.25	$	82,500
Pavement	37400	SF	$	8.00	$	299,200
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	13200	SF	$	4.00	$	52,800
Curb and gutter	2200	LF	$	14.00	$	30,800
Landscaping	13200	SF	$	12.00	$	158,400
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	1100	LF	$	60.00	$	66,000
Full Drainage	1100	LF	$	100.00	$	110,000
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	0	LS	$	-	$	-
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping (1.5%)	1	LS	$	120,450.00	$	120,450
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	923,450
Traffic Control				5%	$	46,173
Mobilization				10%	$	92,345
Design/Administration/Management				15%	$	138,518
Contingency				30%	$	277,035
Project Development				5%	$	46,173
Sales Tax				0.0%	$	-
Right Of Way	66000	SF	$	8.00	$	528,000
Utility Easement	11000	SF	$	5.00	$	55,000
Building Takes	1	LS	$	500,000.00	$	500,000
PROJECT COST:					**$**	**2,606,693**
					$	**2,607,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV7
Length (blank for intersection): 4250
Project Description: Extend Belmont from existing alignment at 27th to Post Canyon

	QTY	UNIT	UNIT COSTS	ESTIMATED COST
Remove Pavement	0	SF	$ 0.33	$ -
Clear & Grub	255000	SF	$ 0.05	$ 12,750
Remove Curb	0	LF	$ 10.00	$ -
Remove Sidewalk	0	SF	$ 1.50	$ -
Remove Striping	0	LF	$ 1.00	$ -
Grading	255000	SF	$ 1.25	$ 318,750
Pavement	144500	SF	$ 8.00	$ 1,156,000
Pavement Elevated/Subgrade	0	SF	$ 200.00	$ -
Sidewalk	51000	SF	$ 4.00	$ 204,000
Curb and gutter	8500	LF	$ 14.00	$ 119,000
Landscaping	51000	SF	$ 12.00	$ 612,000
Retaining Wall	0	LF	$ 120.00	$ -
Bridge < 120 ft.	0	SF	$ 125.00	$ -
Culvert (8' dia. fish passage)	60	LF	$ 1,500.00	$ 90,000
Lighting	4250	LF	$ 60.00	$ 255,000
Full Drainage	4250	LF	$ 100.00	$ 425,000
Drainage Modifications	0	LF	$ 25.00	$ -
Driveway Adjustments	2	Driveway	$ 2,000.00	$ 4,000
Traffic Signal Installation	0	LS	$ -	$ -
Traffic Signal Modification	0	LS	$ -	$ -
Signing and Striping (1.5%)	1	LS	$ 479,475.00	$ 479,475
Building Takes	0	LS	$ -	$ -
Off-site improvements	0	LS	$ -	$ -
SUBTOTAL				$ 3,675,975
Traffic Control			5%	$ 183,799
Mobilization			10%	$ 367,598
Design/Administration/Management			15%	$ 551,396
Contingency			30%	$ 1,102,793
Project Development			5%	$ 183,799
Sales Tax			0.0%	$ -
Right Of Way	255000	SF	$ 8.00	$ 2,040,000
Utility Easement	42500	SF	$ 5.00	$ 212,500
Wetland Mitigation	12000	SF	$ 24.00	$ 288,000

PROJECT COST:	**$ 8,605,859**
	$ 8,605,000

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV17
Length (blank for intersection): 200 turn lane
Project Description: At May/13th, install traffic signal and add eastbound right turn lane

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	5600	SF	$	0.33	$	1,848
Clear & Grub	4000	SF	$	0.05	$	200
Remove Curb	200	LF	$	10.00	$	2,000
Remove Sidewalk	1200	SF	$	1.50	$	1,800
Remove Striping	0	LF	$	1.00	$	-
Grading	4000	SF	$	1.25	$	5,000
Pavement	2800	SF	$	8.00	$	22,400
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	1200	SF	$	4.00	$	4,800
Curb and gutter	200	LF	$	14.00	$	2,800
Landscaping	0	SF	$	12.00	$	-
Retaining Wall	50	LF	$	120.00	$	6,000
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	200	LF	$	25.00	$	5,000
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	1	LS	$	250,000.00	$	250,000
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping	0	LS	$	-	$	-
Signing and Striping	1	LS	$	45,000.00	$	45,000
Building Takes	0	LS	$	-	$	-
Off-site improvements	1	LS	$	75,000.00	$	75,000
SUBTOTAL					$	421,848
Traffic Control				5%	$	21,092
Mobilization				10%	$	42,185
Design/Administration/Management				15%	$	63,277
Contingency				30%	$	126,554
Project Development				5%	$	21,092
Sales Tax				0.0%	$	-
Right Of Way	4000	SF	$	20.00	$	80,000
PROJECT COST:					**$**	**776,049**
					$	**775,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV18
Length (blank for intersection):
Project Description: At May/17th, modify control so SB 18th stops and May is free

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Remove Signing	2	EA	$	250.00	$	500
Grading	0	SF	$	1.25	$	-
Pavement	0	SF	$	8.00	$	-
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	SF	$	12.00	$	-
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	0	LS	$	-	$	-
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping	1	LS		1000	$	1,000
Signing and Striping	0	LF	$	1.50	$	-
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	1,500
Traffic Control				5%	$	75
Mobilization				10%	$	150
Design/Administration/Management				15%	$	225
Contingency				30%	$	450
Project Development				5%	$	75
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-
PROJECT COST:					**$**	**2,475**
					$	**3,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV19
Length (blank for intersection):
Project Description: At May/22nd, modify control so May is free and 22nd stops

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	1	LS	$	500.00	$	500
Remove Signing	1	LS	$	500.00	$	500
Grading	0	SF	$	1.25	$	-
Pavement	0	SF	$	8.00	$	-
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	SF	$	12.00	$	-
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	0	LS	$	-	$	-
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping	1	LS	$	1,000.00	$	1,000
Signing and Striping	0	LF	$	1.50	$	-
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	2,000
Traffic Control				5%	$	100
Mobilization				10%	$	200
Design/Administration/Management				15%	$	300
Contingency				30%	$	600
Project Development				5%	$	100
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-
PROJECT COST:					**$**	**3,300**
					$	**3,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV20, MV21, MV24
Length (blank for intersection):
Project Description: General traffic signal

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LF	$	1.00	$	-
Grading	0	SF	$	1.25	$	-
Pavement	0	SF	$	8.00	$	-
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	SF	$	12.00	$	-
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	1	LS	$	250,000.00	$	250,000
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping	0	LS	$	-	$	-
Signing and Striping	0	LF	$	1.50	$	-
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	250,000
Traffic Control				5%	$	12,500
Mobilization				10%	$	25,000
Design/Administration/Management				15%	$	37,500
Contingency				5%	$	12,500
Project Development				5%	$	12,500
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-
PROJECT COST:					**$**	**350,000**
					$	**350,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

DKS *Associates*
4/2/2011 16:47

City of Hood River TSP
Cost Estimate Summary

PROJECT ELEMENT: MV25
Length (blank for intersection):
Project Description: At Belmont/12th add signs limiting the westbound approach to right out movem

	QTY	UNIT	UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Remove Striping	0	LS	$	500.00	$	-
Remove Signing	0	LS	$	500.00	$	-
Grading	0	SF	$	1.25	$	-
Pavement	0	SF	$	8.00	$	-
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	SF	$	12.00	$	-
Retaining Wall	0	LF	$	120.00	$	-
Bridge < 120 ft.	0	SF	$	125.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Wetland Mitigation	0	SF	$	-	$	-
Driveway Adjustments	0	Driveway	$	2,000.00	$	-
Traffic Signal Installation	0	LS	$	-	$	-
Traffic Signal Modification	0	LS	$	-	$	-
Signing and Striping	1	LS	$	3,000.00	$	3,000
Signing and Striping	0	LF	$	1.50	$	-
Building Takes	0	LS	$	-	$	-
Off-site improvements	0	LS	$	-	$	-
SUBTOTAL					$	3,000
Traffic Control				5%	$	150
Mobilization				10%	$	300
Design/Administration/Management				15%	$	450
Contingency				30%	$	900
Project Development				5%	$	150
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-

PROJECT COST:	**$**	**4,950**
	$	**5,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2011 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

DKS *Associates*
4/2/2011 16:47

Appendix I: Technical Memorandum #4 Implementation-Action Strategy

FINAL Technical Memorandum #4

DATE: May 25, 2011

TO: Hood River TSP PMT

FROM: John Bosket, PE
Garth Appanaitis

SUBJECT: **Implementation-Action Strategy**
Hood River Transportation System Plan P10068-003

This memorandum summarizes the financial strategies for implementing the projects identified in the City of Hood River Transportation System Plan through existing and potential future revenue sources. The proposed transportation system improvement projects and associated costs for each mode are provided for both the "preferred plan" (all projects) as well as the "financially constrained plan". The financially constrained plan was based on a review of current revenue sources, as well as potential additional funds.

Funding for Transportation (Current Sources)

Future projections for the City of Hood River's transportation funding through the year 2031 were described in a previous memorandum. These projections were based on the amount of revenue collected in the past from current funding sources and assumptions for growth in land development through the planning horizon. Table 1 provides a summary of revenue assumed to be available for transportation funding for the City of Hood River, with future revenue divided between maintenance and other expenses and capital projects. Projecting the revenue assumed to be available for future capital projects helps to provide an understanding of the City's capacity for constructing the transportation improvement projects identified to be needed to support future growth. As listed in Table 1, the City has approximately $6.8 million available for capital improvements through 2031. It should be noted that this includes $3 million of ODOT STIP funds that have been dedicated for the realignment of Country Club Road and that the City's regular revenue streams are only projected to generate approximately $3.8 million through 2031.

Table 1: Transportation Revenue from Current Sources

Funding Source	2010 Revenue	Estimated Revenue for Next 21 Years (2011-2031)*		
		Total	Maintenance and Other Expenses	Capital Projects
State Fuel Apportionment	$290,000	$ 6,090,000	$ 6,090,000	$0
State Vehicle License Fees	$10,000	$210,000	$210,000	$0
State Match Funds (STIP)**	-	$3,000,000		$3,000,000
City Gas Tax	$280,000	$ 5,880,000	$ 5,880,000	$0
Street Systems Development Charges	$170,500	$ 3,805,500***	-	$3,805,500
Total	**$750,500**	**$ 18,985,500**	**$ 12,264,000**	**$ 6,805,500**

Note: A portion of the projected revenue will be required for the maintenance of existing facilities, street lighting, staff salaries, as well as other miscellaneous transportation expenses, and thus not available for capital projects.
*Forecast revenue is displayed in 2010 dollars
** includes funds for Country Club Road realignment.
***includes existing balance of $225,000

Transportation Improvement Program

The Transportation Improvement Program consists of a Preferred Plan of all transportation improvements identified to meet future needs through the year 2031, as well as a Financially Constrained Plan, which is a subset of the Preferred Plan projects that aligns with anticipated funding. The Financially Constrained Plan is commonly used to populate the City's Capital Improvement Program (CIP). However, any project from the Transportation Improvement Program Preferred Plan is eligible for inclusion on the CIP.

Table 2 summarizes the total costs to fund the Preferred and Financially Constrained Plans, with individual projects included listed in Tables 3 through 8. The costs associated with each plan are listed by travel mode (i.e., pedestrian, bicycle, and motor vehicle), as well as by lead agency. Lead agencies were assigned according to jurisdiction of the roadway or right of way affected. The designation of a lead agency does not create an obligation or commitment for funding, but is intended to refine the projection of transportation funding needs for the City.

Table 2: Transportation Improvement Program Costs (2011-2031) – Preferred vs. Financially Constrained Plans

Transportation Mode	Planning-Level Costs (2010 Dollars)	
	Preferred Plan	Financially Constrained Plan
Pedestrian	$9.2 million	$1.7 million
Shared Pedestrian/Bicycle	$9.6 million	$85,000
(Crossings)	*($470,000)*	*($85,000)*
(Off Street Facilities)	*($7.3 million)*	*($0)*
(Programs)	*($1.8 million)*	*($0)*
Bicycle	$3.7 million	$1.4 million
Motor Vehicle	$68.3 million	$11.0 million
Total Cost	**$90.8 million**	**$14.2 million**
Difference between Preferred and Financially Constrained Plans		**$76.6 million**

As listed in Table 2, the difference in costs to fund the Preferred Plan ($90.8 million) and Financially Constrained Plan ($14.2 million) is approximately $76.6 million. Furthermore, there is a significant gap between what the City can fund ($6.8 million) compared to what is needed to fund even the Financially Constrained plan ($14.2 million). While the City is not required to be able to fund the entire Preferred Plan list of projects, a reasonable approach to funding the entire Financially Constrained Plan must exist. With the Financially Constrained Plan shown to cost approximately $14.2 million (Table 2) and current revenue projected to reach only $6.8 million (Table 1), a means of generating an additional $7.4 million must be outlined.

As an example, the City of Hood River currently has a Transportation System Development Charge (SDC) rate of approximately $666 per single-family residence and $69.60 per daily trip for all other uses. By comparison, the SDC rates for many cities in and surrounding the Portland Metropolitan Area average approximately $6,500 per p.m. peak hour trip (or approximately $570 per daily trip). Sandy has a transportation SDC rate of $1,943 per p.m. peak hour trip while The Dalles has an SDC rate of $1500 per p.m. peak hour trip. An increase in Hood River's SDC rate of $1,373 for single-family households (from $666 to $2,039) and $143 per daily trip for all other trip types (from $69.60 to $213) would be sufficient to cover the remaining $7.4 million of projected project costs in the Financially Constrained Plan. Alternatively, a lesser SDC rate increase could be applied, with the remainder funded through another revenue source.

The Financially Constrained Plan projects can be relied upon to support future growth that conforms to the current Comprehensive Plan, even if the full funding approach has not be enacted. However, all funding sources must be in place before those projects can be relied upon to support comprehensive plan amendments. The inclusion of proposed projects and actions in this plan does not imply obligations of funds by any jurisdiction for project-level planning or construction. Instead, the inclusion of proposed projects and actions serves as an opportunity for the project to be added, if appropriate, to the State Transportation Improvement Program (STIP) and the City of Hood River CIP.

Detailed project lists for each mode of travel are provided below in Tables 3 through 8, indicating which projects are included in the Preferred Plan and the Financially Constrained Plan. Potential funding sources for the financially constrained plan projects are also included.

Table 3: Pedestrian System Preferred Plan – Sidewalk Infill Corridors

Project ID	Name/Location	Cost Estimate* (High)	Cost Estimate* (Low)	Included in Financially Constrained Plan? (potential funding sources)
SW1	Rand Road	$1,010,000	$460,000	
SW2	20th Street	$420,000	$155,000	
SW3	Cascade Avenue/HCRH-Westcliff Drive to Mt. Adams	$125,000	$125,000	
SW4	Sherman Avenue	$1,075,000	$420,000	
SW5	State Street	$280,000	$140,000	
SW6	OR 35 (north of US 30)	$0	$0	
SW7	Serpentine Road/Eugene Street	$270,000	$270,000	✓ **(City of Hood River)**
SW8	May Street	$1,245,000	$470,000	✓ **(City of Hood River)**
SW9	22nd Street	$640,000	$315,000	
SW10	18th Street	$575,000	$240,000	
SW11	Belmont Avenue	$505,000	$245,000	
SW12	Frankton Road	$1,855,000	$310,000	
SW13	Country Club Rd	$705,000	$705,000	
SW14	Cascade Avenue/HCRH (between Mt. Adams and Rand)	$225,000	$90,000	✓ **(City of Hood River, ODOT)**
SW15	13th Street/OR281	$100,000	$100,000	
SW16	12th/OR 281	$60,000	$60,000	
SW17	OR 35 (near I-84)	$60,000	$60,000	
	Preferred Plan	**$9,150,000**	**$4,165,000**	
	Financially Constrained Plan			**$1,740,000**

Table 4: Shared Pedestrian/Bicycle System Preferred Plan – Point/Crossing Locations

Project ID	Name/ Location	Cost Estimate*	Included in Financially Constrained Plan? (potential funding sources)
CR1	*Westcliff Drive & Cascade Avenue-HCRH	n/a	
CR2	Wasco Avenue & 20th Street/ Jaymar Road	$5,000	
CR3	*2nd Avenue (I-84 overpass)	$105,000	
CR4	6th Street & State Street	$15,000	
CR5	Hood River Bicycle & Pedestrian Bridge	$15,000	
CR6	*OR 281-13th Street & Sherman Street	$5,000	
CR7	*OR 281-13th Street & Montello Avenue	$5,000	✓ **(City of Hood River, ODOT)**
CR8	12th Street (North Leg) & May Street	$35,000	
CR9	*OR 281-13th Street & May Street	$55,000 ($30,000 if RRFB is not included)	✓ **(City of Hood River, ODOT, developer)**
CR10	*OR 281-12th Street & Belmont Avenue	$5,000	
CR11	*OR 281-13th Street & Belmont Avenue	$15,000	✓ **(City of Hood River, ODOT, developer)**
CR12	17th Street & May Street	$45,000	
CR13	Rocky Road & May Street	$5,000	
CR14	Fairview Drive & Belmont Drive	$45,000	
CR15	*OR 281-13th Street & State Street-HCRH	$5,000	
CR16	*OR-281-12th Street & Pacific Avenue	$5,000	
CR17	*5th Street & Oak Street-HCRH	$15,000	
CR18	*2nd Street & Oak Street-HCRH	$25,000	
CR19	2nd Street & State Street	$5,000	
CR20	(Future) Westside Community Trail & Belmont Drive	$5,000	✓ **(City of Hood River)**
CR21	*Cascade Avenue-HCRH (midblock between Mt. Adams Avenue and Rand Road)	$25,000	
CR22	*Cascade Avenue near-HCRH (midblock between Rand Road and 20th Street)	$25,000	
CR23	OR281-13th Street & Oak Street-HCRH	$5,000	✓ **(City of Hood River, ODOT, developer)**
	Preferred Plan Cost	**$470,000**	
	Financially Constrained Plan Cost		**$85,000**

Table 5: Shared Pedestrian/Bicycle System Preferred Plan – Off-street Pedestrian and Bicycle Facilities

Project ID	Name/Location	Cost Estimate*	Included in Financially Constrained Plan? (potential funding sources)
MUP1	Westcliff Drive	Future design refinement by City will be needed; no cost estimate available at this time.	
MUP2	Waterfront Path	$1,125,000	
MUP3	Waterfront Path Access from US 30	$230,000	
MUP4	Westside Community Trail	Project already funded by Hood River Valley Parks & Recreation	✓ **(HR Valley Park & Rec)**
MUP5	Hood River Middle School Path	$25,000	
MUP6	Indian Creek Trail Access from Union Street	$5,000	
MUP7	Indian Creek Bridge at 8th Street	$4,200,000	
MUP8	Indian Creek Trail, Segment 2	Pending future easement, project will be funded by Hood River Valley Parks & Recreation	✓ **(HR Valley Park & Rec)**
MUP9	Indian Creek Trail Access from Sherman Street	$360,000	
MUP10	Port of Hood River Path	$265,000	
MUP11	Post Canyon Path	$660,000	
MUP12	Indian Creek Trail (segment parallel to 12th Street/OR 281)	$215,000	
MUP 13	Cascade Avenue between Mt Adams Avenue and Westcliff Drive	$255,000	
	Preferred Plan Cost	**$7,340,000**	
	Financially Constrained Plan Cost		**$0**

Table 6: Shared Pedestrian/Bicycle System - Citywide and Programmatic Improvements

Name	Description	Cost Estimate	Included in Financially Constrained Plan?
ADA/Curb Ramp Upgrade Program	Upgrade curb ramps and eliminate gaps in ADA access along prioritized pedestrian routes near key destinations.	Example: $20,000/year. Fixed or percentage amount annually for capital improvements.	
"Smart Trips" Individualized Marketing Program	Develop an outreach program targeted at residents in neighborhoods receiving new bicycle and pedestrian infrastructure to encourage them to walk and bike more often. Distribute walking and bicycling maps; partner with local businesses for coupon incentives; organize group walks and rides to local recreational and commercial destinations. Administer before/after travel survey to evaluate effectiveness.	Example: $20,000. (Variable by size; assume ~$10/person in program area).	
Bicycle/Pedestrian Connections to Transit	Coordinate infrastructure upgrades near transit stops and park and rides to improve access and amenities targeted at increasing ridership.	Example: $20,000/year. Fixed or percentage amount annually for capital improvements.	
Safe Routes to Schools Curriculum	Leverage ODOT Safe Routes Program with local investment to bring Safe Routes curriculum to all area K-8 schools.	Example: $20,000/year. Fixed or percentage amount annually for capital improvements.	
Bicycle Wayfinding Signage	Implement a bicycle wayfinding signage program to assist new bicyclists in choosing comfortable routes, and to help visiting bicyclists navigate through the city.	Example: $100,000. Assumes one sign every 800 feet each direction along the ~20 mile proposed bicycle network, including 30% for design/engineering.	
Bicycle Parking Program	Implement bicycle rack design and placement standards; review development applications for compliance; coordinate with sidewalk installation by developments or in city projects.	Example: $5,000/year. Can be funded through fees for developments requesting related design variances.	
	Preferred Plan Cost (20 year total)	**$1,800,000**	
	Financially Constrained Plan Cost		**$0**

Table 7: Bicycle System – On Street Improvements

Project ID	Name/Location	Facility Type	Cost Estimate*	Included in Financially Constrained Plan? (potential funding source)
BL1	Country Club Road	Bike Lanes	$365,000	
BL2	Frankton Road	Bike Lanes	$340,000	
BL3	Cascade Avenue-Oak Street-HCRH	Bike Lanes	$135,000	✓ **(City of Hood River, ODOT, may be candidate for urban renewal)**
BL4	State Street	Bike Lanes	$80,000	
BL5	OR 35/Hood River Bridge	Bike Lanes	$65,000	
BL6	May Street	Bike Lanes	$890,000	✓ **(City of Hood River)**
BL7	Rand Rd	Bike Lanes	$210,000	
BL8	12th Street/13th Street/HCRH	Bike Lanes	$245,000	
BL9	Belmont Avenue	Bike Lanes	$110,000	
BL10	Belmont Drive	Bike Lanes	$115,000	
BL11	Indian Creek Road	Bike Lanes	$155,000	
BL12	Brookside Drive/Eliot Drive	Bike Lanes	$360,000	
BL13	OR 281/13th Street	Bike Lanes	$70,000	✓ **(City of Hood River, ODOT)**
BLSLM1	Serpentine Road/6th Street/Eugene Street	Uphill Bike Lane/ Downhill Shared Lane Markings	$40,000	✓ **(City of Hood River)**
SLM1	Wasco Street/7th Street	Shared Lane Markings	$35,000	✓ **(City of Hood River)**
SLM2	Industrial Street/3rd Street	Shared Lane Markings	$10,000	
SLM3	Oak Street/Front Street	Shared Lane Markings	$20,000	
SLM4	Cascade Avenue	Shared Lane Markings	$20,000	
SLM5	State Street	Shared Lane Markings	$20,000	✓ **(City of Hood RIver, urban renewal)**
SLM6	Sherman Avenue	Shared Lane Markings	$40,000	
SLM7	9th Street/Park Street	Shared Lane Markings	$5,000	
SLM8	May Street	Shared Lane Markings	$10,000	
SLM9	22nd Street	Shared Lane Markings	$15,000	
SLM10	Portway Avenue	Shared Lane Markings	$15,000	
SLM11	Riverside Drive	Shared Lane Markings	$5,000	
BLVD1	20th Street	Bike Boulevard	$25,000	
BLVD2	Sherman Avenue	Bike Boulevard	$10,000	
BLVD3	Montello Avenue/Eugene Street	Bike Boulevard	$115,000	✓ **(City of Hood River)**
BLVD4	9th Street	Bike Boulevard	$25,000	
BLVD5	4th Street	Bike Boulevard	$15,000	
BLVD6	18th Street/17th Street/ Avalon Way/Avalon Drive	Bike Boulevard	$80,000	
BLVD7	8th Street	Bike Boulevard	$60,000	✓ **(City of Hood River)**
	Preferred Plan Cost		**$3,705,000**	
	Financially Constrained Plan Cost			**$1,365,000**

Table 8: Motor Vehicle Preferred Plan

Project ID	Location	Planning Level Cost	Included in Financially Constrained Plan? (potential funding sources)
MV1*	I-84 Exit 62 Interchange	$20,900,000	
MV2*	Cascade Ave (HCRH): I-84 Exit 62 Interchange to Rand Rd.	$2,700,000	
MV3*	Country Club Rd. Realignment/ Mt. Adams Ave.	$3,700,000	✓ **(City of Hood River, ODOT, developer)**
MV4	Mt. Adams Ave.: Country Club Rd. to Fairview Dr.	$11,940,000	✓ **(City of Hood River, Financially Constrained Plan includes segment from Country Club Road to May Street: $5,815,000)**
MV5	Sherman Ave.: Rand Rd. to Mt. Adams Ave.	$2,145,000	
MV6	Rand Rd.: May St. to Belmont Ave.	$3,220,000	
MV7	Belmont Ave.: Rand Rd. to Frankton Rd.	$8,605,000	
MV8**	I-84 Exit 63 Interchange	$8,600,000	
MV9**	I-84 Exit 63 westbound off-ramp queue management	$230,000	
MV10*	Cascade Ave. (HCRH) / Westcliff Dr.	$950,000	
MV11*	Mt. Adams Ave./ Cascade Ave.(HCRH)	$350,000	✓ **(Proportional share district exists – no cost included)**
MV12*	Mt. Adams Ave./Country Club Rd.	$350,000	✓ **(City of Hood River, developer)**
MV13*	Rand Rd./ Cascade Ave. (HCRH)	$1,000,000	✓ **(Proportional share district exists – no cost included)**
MV14**	2nd St./ Riverside Dr.	$310,000	
MV15**	2nd St./ Portway Ave.	$3,000	
MV16**	OR 35/ State St.	$1,100,000	
MV17	May St./ 13th St. (OR 281)	$775,000	✓ **(City of Hood River, ODOT, developer)**
MV18	May St./17th St.	$3,000	✓ **(City of Hood River)**
MV19	May St./ 22nd St.	$3,000	
MV20	Cascade Ave. (HCRH) / 20th St.	$350,000	
MV21	Belmont Ave./ 13th St. (OR 281)	$350,000	✓ **(City of Hood River, ODOT, developer)**
MV22	Belmont Ave./ 12th St (OR 281)	$5,000	
MV23**	2nd St./ Oak St.(HCRH)	$350,000	✓ **(Assumed candidate for proportional share district – no cost included)**
MV24	2nd St./State St.	$350,000	
	Preferred Plan Total Cost	**$68,289,000**	
	Financially Constrained Plan Total Cost		**$10,993,000**

* Included in Draft Hood River I-84 Exit 62 Interchange Area Management Plan
** Included in Draft Hood River I-84 Exit 63 & Exit 64 Interchange Area Management Plan

Potential New Funding Sources

Consideration of new funding sources to increase revenue for transportation improvements is recommended to narrow the gap between the Preferred and Financially Constrained Plans. Any potential funding source is constrained based on a variety of factors, including the willingness of local leadership and the electorate to burden citizens and businesses, the availability of local funds to be dedicated or diverted to transportation issues from other competing City programs, and the availability and competitiveness of state and federal funds. Nonetheless, it is important for the City to consider all of its options and understand where its power may exist to provide and enhance funding for its transportation programs.

This section describes several potential transportation funding sources, including State and County contributions, City sources (i.e., residents, businesses, and/or developers), grants, and debt financing. Many of these sources have been used in the past by other agencies in Oregon, and in most cases, when used collectively, are sufficient to fund transportation improvements for a local community.

State and County Contributions

Within Hood River there are multiple roadways that are not under City jurisdiction but instead are the responsibility of either ODOT or Hood River County. The City should seek contributions (i.e., funding partnerships) from ODOT and Hood River County for projects located on their respective roadways. In addition, direct appropriations are another optional funding source.

ODOT Contributions

The Oregon Department of Transportation (ODOT) funds projects on state highways under three primary programs: modernization, preservation and maintenance, and grants (see *Grant Programs* below). Programmed projects are included in the four-year Statewide Transportation Improvement Program (STIP), which is updated every two years. ODOT maintenance districts (District 2C for Hood River) also have available funds that may be used for small-scale projects such as in-fill sidewalks or culvert repair on a state highway.

When considering proposed land use actions such as subdivisions or site development, the City should not assume that TSP projects on Cascade Avenue (US 30), OR 35, or 12th Street/ 13th Street (OR 281) will be in place to support the proposed development unless the project is programmed in the current STIP. For proposed comprehensive plan amendments, which must consider the long-term adequacy of the transportation system for TPR 660-012-0060 compliance, ODOT must be consulted to determine whether a highway project is “reasonably likely to be funded” based on funding projections at that time.

Direct Appropriations

The City can also seek direct appropriations from the State Legislature and/or the United States Congress for transportation capital improvements. There may be projects identified in the plan for which the City may want to pursue these special, one-time appropriations. In particular, projects that support economic development may gain support for direct appropriations.

City Sources

The City can also look to local residents, business owners, and developers to raise additional funds that can be designated for transportation-related uses. Some optional sources include developer exactions, Urban Renewal District (URD) fund increases, SDC increases, local improvement district (LID) funds, General Fund revenue transfers, special assessments, and employment taxes.

Developer Exactions

Exactions are roadway and/or intersection improvements that are partially or fully funded by developers as conditions of development approval. Typically, all developers are required to improve the roadways along their frontage upon site redevelopment. In addition, when a site develops or redevelops, the developer may be required to provide off-site improvements depending upon the expected level of traffic generation and the resulting impacts to the transportation system.

Urban Renewal District (URD)

A URD is a tax-funded district within the City. The URD is funded with the incremental increases in property taxes that result from the construction of applicable improvements. As desired, the funds raised by a URD can be used for, but are not limited to, transportation projects located within the URD boundaries.

The City has created both the Waterfront URD and a URD for its downtown core. Transportation projects within these areas could be considered for funding through the URD. However, because these funds may be used for other purposes than transportation improvements, no URD funds were assumed in the revenue projections. The City may desire to pay off the debt on the existing URDs before creating additional URDs (such as in the Heights).

Transportation System Development Charges (SDCs)

SDCs are a funding source collected from new development that can be used to fund projects that increase the transportation system's capacity (not for projects that target maintenance or operations). While the methodologies for determining the SDC rate may vary, a commonly used method is to base the rate on the estimated p.m. peak hour vehicle trips generated by a proposed development. Because a single-family home generates approximately 1.0 p.m. peak hour vehicle trip, it is often considered the base unit.

The City of Hood River has a current SDC rate of approximately $666 per single-family residence and $69.60 per daily trip for all other uses. To help fund transportation improvements to support future growth, the City could consider increasing the SDC rate. For every increase in SDC rates of $100 for single-family households and $10 per daily trip for all other trip types, there would be an additional $514,000 available for transportation improvements over a 21-year period.

Additionally, the City of Hood River SDC ordinance could be rewritten so that SDC funds could also be used to make improvements to the pedestrian and bicycle system, which is not currently allowed.

Local Improvement District (LID)

The City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones, of benefit. LIDs impose assessments on properties within its boundaries and may only be spent on capital projects within the geographic area. Because LIDs may not fund ongoing maintenance costs, they require separate accounting. Furthermore, because citizens representing 33 percent of the assessment can terminate a LID and overturn the planned projects, LID projects and costs must obtain broad approval of those within the LID boundaries.

Street Utility Fee

A number of Oregon cities supplement their street funds with street utility fees. Establishing user fees to fund applicable transportation activities and/or capital construction ensures that those who create the demand for service pay for it proportionate to their use. The street utility fees are recurring monthly or bi-monthly charges that are paid by all residential, commercial, industrial, and institutional users. The fees are charged proportionate with the amount of traffic generated, so a retail commercial user pays a higher rate than a residential user. Typically, there are provisions for reduced fees for those that can demonstrate they use less than the average rate implies, for example, a resident that does not own an automobile or truck.

From a system health perspective, forming a utility fee also helps to support the ongoing viability of the program by establishing a source of reliable, dedicated funding for that specific function. Fee revenues can be used to secure revenue bond debt used to finance capital construction. A transportation utility can be formed by Council action and does not require a public vote.

The General Fund Revenues

At the discretion of the City Council, the City can allocate General Fund revenues to pay for its transportation program. General Fund revenues primarily include property taxes, use taxes, and any other miscellaneous taxes and fees imposed by the City. This allocation is completed as a part of the City's annual budget process, but the funding potential of this approach is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source to fund new aspects of the transportation program are only available to the extent that either General Fund revenues are increased or City Council directs and diverts funding from other City programs.

Special Assessments

A variety of special assessments are available in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking, and central business district (CBD) or commercial zone transportation improvements. These assessments would likely fall within the Measure 50 limitations. One example is the 50/50 program. This is a match program for sidewalk infill projects where property owners pay half the cost of a sidewalk improvement and the City matches the investment to complete the project.

Employment Taxes

Employment taxes may be levied to raise additional funds. For example, in the Portland region, payroll and self employment taxes are used to generate approximately $145 million annually. The City of Portland has chosen to earmark these funds for TriMet transit operations.

Grants

The City of Hood River should actively pursue State and Federal grants, in particular to complete desired pedestrian and bicycle projects. Grant opportunities include funding for pedestrian, bicycle, Intelligent Transportation System (ITS), and Safe Routes to School (SRTS) improvements. Current grant programs include:

Federal Funding Sources

- Highway Safety Improvement Program
- Transportation Enhancements
- Recreational Trails Program
- Safe Routes to School (SRTS)
- New Freedom Initiative
- Community Development Block Grants
- Land and Water Conservation Fund
- Transportation, Community and System Preservation Program

State Funding Sources

- Oregon Immediate Opportunity Fund
- Oregon Transportation Infrastructure Bank
- Oregon Special Transportation Fund
- Oregon Bicycle and Pedestrian Program Grants
- Oregon Pedestrian Safety Mini-Grant Program
- Oregon Business Energy Tax Credits (BETC)
- Oregon Safe Routes to School (OSRTS)

Other Funding Sources

- American Greenways Program
- Bikes Belong Grant Program

Debt Financing

While not a direct funding source, debt financing is another funding method. Through debt financing, available funds can be leveraged and project costs can be spread over the projects' useful lives. Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but it is also viewed as an equitable funding source for larger projects because it spreads the burden of repayment over existing and future customers who will benefit from the projects. One caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations. Two methods of debt financing are voter-approved general obligation bonds and revenue bonds.

Voter-Approved General Obligation Bonds

Subject to voter approval, the City can issue General Obligation (GO) bonds to debt finance capital improvement projects. GO bonds are backed by the increased taxing authority of the City, and the annual principal and interest repayment is funded through a new, voter-approved assessment on property throughout the City (i.e., a property tax increase). Depending on the critical nature of projects identified in the Transportation Plan and the willingness of the electorate to accept increased taxation for transportation improvements, voter-approved GO bonds may be a feasible funding option for specific projects. Proceeds may not be used for ongoing maintenance.

Revenue Bonds

Revenue bonds are debt instruments secured by rate revenue. For the City to issue revenue bonds for transportation projects, it would need to identify a stable source of ongoing rate funding. Interest costs for revenue bonds are slightly higher than for general obligation bonds due to the perceived stability offered by the “full faith and credit” of a jurisdiction.

Appendix J: Implementing Ordinances Memorandum

LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date:	April 8, 2011 ***Final Draft May 27, 2011***
To:	Transportation System Plan Advisory Committee
cc:	Cindy Walbridge, City of Hood River Sonya Kazen, Oregon Department of Transportation John Bosket, DKS Associates
From:	Darci Rudzinski, AICP, Angelo Planning Group Shayna Rehberg, AICP, Angelo Planning Group
Re:	Hood River Transportation System Plan Update – TPR Evaluation and Proposed Code Amendments DRAFT

The purpose of this memorandum is to evaluate the City of Hood River Development Code according to requirements in the Oregon Transportation Planning Rule (TPR) and to provide the City with recommended regulatory language that will implement the updated Transportation System Plan (TSP) and ensure consistency with the TPR.

This memo presents a full analysis of the Hood River code as it relates to the TPR. Specifically, the subdivision ordinance (Title 16) and the zoning ordinance (Title 17) were audited for TPR compliance. Although the existing Hood River TSP (1999, updated 2003) cites the TPR and compliance issues, it does not appear that a full TPR analysis was prepared for the 1999 TSP. Additionally, the TPR was updated in 2005 and it needs to be ensured that those updates are adequately addressed in code language.

The TPR Compliance Analysis table that follows identifies applicable sections of the TPR and whether they are addressed in the City's existing code and policies. It also includes a brief discussion of Hood River's existing code and offers recommendations for bringing the code further into compliance with the TPR.

Specific code amendment language to implement the updated TSP and ensure consistency with the TPR is proposed following the analysis table. The relevant section of the TPR is cited, along with repetition of the recommendation from the analysis table, and is called out in a text box preceding the proposed code amendment language. Code amendment language is presented such that language recommended for addition to the code is underlined and language recommended for removal from the code is ~~struck through~~.

Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in Development Code?**	**Comments/Recommendations**
(1) Each local government shall amend its land use regulations to implement the TSP.		
(a) The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances do not have a significant impact on land use.	Yes	Section 17.20.050 (Standards for Transportation Improvements) establishes transportation facilities, services, and improvements that are permitted outright or are permitted subject to site plan review. **No further code amendments are recommended to comply with this section of the TPR.**
(b) To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, policy or legal judgment.	Yes	
(c) Local governments shall provide a review and approval process that is consistent with 660-012-0050 (Transportation Project Development). Local governments shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.	Partially	Notice requirements for administrative actions (Section 17.09.030), quasi-judicial actions (Section 17.09.040), and legislative actions (Section 17.09.050) specify that affected government agencies shall be notified when the action is proposed on or adjacent to property or a facility of their jurisdiction. A pre-application conference is required for Planned Developments pursuant to Section 17.07.080(A) (Preliminary Development Plan Submission Requirements). A pre-application conference may be required for administrative and quasi-judicial actions pursuant to Sections 17.09.030(D) and 17.090.040(C). Provisions for pre-application conferences are established in Section 17.09.120. **<u>Recommendation:</u> The language for required notification for these actions should be expanded so that ODOT receives notice for any proposed development, zone change, or Comprehensive Plan map or text amendment that could potentially impact a state facility. It is further recommended that the city add provisions for inviting ODOT to**

Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in Development Code?**	**Comments/Recommendations**
		participate in pre-application conferences for proposed actions that may impact a state facility.
(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions.		
(a) Access control measures.	Yes/Partially	Section 17.20.030 (Access Management Standards) establishes that access management standards "apply to all development on arterials and collectors within the City and UGA and to all properties that abut these roadways as part of site plan review process." Subsection 16.12.020(G) (Vehicular Access and Circulation, Access Spacing) and Chapter 13.28 (Access Spacing, Driveways and Curb Cuts) establish spacing for local streets and refer to the TSP for spacing for arterial and collector streets. These sections also refer to the OHP and OAR 734-051 for spacing standards for state facilities. **Recommendation: Update the sections citing specific spacing standards to be consistent with standards developed in the TSP update.**
(b) Standards to protect the future operations of roadways and transit corridors	Partially	A Level-of-Service (LOS) performance standard of "D" is being considered for adoption by the city as part of the TSP update. Performances standards are established in the TSP. Traffic impact report requirements should be reviewed/amended to include a determination of whether or not traffic generated from a proposed action conforms to or exceeds the LOS standard. Currently, Sections 17.16.040(E) and 16.12.020(D) state that a traffic impact report may be required as part of site plan review or land division review. These sections require that a report be prepared by a traffic engineer licensed in Oregon and outline the types of conditions that may be attached to approval of an application based on traffic impact. **Recommendation: The City should revise existing traffic impact report**

Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in Development Code?**	**Comments/Recommendations**
		code sections to uniformly name the impact report (e.g. Traffic Impact Report, Traffic Impact Study, or Traffic Impact Analysis) and add more specificity to what would be required in a report and when one would be required. **The City has requested that a "two tiered" requirement be explored, with a proposed trip threshold under which a development proposal would be required to submit a lower level of analysis or documentation to show possible transportation impacts.** **The proposed "Traffic Impact Analysis" requirements would be in new HRMC Title 17.20.060 (in Chapter 17.20, Transportation Circulation and Access Management). Associated changes, including cross-references, would be made to Chapter 17.16, Site Plan Review, and Chapter 16.12, General Design and Improvement Standards (for subdivisions).** **Note that much of the previously drafted TIA language that was developed for the IAMP Overlay Zone has been incorporated into 17.20.060 and is generally applicable to development within the city; Subsection 17.20.060.I includes specific requirements for proposals within the IAMP Overlay Zone.**
(c) Measures to protect public use airports by controlling land uses within airport noise corridors and imaginary surfaces, and by limiting physical hazards to air navigation	No	Not applicable.

Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in Development Code?**	**Comments/Recommendations**
(d) Coordinated review of future land use decisions affecting transportation facilities, corridors or sites	Partially	See comments under 660-12-0045(1)(c). **Recommendation: The language for required notification for these actions should be expanded so that ODOT receives notice for any proposed development, zone change, or Comprehensive Plan map or text amendment that could potentially impact a state facility. Further, provisions for inviting ODOT to participate in pre-application conferences for proposed actions that may impact a state facility should be added.**
(e) Process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities	Yes/Partially	Currently, Sections 17.16.040(E) and 16.12.020(D) state that a traffic impact report may be required as part of site plan review or land division review. These sections require that a report be prepared by a traffic engineer licensed in Oregon and outline the types of conditions that may be attached to approval of an application based on traffic impact. **Recommendation: The type of conditions currently identified in the existing sections on traffic impact reports or studies may be modified to provide more detail, based on the new HRMC Title 17.20.060 Traffic Impact Analysis.**
(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public hearings, subdivision and partition applications, applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations.	Partially	See comments under 660-12-0045(1)(c) **Recommendation: The language for required notification for these actions should be expanded so that ODOT receives notice for any proposed development, zone change, or Comprehensive Plan map or text amendment that could potentially impact a state facility. Further, provisions for inviting ODOT to participate in pre-application conferences for proposed actions that may impact a state facility should be added.**
g) Regulations assuring amendments to land use	Yes	Section 17.08.050 addresses TPR requirements for legislative and quasi-

Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in Development Code?**	**Comments/Recommendations**
designations, densities, design standards are consistent with the function, capacities, and levels of service of facilities designated in the TSP.		judicial actions. It requires that "land uses be consistent with the function, capacity, and level of service of the facility" identified in the TSP, pursuant to OAR 660-012-0060. **No further amendments are recommended to implement this section of the TPR.**
(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth in 660-012-0040(3)(a-d):		
(a) Provide bicycle parking in multifamily developments of 4 units or more, new retail, office and institutional developments, transit transfer stations and park-and-ride lots	Yes/Partially	Section 17.20.040 (Bicycle Parking) requires a minimum of two (2) bicycle parking spaces per use for all uses subject to site review. Further, additional standards are established for multi-family residential development, public and commercial parking lots, schools, and all other uses. **<u>Recommendation:</u> No further amendments are needed to comply with this section of the TPR. However, the City is interested in augmenting the existing standards with guidelines and requirements for design and location as provided in the Oregon Bicycle Plan (2005 Draft). Most of the proposed design language is presented as guidelines ("should") rather than requirements ("shall") for this subsection.**
(b) Provide "safe and convenient" (per subsection 660-012-0045.3(d)) pedestrian and bicycle connections from new subdivisions/multifamily development to neighborhood activity centers; bikeways are required along arterials and major collectors; sidewalks are required along arterials, collectors, and most local streets in urban areas except controlled access roadways	Partially	Requirements for internal pedestrian circulation in site plans are included in Subsection in Subsection 17.020.030(B)(4) and in land divisions in Section 16.12.030. Cross-sections are being revised as part of the TSP update and these show bikeways and sidewalks on all arterials and collectors. Currently, cross-sections for urban arterials, commercial/industrial streets, urban collectors, local streets, local streets/infill, and cul-de-sacs are included in the code in Chapter 16.12 (General Design and Improvement Standards).

Transportation Planning Rule Compliance Analysis

TPR Requirement (OAR Section 660-12-0045)	Addressed in Development Code?	Comments/Recommendations
		Subsection 16.12.020(I) sets out block standards in order to create good street connectivity. Subsection (J) establishes requirements for Future Street Plans (FSPs) that must demonstrate connectivity. **Recommendation: Chapter 16.12 will be modified to be consistent with the proposed street cross-sections in the TSP. It is recommended that multi-use path or trail cross-sections also be added this section. Bicycle circulation requirements should be added where pedestrian circulation requirements currently appear in the code.**
(c) Off-site road improvements required as a condition of development approval must accommodate bicycle and pedestrian travel, including facilities on arterials and major collectors	Yes	Provisions for conditions of approval as a result of traffic impact studies are described in Subsections 17.16.040(E)(6) and 16.12.020(E) Updated street cross-sections for city arterials, collectors and local streets will be included in Chapter 16.12 where existing cross-sections are found. Bike lanes and sidewalks are part of the proposed cross-sections, which would generally be required of a developer constructing a street to City standards. Existing Hood River code (16.12.060 Public Facilities Standard, (B) Transportation Standards) allows for modifications as needed: *2. Modifications: A modification to the street design standards in this section and the Transportation System Plan may be granted by the City Engineer under this provision if a required improvement is not feasible due to topographic constraints or constraints posed by sensitive lands (e.g., wetlands, significant trees and shrubs) or if necessary for safety or improved function of the transportation facility.* **No further amendments are recommended to implement this section of the TPR.**
(e) Provide internal pedestrian circulation within new	Yes	Requirements for internal pedestrian circulation in site plans are included in

<table>
<tr><th colspan="3">Transportation Planning Rule Compliance Analysis</th></tr>
<tr><th>TPR Requirement (OAR Section 660-12-0045)</th><th>Addressed in Development Code?</th><th>Comments/Recommendations</th></tr>
<tr><td>office parks and commercial developments</td><td></td><td>Subsection 17.020.030(B)(4) and in land divisions in Subsection 16.12.030(A).

No further amendments are recommended to implement this section of the TPR.</td></tr>
<tr><td>(6) As part of the pedestrian and bicycle circulation plans, local governments shall identify improvements to facilitate bicycle and pedestrian trips to meet local travel needs in developed areas.</td><td>Yes</td><td>Bicycle and pedestrian facility improvements are identified in the TSP, and were developed with the assistance of a Bicycle/Pedestrian Group formed specifically for this TSP update.

No further amendments are recommended to implement this section of the TPR.</td></tr>
<tr><td>(7) Local governments shall establish standards for local streets and accessways that minimize pavement width and total ROW consistent with the operational needs of the facility.</td><td>Yes/Partially</td><td>The TSP will include updated street cross-sections: these cross-sections will replace existing graphics/standards in Section 16.12.060 Public Facilities Standards. In order to meet the TPR requirement of “minimizing pavement width,” a narrower local street right-of-way option should be provided.
The Department of Land Conservation and Development’s Neighborhood Street Width Guidebook suggests the following local street standards:
Pavement — Right of-Way
No On-Street Parking 20’ 42-48’
Parking on One Side 24’ 47-52’
Parking on Two Sides 28’ 52-56’

Currently, the suggested local street standards do not include a public street standard that is less than 28’ of paved right-of-way. Proposed private street standards would allow 28’ of paved right-of-way with parking on both sides. The City’s adopted local street right-of-way and pavement width standards are consistent with recommended standards, but allowing a narrower local street pavement option would further the goal of reducing impervious surface.</td></tr>
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Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in Development Code?**	**Comments/Recommendations**
		<u>Recommendation:</u> Reexamine the proposed local street design options and determine if a narrower street option is feasible for public streets and under what conditions a "skinny street" design could be permitted (e.g., limiting parking to one side of the street or prohibiting parking).
OAR 660-12-0060 Plan & Land Use Regulation Amendments Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility.	Partially	Section 17.08.050 addresses TPR requirements for legislative and quasi-judicial actions. It requires that "land uses be consistent with the function, capacity, and level of service of the facility" identified in the TSP, pursuant to OAR 660-012-0060. **<u>Recommendation:</u> Add clarification that these provisions also currently apply to zone changes consistent with the comprehensive map designation. Add provisions that reference the new TIA section in the code.**

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(1) Each local government shall amend its land use regulations to implement the TSP.
(c) Local governments shall provide a review and approval process that is consistent with 660-012-0050 (Transportation Project Development). Local governments shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.

(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions.
(d) Coordinated review of future land use decisions affecting transportation facilities, corridors or sites
(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public hearings, subdivision and partition applications, applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations.

<u>Recommendation:</u> The language for required notification for these actions should be expanded so that ODOT receives notice for any proposed development, zone change, or Comprehensive Plan map or text amendment that could potentially impact a state facility. It is further recommended that the city add provisions for inviting ODOT to participate in pre-application conferences for proposed actions that may impact a state facility.

17.09.030 Administrative Actions
F. Notice of Application.
1. Within ten (10) days after receipt of a complete application for administrative action, notice of the request shall be mailed to:
a. The applicant and owners of property within 250 feet of the subject property. The list shall be completed from the most recent property tax assessment roll.
b. Any affected governmental agency, department, or public district within, or adjacent to, whose boundaries the subject property lies. <u>For subject sites located adjacent to a state roadway or where proposals may have an impact on a state facility, notice of the application shall be sent to ODOT</u>.

17.09.040 Quasi-Judicial Actions
G. Notice of Hearing.
1. At least twenty (20) days before a scheduled quasi-judicial public hearing, notice of the hearing shall be mailed to
a. The applicant and owners of property within 250 feet of the subject property. The list shall be compiled from the last available complete property tax assessment roll; and
b. Any affected governmental agency, department, or public district within, or adjacent to, whose boundaries include the subject property lines. <u>For subject sites located adjacent to a state roadway or where proposals may have an impact on a state facility, notice of the application shall be sent to ODOT</u>.

17.09.050 Legislative Actions
E. Additional Notice.
1. Written notice shall be provided to property owners when required by ORS 227.186.
2. Written notice shall be provided to the Department of Land Conservation and Development as required by ORS 197.610. <u>For subject sites located adjacent to a state roadway or where proposals may have an impact on a state facility, notice of the application shall be sent to ODOT</u>.

17.09.120 Pre-Application Conferences

A. When a pre-application conference is required, the applicant shall schedule a meeting with the Planning Department. When the proposed action is located adjacent to a state roadway or the proposed action may have an impact on a state roadway, ODOT shall be invited to participate in the preapplication conference and review of the application. At the conference, the City may address the following:

1. The comprehensive plan policies, and map designations applicable to the proposal;
2. The ordinance provisions, including substantive and procedural requirements applicable to the proposal;
3. Availability of technical data and assistance which will aid the applicant; and
4. Other governmental policies and regulations that relate to the application.

B. Disclaimer. Failure of the City to provide any of the information required by this section does not constitute a waiver of any of the standards, criteria, or requirements for the application.

C. Pre-application comments expire one year from the date of the pre-application meeting.

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(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions.
(a) Access control measures.

Recommendation: Update the sections citing specific spacing standards to be consistent with standards developed in the TSP update. The tables that have been inserted into Section 13.28.040 are from the proposed standards in the TSP.

13.28.040 ~~Access Spacing for Streets~~Driveways and Public Street Access Spacing Standards: Driveway ~~accesses~~approaches shall be separated from other driveways and street intersections in accordance with the following standards and procedures:

A. Local Streets. A minimum of 22 feet separation (as measured by straight curb between access points) shall be required on local streets (i.e. streets not designated as collectors or arterials).

B. Arterial and Collector Streets. Access spacing on collector and arterial streets, and intersections shall be determined based on the policies and standards contained in the City's Transportation System Plan and Manual for Uniform Traffic Control Devices. Access to state highways shall be subject to the requirements of the Oregon Highway Plan and OAR Chapter 734, Division ~~3~~51.

The standards for driveway and street spacing on local public streets are established in Table 8 of the Transportation System Plan and are included below as Table 13.28-A.

Table 13.28-A: City of Hood River Access Management Spacing Standards [a, b, c]

Street Classification	Spacing Between Public Streets (Min.-Max.)	Minimum Spacing Between Driveways and Other Driveways or Public Streets [d]
Minor Arterial Street	660-1,000 feet	300 feet
Collector Street	220-440 feet	100 feet
Local Street	200 feet	22 feet

[a] Exceptions may be made by the City Engineer
[b] Measured centerline to centerline
[c] Public streets within the IAMP Overlay Zone are subject to the standards in [new] Section 17.20.030.D.
[d] Private access to arterial roadways shall only be granted through a requested variance of access spacing standards when access to a lower classification facility is not feasible.

The standards for street spacing on state highways in the Hood River Urban Growth Boundary (UGB) are established in the Oregon Highway Plan and OAR Chapter 734, Division 51. Standards for District highways are presented below in Table 13.28-B.

Table 13.28-B Oregon Highway Plan Access Management Spacing Standards

Facility	**Access Spacing Standard [a] per Posted Speed (Urban Area [b])**				
	>= 55 mph	50 mph	40 & 45 mph	30 & 35 mph	<= 25 mph
District Highway [c]	700 feet	550 feet	500 feet	350 feet	350 feet

[a] Measurement of the approach road spacing is from center to center on the same side of the roadway.
[b] The Urban standard applies within UGBs unless a management plan agreed to by ODOT and the local government(s) establishes a different standard.
[c] OR 281 and US 30 are currently classified as District Highways

16.12.020 Vehicular Access and Circulation
G. Access Spacing. Driveway accesses shall be separated from other driveways and street intersections in accordance with the following standards and procedures:

1. Local Streets: A minimum of twenty-two (22) feet separation (as measured ~~from the sides of the driveway/street~~ by straight curb between access points) shall be required on local streets (i.e., streets not designated as collectors or arterials), except as provided in subsection 3, below.
2. Arterial and Collector Streets: Access spacing on collector and arterial streets, and at controlled intersections (i.e., with four-way stop sign or traffic signal) shall be determined based on the policies and standards contained in the City's Transportation System Plan. Access to state highways shall be subject to the requirements of the Oregon Highway Plan and OAR Chapter 734, Division ~~3~~51.

The standards for driveway and street spacing on local public streets are established in Table 8 of the Transportation System Plan and are included below as Table 16.12-A.

Table 16.12-A: City of Hood River Access Management Spacing Standards [a, b, c]

Street Classification	**Spacing Between Public Streets (Min.-Max.)**	**Minimum Spacing Between Driveways and Other Driveways or Public Streets [d]**
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Local Street	200 feet	22 feet

[a] Exceptions may be made by the City Engineer
[b] Measured centerline to centerline
[c] Public streets within the IAMP Overlay Zone are subject to the standards in [new] Section 17.20.030.D.
[d] Private access to arterial roadways shall only be granted through a requested variance of access spacing standards when access to a lower classification facility is not feasible.

The standards for street spacing on state highways in the Hood River Urban Growth Boundary f(UGB) are established in the Oregon Highway Plan and OAR Chapter 734, Division 51. Standards for District highways are presented below in Table 16.12-B.

Table 16.12-B Oregon Highway Plan Access Management Spacing Standards

Facility	**Access Spacing Standard [a] per Posted Speed (Urban Area [b])**				
	>= 55 mph	50 mph	40 & 45 mph	30 & 35 mph	<= 25 mph
District Highway [c]	700 feet	550 feet	500 feet	350 feet	350 feet

[a] Measurement of the approach road spacing is from center to center on the same side of the roadway.
[b] The Urban standard applies within UGBs unless a management plan agreed to by ODOT and the local government(s) establishes a different standard.
[c] OR 281 and US 30 are currently classified as District Highways

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(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions.
(b) Standards to protect the future operations of roadways and transit corridors
(e) Process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities

Recommendation: The City should revise existing traffic impact report code sections to uniformly name the impact report (e.g. Traffic Impact Report, Traffic Impact Study, or Traffic Impact Analysis) and add more specificity to what would be required in a report and when one would be required.

The City has requested that a "two tiered" requirement be explored, with a proposed trip threshold under which a development proposal would be required to submit a lower level of analysis or documentation to show possible transportation impacts.

The proposed "Traffic Impact Analysis" requirements are in new Section 17.20.060 (in Chapter 17.20, Transportation Circulation and Access Management). Associated cross-references have been made to Chapter 17.16, Site Plan Review, and Chapter 16.12, General Design and Improvement Standards (for subdivisions).

CHAPTER 17.20 TRANSPORTATION CIRCULATION AND ACCESS MANAGEMENT

17.20.010 Applicability
17.20.020 Definitions
17.20.030 Access Management Standards
17.20.040 Bicycle Parking
17.20.050 Standards for Transportation Improvements
17.20.060 Transportation Impact Analysis

17.20.060 Traffic Impact Analysis

A. Purpose. The purpose of this section of the code is to implement Section 660-012-0045(2)(e) of the State Transportation Planning Rule that requires the city to adopt a process to apply conditions to development proposals in order to protect and minimize adverse impacts to transportation facilities. This section establishes the standards for when a proposal must be reviewed for potential traffic impacts; when a Traffic Impact Analysis (TIA) must be submitted with an application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what must be in a TIA; and who is qualified to prepare the analysis.
B. Typical Average Daily Trips and Peak Hour Trips. The latest edition of the *Trip Generation* manual, published by the Institute of Transportation Engineers (ITE) shall be used as standards by which to gauge average daily and peak hour (weekday and/or weekend) vehicle trips, unless a specific trip generation study that is approved by the City Engineer indicates an alternative trip generation rate is appropriate. A trip generation study may be used to determine trip generation for a specific land use which is not well represented in the ITE Trip Generation Manual and for which a similar facility is available to count.

C. Applicability and Consultation. A Traffic Impact Analysis shall be required to be submitted to the city with a land use application when (1) a change in zoning or plan amendment is proposed or (2) a proposed development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis, field measurements, crash history, Institute of Transportation Engineers *Trip Generation*; and information and studies provided by the local reviewing jurisdiction and/or ODOT:

a. The proposed action is estimated to generate 250 Average Daily Trips (ADT) or more, or 25 or more weekday AM or PM peak hour trips (or as required by the City Engineer);

b. An increase in use of adjacent streets by vehicles exceeding the 20,000 pound gross vehicle weights by 10 vehicles or more per day

c. The location of the access driveway does not meet minimum intersection sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate, creating a safety hazard; or

d. The location of the access driveway does not meet the access spacing standard of the roadway on which the driveway is located; or

e. A change in internal traffic patterns that may cause safety problems, such as back up onto public streets or traffic crashes in the approach area.

The applicant shall consult with the City Engineer or his/her designee at the time of a pre-application conference (see Section 17.09.120 Pre-Application Conferences) about whether a TIA is required and, if required, the details of what must be included in the TIA.

D. Traffic Assessment Letter. If a TIA is not required as determined by Section 17.20.060.C, the applicant shall submit a Transportation Assessment Letter (TAL) to the City indicating that TIA requirements do not apply to the proposed action. This letter shall present the trip generation estimates and distribution assumptions for the proposed action and verify that driveways and roadways accessing the site meet the sight distance, spacing, and roadway design standards of the agency with jurisdiction of those roadways. Other information or analysis may be required as determined by the City Engineer. The TAL shall be prepared by an Oregon Registered Professional Engineer who is qualified to perform traffic engineering analysis.

The requirement for a TAL may be waived if the City Engineer determines that the proposed action will not have a significant impact on existing traffic conditions.

E. Traffic Impact Analysis Requirements.

1. Preparation. A Traffic Impact Analysis shall be prepared by an Oregon Registered Professional Engineer who is qualified to perform traffic engineering analysis and will be paid for by the applicant.

2. Transportation Planning Rule Compliance. See Chapter 17.08.050 Transportation Planning Rule Compliance.

3. Pre-application Conference. The applicant will meet with the City Engineer prior to submitting an application that requires a Traffic Impact Analysis. The City has the discretion to determine the required elements of the TIA and the level of analysis expected.

F. Study Area. The following facilities shall be included in the study area for all Traffic Impact Analyses (unless modified by the City Engineer):

1. All site-access points and intersections (signalized and unsignalized) adjacent to the proposed site. If the proposed site fronts an arterial or collector street, the analysis shall address all intersections and driveways along the site frontage and within the access spacing distances extending out from the boundary of the site frontage.

2. Roads through and adjacent to the site.

3. All intersections that receive site-generated trips that comprise at least 10% or more of the total intersection volume.

4. All intersections needed for signal progression analysis.

5. In addition to these requirements, the City Engineer may determine any additional intersections or roadway links that may be adversely affected as a result of the proposed development.

6. Those identified in the IAMP Overlay Zone (see Subsection I).

G. When a Traffic Impact Analysis (TIA) is required, the TIA shall address the following minimum requirements:

1. The TIA was prepared by an Oregon Registered Professional Engineer; and

2. If the proposed development shall cause one or more of the effects in Section 17.20.060(C), above, or other traffic hazard or negative impact to a transportation facility, the TIA shall include mitigation measures that are attributable and are proportional to those impacts, meet the City's adopted Level-of-Service standards, and are satisfactory to the City Engineer and ODOT, when applicable; and

3. The proposed site design and traffic and circulation design and facilities, for all transportation modes, including any mitigation measures, are designed to:

a. Minimize the negative impacts on all applicable transportation facilities; and

b. Accommodate and encourage non-motor vehicular modes of transportation to the extent practicable; and

c. Make the most efficient use of land and public facilities as practicable; and

d. Provide the most direct, safe and convenient routes practicable between on-site destinations, and between on-site and off-site destinations; and

e. Otherwise comply with applicable requirements of the Hood River Municipal Code.

4. If the proposed development will increase through traffic volumes on a residential local street by 20 or more vehicles during the weekday p.m. peak hour or 200 or more vehicles per day, the impacts on neighborhood livability shall be assessed and mitigation for negative impacts shall be identified. A negative impact to neighborhood livability will occur where:

a. residential local street volumes increase above 1,200 average daily trips; or

b. the existing 85th percentile speed on residential local streets exceed 28 miles per hour.

H. Conditions of Approval. The city may deny, approve, or approve a development proposal with appropriate conditions needed to meet transportation operations and safety standards and provide the necessary right-of-way and improvements to develop the future planned transportation system. Factors that should be evaluated as part of land division and site development reviews, and which may result in conditions of approval, include:

1. Crossover or reciprocal easement agreements for all adjoining parcels to facilitate future access between parcels.

2. Access for new developments that have proposed access points that do not meet the designated access spacing policy and/or have the ability to align with opposing access driveways.

3. Right-of-way dedications for planned roadway improvements.

4.Street improvements along site frontages that do not have improvements to current standards in place at the time of development.

5. Construction or proportionate contribution toward roadway improvements necessary to address site generated traffic impacts, i.e. construction or modification of turns lanes or traffic signals.

I. Traffic analysis within an IAMP Overlay Zone. All development applications located within an IAMP Overlay Zone that are subject to the provisions of Chapter 17.16 (Site Plan Review) or Chapter 16.08 (Land Divisions) may be required to prepare a Traffic Impact Analysis. City of Hood River Transportation System Plan policies call for the City, in coordination with Hood River County and ODOT, to monitor and evaluate vehicle trip generation impacts at Hood River interchanges and on street systems in interchange areas from development. This requirement will not preclude Oregon Department of Transportation, City of Hood River, or Hood River County from requiring analysis of IAMP study intersections under other conditions. Development approved under this article shall be subject to the following additional requirements.

1. The Traffic Impact Analysis must include an account of weekday p.m. peak hour site generated trips through IAMP study intersections. Intersections impacted by 25 or more weekday p.m. peak hour site generated trips, or weekend peak hour site generated trips, shall be analyzed for level of service and volume to capacity ratio during day of opening conditions.

2. The City shall provide written notification to ODOT and Hood River County when an application concerning property in the IAMP Overlay Zone and subject to Site Plan Review or Title 16 is received. This notice shall include an invitation to ODOT and the County to participate in the City's pre-application conference with the applicant, pursuant to Section 17.09.120.

3. The City shall not deem the land use application complete unless it includes a Traffic Impact Analysis prepared in accordance with the applicable requirements of Section 17.20.060.

4. Pursuant to Section 17.09.030.F, ODOT shall have 14 calendar days from the date a completion notice is mailed to provide written comments to the City. If ODOT does not provide

written comments during this 14-day period, the City staff report may be issued without consideration of ODOT comments.
5. Monitoring Responsibilities. The details of monitoring responsibilities will be outlined in the adopted IAMP.

17.16 Site Plan Review
17.16.040 Decision Criteria.
E. Traffic and Circulation: The following traffic standards shall be applicable to all proposals:

4. Traffic Impact ~~Report~~Analysis: The applicant ~~may~~will be required to provide a ~~t~~Traffic ~~i~~Impact ~~report~~Analysis prepared by an Oregon licensed traffic engineer or a Transportation Assessment Letter pursuant to Section 17.20.060. ~~Every effort will be made to inform the applicant within twenty (20) days of receiving a completed application whether a traffic impact report and/or a determination of the level of service will be required. Unforeseen circumstances could result in a delayed request for this information.~~

17.16.050 Multi-Family and Group Residential Decision Criteria.
D. Traffic and Circulation: The following traffic standards shall be applicable to all proposals:

4. Traffic Impact ~~Report~~Analysis: The applicant ~~may~~will be required to provide a traffic impact ~~report~~analysis prepared by an Oregon licensed traffic engineer or a Transportation Assessment Letter pursuant to Section 17.20.060 unless waived by the City Engineer. ~~Every effort will be made to inform the applicant within twenty (20) days of receiving a completed application whether a traffic impact report and/or a determination of the level of service will be required. Unforeseen circumstances could result in a delayed request for this information.~~

16.12 General Design and Improvement Standards
16.12.020 Vehicular Access and Circulation
D. Traffic ~~Study~~Impact Analysis. The City or other agency with access jurisdiction may require a traffic impact analysis prepared by a qualified professional to determine access, circulation, and other transportation requirements. The City requires either a Transportation Assessment Letter or a Traffic Impact Analysis pursuant to Section 17.20.060 for proposed land use actions unless waived by the City Engineer. (See also, Public Facilities Standards, Section 16.12.060.)

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(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth in 660-012-0040(3)(a-d):
(a) Provide bicycle parking in multifamily developments of 4 units or more, new retail, office and institutional developments, transit transfer stations and park-and-ride lots

Recommendation: No further amendments are needed to comply with this section of the TPR. However, proposed language in Section 17.20.040 addresses the City's interested in providing more direction regarding the design and location of required bicycle parking. Suggested code language in the following section is based on Chapter 3 (Bicycle Parking) of the Oregon Bicycle and Pedestrian Plan (2005 Draft).

17.20.040 Bicycle Parking.

~~For all uses subject to Site Plan Review (Chapter 17.16), a minimum of two (2) bicycle parking spaces per use shall be required. In addition, the following Special Minimum Standards shall be considered as supplemental requirements for the number of required bicycle parking spaces:~~

~~1. Multi-Family Residences: Every residential use of four (4) or more dwelling units shall provide at least one (1) sheltered bicycle parking space for each unit. Sheltered bicycle parking spaces may be located within a garage, storage shed, basement, utility room, or similar area. In those instances in which the residential complex has no garage or other easily accessible storage unit, the required bicycle parking spaces shall be sheltered under an eave, overhang, an independent structure, or similar cover.~~

~~2. Parking Lots: All public and commercial parking lots and parking structures shall provide a minimum of one bicycle parking space for every 10 motor vehicle parking spaces.~~

~~3. School: Elementary and middle schools, both private and public, shall provide one (1) bicycle parking space for every twenty (20) students and employees. High schools shall provide one (1) bicycle parking space for every twenty (20) students and employees. All spaces shall be sheltered under an eave, overhang, independent structure, or similar cover.~~

~~4. Other Uses: To calculate the number of required bicycle parking spaces~~

~~a. Fractional numbers of spaces shall be rounded up to the next whole space.~~

~~b. For facilities with multiple uses (such as a commercial center), the bicycle parking requirements shall be calculated by using the total number of motor vehicle parking spaces required for the entire development.~~

All uses that are subject to Site Design Review shall provide bicycle parking, in conformance with the standards in Table 17.20-40-A, and subsections A-H, below.

A. Minimum Required Bicycle Parking Spaces. Uses shall provide long- and short-term bicycle parking spaces, as designated in Table 17.20.40-A. Where two options are provided (*e.g.,* 2 spaces, or 1 per 8 bedrooms), the option resulting in more bicycle parking shall be used.

Table 17.20.40-A Minimum Requirements for Bicycle Parking Spaces

Use Categories	Specific Uses	Long-term Spaces (Covered or Enclosed)	Short-term Spaces (Near Building Entry)
Residential Categories			
Household Living	Multifamily	1 per 4 units	2, or 1 per 20 units
Group Living		2, or 1 per 20 bedrooms	None
	Dormitory	1 per 8 bedrooms	
Commercial Categories			
Retail Sales and Services		2, or 1 per 12,000 sq. ft. of floor area	2, or 1 per 5,000 sq. ft. of floor area
	Lodging	2, or 1 per rentable rooms	2, or 1 per 20 rentable rooms
Office		2, or 1 per 10,000 sq. ft. of floor area	2, or 1 per 40,000 sq. ft. of floor area
Commercial Outdoor Recreation		8, or 1 per 20 motor vehicle spaces	None
Major Event Entertainment		8, or 1 per 40 seats or per CU Review	None
Industrial Categories			
Manufacturing and Production		2, or 1 per 15,000 sq. ft. of floor area	None
Warehouse and Freight Movement		2, or 1 per 40,000 sq. ft. of floor area	
Institutional Categories			
Basic Utilities	Transit center	8	None
Community Service		2, or 1 per 10,000 sq. ft. of	2, or 1 per 10,000 sq. ft. of

Use Categories	Specific Uses	Long-term Spaces (Covered or Enclosed)	Short-term Spaces (Near Building Entry)
		floor area	floor area
	Park and ride	8, or 5 per acre	None
Parks (active recreation areas only)		None	8, or per CU Review
Schools	Grades 2-5	1 per classroom, or per CU Review	1 per classroom, or per CU Review
	Grades 6-12	2 per classroom, or per CU Review	4 per school, or per CU Review
Colleges	Excluding dormitories (see Group Living, above)	2, or 1 per 20,000 sq. ft. of net building area, or per CU Review	2, or 1 per 10,000 sq. ft. of net building area, or per CU Review
Medical Centers		2, or 1 per 70,000 sq. ft. of net building area, or per CU Review	2, or 1 per 40,000 sq. ft. of net building area
Religious Institutions and Places of Worship		2, or 1 per 4,000 sq. ft. of net building area	2, or 1 per 2,000 sq. ft. of net building area
Daycare		2, or 1 per 10,000 sq. ft. of net building area	None
Other Categories			
Other uses	Determined through Land Use Review, Site Design Review, or Conditional Use (CU) Review, as applicable		

B. Exemptions. Section 17.20.040 does not apply to single-family and two-family housing (attached, detached, or manufactured housing) or home occupations.

C. Location and Design. Bicycle parking should be no farther from the main building entrance than the distance to the closest vehicle space, or 50 feet, whichever is less. Long-term (*i.e.,* sheltered) bicycle parking should be incorporated whenever possible into building design. Short-term bicycle parking, when allowed within a public right-of-way, should be coordinated with the design of street furniture, as applicable. Racks shall allow frames and wheels to be locked. Shared facilities will be allowed.

D. Visibility and Security. Bicycle parking for customers and visitors of a use shall be visible from street sidewalks or building entrances, so that it provides sufficient security from theft and damage.

E. Options for Storage. Long-term bicycle parking requirements for multiple family uses and employee parking can be met by providing a bicycle storage room, bicycle lockers, racks, or other secure storage space inside or outside of the building, including beneath roof overhangs and awnings.

F. Lighting. For security, bicycle parking shall be at least as well lit as vehicle parking.

G. Reserved Areas. Areas set aside for bicycle parking shall be clearly marked and reserved for bicycle parking only.

H. Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. Parking areas shall be located so as to not conflict with vision clearance areas (see Diagram "A" – 17.04.090).

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(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth in 660-012-0040(3)(a-d):
(b) Provide "safe and convenient" (per subsection 660-012-0045.3(d)) pedestrian and bicycle connections from new subdivisions/multifamily development to neighborhood activity centers; bikeways are required along arterials and major collectors; sidewalks are required along arterials, collectors, and most local streets in urban areas except controlled access roadways

Recommendation: Modifications to Chapter 16.12 are recommended to ensure consistency with the proposed street cross-sections in the TSP. It is recommended that multi-use path or trail cross-sections also be added this section. Bicycle circulation requirements have been added where pedestrian circulation requirements currently appear in the code.

CHAPTER 16.12 GENERAL DESIGN AND IMPROVEMENT STANDARDS
16.12.010 General Applicability
16.12.020 Vehicular Access and Circulation
16.12.030 Pedestrian and Bicycle Access and Circulation
16.12.040 Landscape Conservation
16.12.050 Street Trees
16.12.060 Public Facilities Standards

16.12.030 Pedestrian and Bicycle Access and Circulation

A. Pedestrian and Bicycle Access and Circulation. To ensure safe, direct, and convenient pedestrian and bicycle circulation, all developments, except single family detached housing (i.e., on individual lots), shall provide a continuous pedestrian and/or multi-use pathway system. (Pathways only provide for pedestrian circulation. Multi-use pathways accommodate pedestrians and bicycles.) The system of pathways shall be designed based on the standards~~ in subsections 1-3~~, below.

1. Continuous Pathways: A continuous pathway system, including sidewalks along streets, shall extend throughout the development site, and connect to all future phases of development, adjacent trails, public parks, and open space areas whenever possible. The developer may also be required to connect or stub pathway(s) to adjacent streets and private property, in accordance with the provisions of Section 16.12.020 - Vehicular Access and Circulation, and Section 16.12.060 Public Facilities Standards.
2. Street Connectivity: Multi-use p~~P~~athways (for pedestrians and bicycles) shall be provided at or near mid-block where the block length exceeds the length required by Section 16.12.020(I)~~010(J)~~. Multi-use p~~P~~athways shall also be provided ~~where~~to connect cul-de-sacs or dead-end streets ~~are planned, to connect the ends of the streets together, to~~with other public streets~~,~~ and/or to other developments where feasible~~, as applicable~~. Multi-use p~~P~~athways used to comply with these standards shall conform to all of the following criteria:
    a. Multi-use pathways (i.e., for pedestrians and bicyclists) are no less than ten (10)~~eight (8)~~ feet wide and located within a fifteen (15) foot-wide right-of-way. The pathway shall generally be located within the center of the right-of-way or easement unless otherwise constrained by topography;
    b. Stairs or switchback paths using a narrower right-of-way or ~~/~~easement may be required in lieu of a multi-use pathway where grades are steep;
    c. The City may require landscaping within the pathway ~~easement/~~right-of-way~~ for screening and the privacy of adjoining properties~~;

d. The hearings body or Planning Director may determine, based upon facts in the record, that a pathway is impracticable due to

(1) Physical or topographic conditions (e.g., freeways, railroads, extremely steep slopes, sensitive lands, and similar physical constraints);

(2) Buildings or other existing development on adjacent properties that physically prevent a connection now or in the future, considering the potential for redevelopment; and

(3) Sites where the provisions of recorded leases, easements, covenants, restrictions, or other agreements recorded as of the effective date of this Code prohibit the pathway connection.

B. Design and Construction. Pathways shall conform to all of the standards ~~in~~ below as follows~~:~~. Sidewalks that are part of required public roadway right-of-way shall conform to the standards in Section 16.12.060 Public Facilities Standards.

1. Vehicle/Pathway Separation: Where pathways are parallel and adjacent to a driveway or street (public or private), they shall be raised six (6) inches and curbed, or separated from the driveway/street by a five (5) foot minimum strip with bollards, a landscape berm, or other physical barrier. If a raised path is used, the ends of the raised portions must be equipped with curb ramps.
2. Housing/Pathway Separation: ~~Pedestrian p~~Pathways shall be separated a minimum of five (5) feet from all residential living areas on the ground-floor, except at building entrances. Separation is measured from the pathway edge to the closest dwelling unit. No pathway/building separation is required for commercial, industrial, public, or institutional uses.
3. Crosswalks: Where pathways cross a parking area, driveway, or street ("crosswalk"), they shall be clearly marked with contrasting paving materials, humps/raised crossings, or painted striping. An example of contrasting paving material is the use of a concrete crosswalk through an asphalt driveway. If painted striping is used, it shall consist of thermo-plastic striping or similar type of durable application.
4. Pathway Surface: Pathway surfaces shall be concrete, asphalt, brick/masonry pavers, or other durable surface, at least six (6) feet wide, and shall conform to ADA requirements. Multi-use paths (i.e., for bicycles and pedestrians) shall be the same materials, at least eight (8) feet wide. (See also, Public Facilities Standards, Section 16.12.060 for public, multi-use pathway standard.)
5. Accessible Routes: Pathways and multi-use paths shall comply with the Americans with Disabilities Act, which requires accessible routes of travel.
6. Fencing adjacent to pathway rights-of-way shall not exceed four (4) feet in height in order to improve visibility and safety of path users.

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(7) Local governments shall establish standards for local streets and accessways that minimize pavement width and total ROW consistent with the operational needs of the facilities.

Recommendation: Modifications to Chapter 16.12 are recommended to ensure consistency with the proposed street cross-sections in the TSP (see Typical Roadway Standards in the Motor Vehicle System Plan section of the TSP). Existing Table 16.12-A and Figures 16.12-A through 16.12-E will be replaced with the updated Typical Roadway Standards figures in the TSP.

16.12.060 Public Facilities Standards

B. Transportation Standards.

6. Minimum Rights-of-Way and Street Sections: Street rights-of-way and improvements shall be consistent with the widths ~~in Table 16.12-A and as~~ shown in Figures 16.12-A through 16.12-~~E~~G. A modification shall be required in conformance with Section 2 (above) to vary from these standards. Where a range of width is indicated, the width shall be determined by the decision-making authority based upon the following factors:

a. Street classification in the Transportation System Plan;

b. Anticipated traffic generation;

c. On-street parking needs;

d. Sidewalk and bikeway requirements based on anticipated level of use;

e. Requirements for placement of utilities;

f. Street lighting;

g. Minimize drainage, slope, and sensitive lands impacts;

h. Street tree location, as provided for in Section 16.12.050;

i. Protection of significant vegetation, as provided for in Section 16.12.040;

j. Safety and comfort for motorists, bicyclists, and pedestrians;

k. Street furnishings (e.g., benches, lighting, bus shelters, etc.), when provided;

l. Access needs for emergency vehicles; and

m. Transition between different street widths (i.e., existing streets and new streets), as applicable.

~~**Table 16.12-A – Street Design Standards**~~
[Figures 16.12-A through 16.12-E will be replaced with TSP Figures 6A through 6G.]

OAR 660-12-0060
Plan & Land Use Regulation Amendments

Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility.

Recommendation: Add clarification that these provisions also currently apply to zone changes and reference the new TIA section in the code.

17.08.050 Transportation Planning Rule (Legislative and Quasi-Judicial)

A. Zone changes and a~~A~~mendments to the comprehensive plan and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:

1. Limiting allowed land uses to be consistent with the planned function of the transportation facility;
2. Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses consistent with the requirement of the Transportation Planning Rule; ~~or,~~
3. Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes~~.~~; or
4. Amending the Transportation System Plan to modify the planned function, capacity or performance standards of the transportation facility.

B. A plan or land use regulation amendment significantly affects a transportation facility if it

1. Changes the functional classification of an existing or planned transportation facility;
2. Changes standards implementing a functional classification system;
3. As measured at the end of the planning period identified in the adopted transportation system plan or, when evaluating highway mobility on state facilities, as measured at the end of the 20 year planning horizon or a planning horizon of 15 years from the proposed date of the amendment adoption, whichever is greater:
   a. Allows types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation facility; ~~or~~

b. Would reduce the level of service of the facility below the minimum acceptable level identified in the Transportation System Plan; or

c. Worsen the performance of an existing or planned transportation facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the TSP or comprehensive plan.

C. Traffic Impact Analysis. A Traffic Impact Analysis or Traffic Assessment Letter shall be submitted with a plan or land use regulation amendment or a zone change application. (See Section 17.20.060 Transportation Impact Analysis).

Register of Proposed Code Amendments

13.28.040 Streets, Sidewalks and Public Places, Driveways and Curb Cuts, Access Spacing for Streets.

16.12.020 (D) Subdivisions, General Design and Improvement Standards, Vehicular Access and Circulation, Traffic ~~Study~~Impact Analysis
16.12.020 (G) Subdivisions, General Design and Improvement Standards, Vehicular Access and Circulation, Access Spacing
16.12.030 Subdivisions, General Design and Improvement Standards, Pedestrian and Bicycle Access and Circulation
16.12.060 Subdivisions, General Design and Improvement Standards, Public Facilities Standards

17.08.050 Zoning, Zone Changes and Plan Amendments, Transportation Planning Rule (Legislative and Quasi-Judicial)

17.09.030 Zoning, Review Procedures, Administrative Actions
17.09.040 Zoning, Review Procedures, Quasi-Judicial Actions
17.09.050 Zoning, Review Procedures, Legislative Actions
17.09.120 Zoning, Review Procedures, Pre-Application Conferences

17.16.040 Zoning, Site Plan Review, Decision Criteria.
17.16.050 Zoning, Site Plan Review, Multi-Family and Group Residential Decision Criteria.

17.20.040 Zoning, Transportation Circulation and Access Management, Bicycle Parking.
17.20.060 Zoning, Transportation Circulation and Access Management, Transportation Impact Analysis

Appendix K: Public Involvement Summary

TSPAC COMMITTEE

Dan Schwanz	Columbia Area Transit	cat1@gorge.net
Susan Henness	School District – May Street School	Shenness@hoodriver.k12.or.us
Mac Lee	Full Sail Brewing	ml@fullsailbrewing.com
Stephen Ford	Current Commercial Real Estate	skford@currentcommercial.com
Josette Griffiths	Hood River County Planning	Josette.griffiths@co.hood-river.or.us
Jonathan Graca	HR Valley Residents/Bike Commuter	jonathangraca@hrvrc.org
Sonya Kazen	ODOT	Sonya.B.Kazen@odot.state.or.us
Avi Tayar	ODOT	Abraham.TAYAR@odot.state.or.us
Kristen Stallman	ODOT/HCRHAC	Kristen.STALLMAN@odot.state.or.us
Jack Trumbull	Heights Bus Assn/Anderson Tribute Center	atc@gorge.net
Gary Fish	DLCD	gary.fish@state.or.us
Lori Stirn	Hood River Valley Parks and Recreation District	parksandrec@gorge.net
David Barringer	Downtown Business Association/Naked Winery	david@nakedwindery.com
Planning Comm.		
Carrie Nelson	City Council	carrie@ci.hood-river.or.us
Alison McDonald	School District – Hood River Middle School	alisonb@gorge.net
Alina Aaron	MCEDD	alina@mcedd.org

Important people not on the committee:

Michael McElwee	Port of Hood River
Don Wiley	Hood River County Engineer
Bob Francis	City Manager
Cindy Walbridge	City Planning Director

Hood River TSP

Public Involvement Strategy

Goal: Establish an inclusive process for public involvement for development of the Hood River TSP that provides for meaningful engagement of citizens, stakeholders, and affected public agencies.

Objectives:

- Provide timely, user-friendly information about the Hood River TSP Update;
- Utilize multiple media for wide dissemination of information and include opportunities for input by Hood River residents, businesses and other stakeholders;
- Strive for participation in the Hood River TSP Technical Advisory Committee (TSPAC) and Bicycle-Pedestrian Group by citizens representative of the broad range of community interests, as well as agencies' technical staff. The TSPAC will provide a forum to consider and balance multiple community objectives for the Hood River transportation system;
- Make special efforts to gain and accommodate participation by minority groups such as seniors, the disabled, low income, ethnic minorities, and low income, consistent with federal Title VI requirements;
- Strive to address specific concerns and resolve differences about TSP alternatives during development of the plan.

Outreach Tools:

Webpage: City will create a TSP project section on the City's official webpage. Typical project web postings will include:

- o Announcements, agendas and minutes of community workshops, TSPAC meetings, PC-CC work sessions and other plan public forums
- o Adoption Hearing notices with Draft TSP
- o Project update memos and news articles
- o Project schedule and calendar of meetings
- o Technical memos, system maps, and draft/final TSP
- o Surveys and other interactive tools to garner public input/comments
- o Public review/comment deadlines for project documents
- o City contact information
- o Information on availability of translation and special accommodations

Meeting Announcements typically shall include the following:

- Brief project update
- Title and purpose of meeting
- Date, time and place meeting to be held

- Information on availability of language (Spanish, ASL, and others) translators, or special ADA accommodation for the meeting with request 48-hours in advance of the meeting
- Notice that the meeting space is ADA accessible, and that there will be a child play area (not babysitting).

Meeting announcements and surveys will be posted to the City project web page, and printed on flyers posted at City hall, library, recreation center, senior center and La Clinica latino center. City shall also submit the meeting notices to local newspapers.

Other Outreach Activities: City will provide information about the TSP at community events such as the Gorge Grown Farmers Market, table displays at downtown First Fridays.

Project Information Articles
City shall create (or request local newswriter to prepare) articles about the project, to be posted on the City web page and to submit to the local newspaper, the Hood River News. Articles should be released at the beginning of the project, prior to community meetings and at major milestones. Maps, and written text prepared by the Consultant may be incorporated into the articles.

ADVISORY COMMITTEES – The timeframe for committee meetings, and topics to be covered are included within the Statement of Work and project schedule. The following provides additional information on committee structure and roles.

TSP Advisory Committee

City shall invite participants and prepare rosters of TSPAC and Bicycle/Pedestrian Group membership including contact information and constituency/agency represented.

The following affected agencies and communities of interest have been identified. The City will invite individuals, or ask organizations to send representatives, with the intent of gaining a full complement of stakeholder perspectives on the TSPAC and Bicycle-Pedestrian Groups.

Agencies:
City of Hood River: Planning, Public Works, PC and/or CC member
Hood River County: Planning, Parks & Recreation
DLCD field rep
ODOT R1: Sonya Kazen, Planning; Avi Tayar, Traffic; Larry Olson, Mgr District 2C.
ODOT R1: Kristen Stallman, HCRH-Gorge Coordinator (will serve as liaison to the HCRH Advisory Committee)
Columbia Area Transit: Dan Schwanz or CAT advisory committee member

Business:
Hood River Downtown Business Association

HR Downtown Business Association
Growers and Shippers (freight)
Major employer (hospital, school district)
Port of Hood River
Mid-Columbia EDD: Alina Aaron, transportation coordinator

Community:
Hood River School District – staff or parent involved w/Safe Routes to School
One or two liaisons to the Bike-Ped Group
Senior/disabled – (HR Social Services staff, and/or citizen)
Healthy Hood River Community group (includes minority representation)
Recreation advocate
Other neighborhood and stakeholder groups

Bicycle-Pedestrian Group
This group shall function as an advisory group to the larger TSPAC. One or two members of the Bicycle-Pedestrian Group, in addition to City and HR County Parks & Rec staff, shall also serve on the TSPAC and act as liaisons between the groups.

Stakeholders to invite to the Bicycle-Pedestrian Group include:

- High school student (who walks and/or bikes to school)
- Hood River Valley Residents Associate
- Bicyclists – commuter, recreational
- Pedestrians
- Senior citizen
- Mobility impaired citizen
- Trail user/advocate
- Hood River Parks and Rec (also rep to TSPAC)
- City staff (also on TSPAC)

Public Involvement in the Statement of Work – Specific activities and responsibilities are contained in Statement of Work tasks for Community Briefings, HCRH Advisory Committee Meetings, Community Workshops, PC-CC Work Sessions and TSP Adoption Hearings.

There is a contingency task for consultant Expert Meeting Facilitation, to be utilized in the event that facilitation is needed, particularly to resolve major concerns with TSP solutions that may arise. The City should inform the PMT, City manager, Mayor and Council when significant concerns are being raised, so that a strategy to address them can be developed.

agenda

Hood River Transportation System Plan Update

TSP Advisory Committee Meeting #1

Meeting Date: June 17, 2010
Meeting Time: 4:00 p.m. – 6:00 p.m.
Meeting Location: Hood River City Council Chambers

Purpose: Project orientation, review and comment on Draft Technical Memoranda (Background Documents/Plans and Project Goals and Objectives)

Notes: Participants in the Bicycle Tour will be dismissed following the project introduction.

Topics

I.	Sign-in and Introductions	4:00
II.	Agenda Overview	4:05
III.	Project Background, Purpose, and Schedule	4:10
IV.	Bicycle Tour Participants are Dismissed	4:25
V.	TSPAC Roles and Responsibilities	4:30
VI.	Transportation System Planning “101” Presentation	4:40
VII.	Draft Chapter 2: Goals and Policies	5:05
VIII.	Draft Technical Memorandum #1: Background Documents/ Plans	5:30
IX.	Next Steps	5:40
X.	Adjourn	6:00

City of Hood River
Transportation System Plan Advisory Committee (TSPAC)
Public Hearing
Thursday, June 17, 2010

City Council Chambers
211 Second Street
Hood River, OR 97031
4:00 p.m.

MINUTES

I. CALL TO ORDER: John Bosket, at 4:00 p.m.

II. PRESENT:

STAFF: John Bosket; Rory Renfro; Elliot Akwai-Scott; Cindy Walbridge; Kevin Liburdy; Gary Lindemyer.

TSPAC: David Barringer; Avi Tayar; Sonya Kazen; Stephen Ford; Mac Lee; Lori Stirn; Josette Griffiths; Alina Aaron; Dan Schwanz.

BICYCLE COMMITTEE: Alison McDonald; Christopher Van Tilburg; Jonathan Graca; Kelly Chambers; Brian Chambers; Dylan Chambers; Andrew Bryden.

PUBLIC: Alan Winans

III. MINUTES:

John Bosket provided an introduction for Rory and Elliot who will lead the bike tour today, and reviewed the meeting agenda.

Cindy Walbridge asked the group to introduce themselves, then provided background on the Transportation System Plan (TSP).

Bosket presented the project schedule, and discussed roles and responsibilities.

The bicycle group was dismissed.

Bosket presented a "TSP 101" powerpoint presentation.

Bosket presented Chapter 2 as currently drafted including a new Goal 8, addressing IAMP issues, and a new Goal 9, addressing sustainability.

Bosket explained that a vision statement is not required but asked the committee to provide direction. There was general support by the TSPAC for a vision statement but no specific concepts or values were proposed.

David Barringer expressed concern with Goal 4 which promotes a reduction in vehicle trips because it may conflict with economic development goals.

Alina Aaron suggested amending the language to reduce vehicle miles traveled.

Sonya Kazen suggested reducing single-occupancy vehicle trips.

Alan Winans suggested simplifying things: “less gas, more leather.” Also suggested reviewing Rick Williams’ findings, regarding the distance between facilities.

Bosket continued with a discussion of Goal 5.

Kazen suggested addressing options for those who don’t have access to vehicles.

Bosket continued with a discussion of Goal 6.

Dan Schwanz recommended addressing loading zones for delivery vehicles.

Aaron recommended adding the Port District to the list.

Mac Lee recommended adding Full Sail.

Bosket continued with a discussion of Goal 7.

Stephen Ford noted that the TSP serves three distinct groups: tourists, residents and freight.

Bosket continued with a discussion of Goal 8, explaining that it is a draft that will be amended as the IAMPs are refined and adopted.

Bosket continued with a discussion of Goal 9, and asked about functions and values..

Kazen asked what the city can do to promote alternatives (e.g. electric vehicle charging stations).

Winans expressed a desire to promote bike travel, especially across the Hood River Bridge.

Aaron explained the status of the potential bridge crossing pilot project, connecting existing transportation systems in Hood River, Bingen and White Salmon.

Ford noted the importance of cooperating on interstate issues.

Schwanz recommended adding “park & rides” as a priority under Goal 2.

Bosket finished the discussion by explaining that addition comments can be provided by June 23rd, but there will be opportunities for later additions. Also asked the group to review Tech Memo #1 to determine if any documents were missing or could be added to the list.

Bosket explained next steps. TSPAC will get together again in late July to discuss system deficiencies.

Winans asked how the system would be connected to Amtrak.

Bosket asked if there were any other issues that could be discussed before the bike group returned.

Lee explained that Full Sail has 15-30 freight trucks per day via Exit 63, and freight movement is a big concern. 95% of Full Sail’s freight traffic uses Exit 63, to 2nd/Cascade, to 3rd/Cascade, to Industrial. 3rd & Cascade is a problem in the snow when vehicles park further away from curbs. Business is growing 15-20% annually. Ideal situation would be exit off of I-84 through the Union Building. One-way on Cascade Ave from east to west would be helpful.

Ford asked if it would be possible to reconfigure Full Sail's loading doc so that traffic can come from Exit 62.

Lee also noted that Full Sail is using the old Expo hall for administrative offices and auxillary warehouse space.

Winans expressed concern with one-way north/south streets downtown during winter months because street grades are too steep.

Barringer noted that the Naked Winery production facility is on Industrial Loop, so there is a fair amount of traffic between that site and their tasting room. Also noted that eastbound traffic on Cascade at 2nd is a problem.

Ford expressed concern with northbound traffic on 12th Street through residential neighborhoods.

Aaron noted pedestrian traffic can back-up traffic at 12th and May.

Schwanz noted that that the 12th and May issues worsened when the hospital changed the location of their entrance to 12th Street.

Ford noted that Country Club west of Cascade is the future of industrial development in the city and currently cannot be developed due to the failing intersection at Cascade.

Lee noted problems at 13th and State during rush hour.

Barringer expressed concern about traffic safety on 12th is unsafe near the children's park.

Winans explained that he proposed park and ride locations to Kristen Stallmen during an IAMP presentation at the Best Western.

IV. ADJOURN: 6:20 p.m.

HOOD RIVER
TRANSPORTATION SYSTEM PLAN

TSPAC Bicycle/Pedestrian Subcommittee Bicycle Tour

You're invited to participate in a citywide bicycle tour for the Hood River Transportation System Plan.

The tour's goal is to provide committee members and the Project Team familiarity with Hood River's existing walking and cycling environment and to gain first-hand knowledge of conditions on the ground. The tour will highlight areas where the system is working well, and areas needing improvement. The group will stop at various locations along the way to discuss observations, issues and other thoughts.

Please come prepared to discuss your thoughts on the existing system (e.g., current major routes and destinations), challenges facing cyclists and pedestrians (e.g., "missing links," difficult crossings), and ideas for system improvements.

Thursday, June 17, 2010, 4:00 PM
Hood River City Hall, City Council Chambers, 301 Oak Street

City staff and the Project Team will first brief the committee with the overall TSP project; the bicycle tour will occur immediately afterward.

Participants will need to provide their own bikes. <u>Helmets are mandatory.</u>

For additional information, please contact
Cindy Walbridge at (541) 387-5210

agenda

Hood River Transportation System Plan Update
Downtown Truck Circulation Meeting

Meeting Date: August 5, 2010
Meeting Time: 3:00 p.m. – 4:00 p.m.
Meeting Location: Hood River City Council Chambers

Purpose: Discuss problems and potential solutions regarding truck access to the industrial area north of the downtown core and truck delivery/parking within the downtown core.

Topics

I.	Truck Access to Industrial Area	3:00
II.	Downtown Truck Deliveries/ Parking	3:30
III.	Adjourn	4:00

agenda

Hood River Transportation System Plan Update
TSP Advisory Committee (Bicycle/Pedestrian Group) Meeting #2

Meeting Date: August 5, 2010
Meeting Time: 3:00 p.m. – 4:00 p.m.
Meeting Location: Hood River City Council Chambers

Purpose: Review and comment on Draft Technical Memoranda (Existing Conditions and Future Needs); discuss potential system improvement options

Notes: The general TSPAC meeting (addressing other transportation modes) will occur immediately after the Bicycle/Pedestrian Group meeting

Topics

I.	Sign-in and introductions	3:00
II.	Agenda overview	3:05
III.	Review/discuss Draft TSP Chapter #3 (Existing Bicycle/Pedestrian Conditions) and Draft TSP Chapter #4 (Future Bicycle/Pedestrian Needs)	3:10
IV.	Discuss potential system improvement ideas and options	3:35
V.	Next Steps	3:55
VI.	Adjourn	4:00

agenda

Hood River Transportation System Plan Update
TSP Advisory Committee Meeting #2

Meeting Date:	August 5, 2010
Meeting Time:	4:00 p.m. – 6:00 p.m.
Meeting Location:	Hood River City Council Chambers

Purpose: Review and confirm the assessment of existing and future baseline conditions (Draft Chapters 3 and 4), followed by an early discussion of potential solutions for consideration.

Notes: The TSP Advisory Committee Meeting will be preceded by a meeting with the Bicycle/Pedestrian Group and a meeting discussing downtown truck circulation issues.

Topics

I.	Sign-in and introductions/ Agenda Overview	4:00
II.	Draft Chapter 3 (Existing Conditions) findings	4:10
III.	Draft Chapter 4 (Future Needs) findings	4:35
IV.	Summary of comments from Bicycle/Pedestrian Group	5:00
V.	Summary of comments from downtown truck circulation meeting	5:10
VI.	Discuss preliminary concepts for addressing needs	5:20
VII.	Next steps	5:50
VIII.	Adjourn	6:00

Hood River Transportation System Plan Update –
TSP Advisory Committee Meeting #2
August 5, 2010
4:00pm – 6:00pm
City Council Chambers

Attendance: Sonya Kazen, ODOT; John Bosket , DKS; Garth, DKS; Rory Renfro, ALTA, Cindy Walbridge, City, Kevin Liburdy, City of Hood River

Mac Lee, Full Sail; Lori Stirn, Parks District; David Barringer, DBA; Laurie Stephens, Planning Commission; Alina Aaron, MCEDD

1. Draft Chapter 3 (Existing Conditions) findings:

Rory Renfro, Alta stated the primary constraints to bike/ped were topography and the lack of a well-connected system both E/W and N/S. The TSP will get the needed projects on the list, and then the City can apply for grants.

Renfro also said that CAT will provide covered bike shelters at Transit Center. Bike Racks can be added to buses, if requested. Bikes are currently carried on board if no wheelchairs are on bus. CAT is the grant driver.

A bike/ped connection between Skatepark and Waterfront is especially needed.

The Planning Commission approved the Westside Trail for the Parks District recently, which is an all-weather path connection Westside School to residential areas.

Bosket pointed out that transit is very grant driven. There was a fixed route about 10 years ago that did not meet ADA requirements, so it was not a true fixed route.

There are existing vanpools from HR to the Metro/Bonneville buildings in Portland.

Renfro said that the idea behind TDM (traffic demand management) was trying to reduce the amount of traffic on your system at peak hours.

Alina Aaron suggested conducting an employee survey for the hospital, schools, Insitu, Full Sail, Dakine, Cardinal Glass, Mt. Hood Meadows and the Columbia Gorge Community College (already major parking issues there) to determine TDM options.

Bosket said the data gathered does not present anything unusual, and he mentioned a few the intersections that currently do not meet city standards: 12th/Sherman, Frankton/Country Club, 13th/Belmont, 3rd, 4th and 5th Streets as they intersect with Oak (where bike corrals in the parking spaces at these intersections would improve sight distance); and May/12th.

Regional bike/bed connections (a bridge) are impossible. The Hood River Bridge is motor vehicle only.

2. Draft Chapter 4 (Future Needs) findings:

Walbridge stated the City would like to lower its LOS from C to D. This will allow for longer waits at intersections, but will delay the need for street widening and traffic signals in the future.

Bosket said The Dalles put into place a 1 year trial – a tiered SDC – based on sewer charges to determine number of employees, and a possible TDM.

Renfro stated that 13th crossing Sherman Avenue to State is difficult for bikes, and there should be a potential for a bike/ped connection across the creek.

The City needs bike/ped connections to recreational facilities (i.e. Skatepark to Waterfront via a "floating bridge"); and a mid-block crossing on Cascade near Sunset Hotel and Safeway.

Bosket stated that the future growth will be in the key corridors and those will be addressed in Plan.

Kazen said that the City of Tigard has a mechanism to map public and private lands, and to determine where an easement could be granted for non-motorized connections.

Bosket said that Hood River's transportation SDC is at the most 25% less than the average in Oregon.

3. Summary of comments from Bicycle/Pedestrian Group: Above in Renfro's comments.

4. Summary of comments from downtown truck circulation meeting:

Mac Lee, Full Sail brewing described downtown truck traffic. He said trucks into industrial area from Exit 63, have a hard time with the first 2 right hand turns, especially the turn from Cascade to northbound 3rd. The trucks are about 48'-53' long and Full Sail gets 20-22 trucks every day, 4 days a week. Full Sail is expecting a 20% growth in the coming year. Full Sail also runs a box truck to the Port area from the Columbia Street plant about 6 times a day.

Jamie Athos, Turtle Island Foods said that their trucks generally come in on Exit 62 down Oak Street and turn left onto 7th Street to reach plant.

Walbridge said that City has removed the two parking spaces on the inside corner of 3rd and Cascade to help the Full Sail trucks turning northbound.

There was a discussion of one-way on Cascade, Columbia and how it may provide more parking along with helping truck movement.

Walbridge reminded the group of the one way system over 15 years ago on 3rd, 4th, and 5th. It was scratched after a few months because the traffic issues it created were not a good trade-off for additional parking.

It was noted that drivers at 2nd and Cascade who are turn left (northbound) are taking safety risks to do so.

Bosket asked if Columbia also needed to be one-way. Would it make deliveries more difficult for local deliveries? He mentioned this because it is not common for only having one one-way street (Cascade).

The impact at 2nd and Cascade is generally from shift change, but a lot depends on whether the wind is blowing or not. More people hang-out downtown when the wind is calm, creating more traffic congestion.

If Columbia was one-way it could provide more parking for employees.

Art gallery loading zone is underutilized and may provide better use if it moved east for Naked Winery loading.

Getting City trucks into loading zones would be an improvement rather than idling in the traffic lane.

The Post Office is a large generator of traffic on Cascade.

It was discussed and agreed that the only real problem is the intersection of 2nd and Cascade. Bosket would sketch ideas for the area on Cascade between 2nd and 3rd.

Submitted by Cindy Walbridge

agenda

Hood River Transportation System Plan Update

TSP Advisory Committee Meeting #3
Bicycle/ Pedestrian Group Meeting #3

Meeting Date: December 1, 2010
Meeting Time: 5:00 p.m. – 7:00 p.m.
Meeting Location: Hood River City Council Chambers

Purpose: Review and Discuss Preliminary Alternatives Development Memorandum. Input received will be incorporated into the draft transportation solutions developed in the following steps of the project.

Notes: The Preliminary Alternatives Development Memorandum was previously completed and distributed to meeting attendees. Please review the memorandum prior to the meeting (call Cindy Walbridge if you can't find this document: 541-387-5217).

Topics

I.	Sign-in and Introductions	5:00
II.	Agenda Overview	5:05
III.	Project Status and Schedule Update	5:10
IV.	Review and Discuss Preliminary Alternatives • Pedestrian Facilities • Bicycle Facilities • Motor Vehicle Facilities	5:15
V.	Recap of Input Received and Next Steps	6:40
VI.	Adjourn	7:00

December 1, 2010

To: John Bosket, DKS
Sonya Kazen, ODOT

From: Cindy Walbridge, City of Hood River

RE: Stakeholder Interviews

I met with 3 stakeholder groups and conducted 5 interviews (3 pending) on the Preliminary Transportation Concepts Analysis:

1. Planning Commission
2. Healthy Active Hood River County
3. Downtown Business Council
4. Susan Hess – Pedestrian
5. Don Wiley – Hood River County Engineer
6. Jeff Pickhardt – developer - Westside Hood River
7. Michael McElwee – Port of Hood River
8. Heights Business District – interview pending
9. Mac Lee –Full Sail – interview pending
10. Lori Stirn, HRVPRD
11. School District – interview pending

I started each interview with a short background and then asked:

1. What's important to you and your group regarding HR's transportation system?
2. Agree with assumptions?
3. Additional items missed?
4. Went over 11 concepts.

A. Planning Commission:

Needs and deficiencies:

- Add 13th and State to bad intersections.
- The bottom line: Need to make it easier for people to get out of cars and walk or bike. They understand that people will drive, this is a tourist tow, but the priority should be getting people to work and school – recreation will follow.
- Lack of sidewalk, infill very important.
- If we add more sidewalks and provide bike lanes is there research showing that this has actually got people out of cars? What is the proof?
- 2nd/Oak and 5th/Oak bad pedestrian intersections, need better controls.
- Indian Creek Trail: Need sign on east side of 12th Street directing pedestrians/bikers to signalized intersection and back down to trail.
- Clearance issue for crosswalks – need policy for distance from sidewalk for parked cars.
- There is a deficiency in sidewalk in getting to the east side of HR from Front and State to the Indian Creek Trail. The only way now is via the 2nd Street stairs.
- Add to deficiencies the lack of friendly connectivity to the Waterfront.

Concept 1: What are implication to State and 13th? Already difficult to access 13th. **Eliminate.**

Concept 2: Agree this should be #1 project – work with school district on placement.

Concept 3: OK.

Concept 4: Not important, only need one thru route to Westside**.** **Eliminate.**

Concept 5: **Eliminate.** Topography and possible Indian Burial Ground, other concerns.

Concept 6: #2 in importance. Just have light blink during snow emergencies.

Concept 7: Not necessary, but what about offset intersection at 17th/18th and May?

Concept 8: OK.

Concept 9: OK.

Concept 10: **Eliminate for vehicular, but secure for bike/ped.**

Concept 11: **Eliminate realignment**, but is there a way to redesign for safety. Do not want additional traffic in neighborhood, don't want to split hospital campus and safer for kids.

Downtown Industrial Area Truck Access: Commission supported the change, but asked if this has been modeled for improvement for Port development because the left turn onto 2nd would be eliminated?

Concepts:

- Map and list for projects are not consistent.
- Are the widths of the roadways capable of bike lane installation on the bike lane list?
- Are the shared roadways designated as such because of lack of ROW?
- Realignment of Country Club could include a park and ride near the closed off Country Club.
- Have the concepts been prioritized yet? If so, the PC would rearrange.

B. Healthy Active Hood River County:

Concerns:

- Latina population are renewing drivers licenses less and less due to fear of government, and the need for a fixed route bus system has arisen.
- Education for helmets and how to ride should be in the policies. This would involve more disadvantaged and Latina populations (i.e. free helmets, free tune-ups, fun events for bike safety).
- Parent education is needed, also.
- In this day of child abductions, parents are hesitant to allow kids to bike and walk to school with or without bike lanes and sidewalks. Need to set up a structure for designated "safe" houses throughout routes to schools.

- Need bike lane/pedestrian ways to high school.
- Westside School is difficult to access as a bike or ped due to the high number of kids being dropped off in cars.
- Need safe crosswalk from Westside School to new Westside Trail.

Pages 4-5: IAMP findings have been pretty much accepted by groups. One continuing issue is the Waterfront and the possibility of a LI campus. Will the IAMP prohibit or limit that? Port has contracted with Group McKenzie to provide its own TIA to determine issues and the findings will be used in IAMP and this report.

Date:	**Thursday, February 17, 2011**
Time:	**6:00 pm to 8:00 pm**
Location:	**City Council Chambers**
Address:	**Hood River City Hall** **207 2nd Street**

City of Hood River Transportation System Plan Update Community Workshop

What Is It All About? The city of Hood River is holding a Community Workshop to gather public input on findings and recommendations coming out of its Transportation System Plan (TSP) update project. The TSP is the transportation element of the City's Comprehensive Plan that establishes a system of facilities and services to meet local transportation needs. With the current TSP being several years old, this update will use the most recent growth projections to address current transportation system needs and plans for facilities that will be required to serve growth over the next 20 years. All modes of transportation are included in the plan.

What has changed from the previous TSP? Eight years of growth have changed the shape of Hood River and surrounding areas. This growth has changed the baseline (or "existing conditions") that is used for planning for the future. Furthermore, since the current TSP was completed, new projections for housing and employment in the area have been made and there have been recent updates to the Transportation Planning Rule (OAR 660-12), which include additional planning and code implementation requirements for the city.

How can citizens help? Your input and participation plays a key role in shaping the future of the Hood River transportation system. You will have the opportunity to circulate about the room to view maps displaying current recommendations for improving all modes of travel within the city and provide your opinions and suggestions. City and consultant staff will be stationed around the room and will be available for answering questions about the TSP update. Comment forms are attached that provide space for input on each transportation mode. Your input is very important to us and will help us form a plan that represents the interests of the community as a whole.

What will be the outcome of the TSP Update? The recommendations collected will be combined with input from and advisory committee to finalize an updated TSP for the city of Hood River. This TSP will go through a public adoption process with City Council this June. When adopted, the TSP will include action plans for implementing improvement projects, recommendations for funding improvements, and goal/policy changes that will be used to update city of Hood River codes and standards.

If you choose to fill out this form at a later time, please return to:

Cindy Walbridge
City of Hood River
207 2nd Street, P.O. Box 27
Hood River, OR 97031

City of Hood River TSP Update: Upcoming Milestones

Joint Planning Commission / City Council Work Session	**February 22**
Draft TSP	**mid April**
TSP Advisory Committee Meeting	**late April**
Joint Planning Commission / City Council Work Session	**early May**
Recommended TSP	**mid May**
Planning Commission Hearing	**early June**
City Council Hearing	**late June**

Comments

Pedestrian Facilities

Bicycle Facilities

Transit Facilities

Local Street Connectivity

Proposed Functional Classification

Roadway Improvements Projects

General Comments

Your Name and Address (optional)

Appendix L: 2031 Preferred Alternative Synchro Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	155	0	0	0	0	50	175	935	15	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	168	0	0	0	0	54	190	1016	16	0	0	0
Pedestrians		8			8							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	951	1429	8	1413	1421	524	8			1041		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	951	1429	8	1413	1421	524	8			1041		
tC, single (s)	*6.9	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	*3.3	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	20	100	100	100	100	89	88			100		
cM capacity (veh/h)	210	118	1071	89	120	500	1600			672		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	168	54	698	524
Volume Left	168	0	190	0
Volume Right	0	54	0	16
cSH	210	500	1600	1700
Volume to Capacity	0.80	0.11	0.12	0.31
Queue Length 95th (ft)	144	9	10	0
Control Delay (s)	67.7	13.1	3.0	0.0
Lane LOS	F	B	A	
Approach Delay (s)	67.7	13.1	1.7	
Approach LOS	F	B		

Intersection Summary			
Average Delay	9.8		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	440	170	5	325	70	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	449	173	5	332	71	5
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			622		878	536
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			622		878	536
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		77	99
cM capacity (veh/h)			958		317	545

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	622	337	77
Volume Left	0	5	71
Volume Right	173	0	5
cSH	1700	958	326
Volume to Capacity	0.37	0.01	0.23
Queue Length 95th (ft)	0	0	22
Control Delay (s)	0.0	0.2	19.4
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	19.4
Approach LOS			C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	85	0	0	400	570	525
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.98
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1731			3353	1693	1483
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1731			3353	1693	1483
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	0	0	435	620	571
RTOR Reduction (vph)	0	0	0	0	0	296
Lane Group Flow (vph)	92	0	0	435	620	275
Confl. Bikes (#/hr)		3				1
Heavy Vehicles (%)	4%	0%	0%	2%	1%	1%
Turn Type						Perm
Protected Phases	2			2	4	
Permitted Phases						4
Actuated Green, G (s)	8.6			8.6	15.4	15.4
Effective Green, g (s)	8.6			8.6	15.4	15.4
Actuated g/C Ratio	0.27			0.27	0.48	0.48
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	0.2			0.2	0.2	0.2
Lane Grp Cap (vph)	465			901	815	714
v/s Ratio Prot	0.05			c0.13	c0.37	
v/s Ratio Perm						0.19
v/c Ratio	0.20			0.48	0.76	0.38
Uniform Delay, d1	9.0			9.8	6.8	5.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.1	3.8	0.1
Delay (s)	9.1			10.0	10.6	5.4
Level of Service	A			A	B	A
Approach Delay (s)	9.1			10.0	8.1	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	32.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	55	355	255	185	475	0	0	0	30	595	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0					4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00					1.00	
Frpb, ped/bikes		1.00	0.99		1.00	0.97					1.00	
Flpb, ped/bikes		0.99	1.00		1.00	1.00					1.00	
Frt		1.00	0.85		1.00	0.85					0.99	
Flt Protected		0.96	1.00		0.97	1.00					1.00	
Satd. Flow (prot)		1793	1560		1827	1540					1833	
Flt Permitted		0.40	1.00		0.67	1.00					1.00	
Satd. Flow (perm)		750	1560		1256	1540					1833	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	158	58	374	268	195	500	0	0	0	32	626	53
RTOR Reduction (vph)	0	0	101	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	216	273	0	463	500	0	0	0	0	708	0
Confl. Peds. (#/hr)	14		1	1		14			10	10		
Confl. Bikes (#/hr)			3			2						2
Heavy Vehicles (%)	0%	5%	2%	1%	1%	2%	0%	0%	0%	4%	2%	2%
Turn Type	Perm		Perm	Perm		Free				Perm		
Protected Phases		4			8						6	
Permitted Phases	4		4	8		Free				6		
Actuated Green, G (s)		32.9	32.9		32.9	74.5					33.6	
Effective Green, g (s)		32.9	32.9		32.9	74.5					33.6	
Actuated g/C Ratio		0.44	0.44		0.44	1.00					0.45	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		331	689		555	1540					827	
v/s Ratio Prot												
v/s Ratio Perm		0.29	0.18		c0.37	0.32					0.39	
v/c Ratio		0.65	0.40		0.83	0.32					0.86	
Uniform Delay, d1		16.3	14.1		18.4	0.0					18.3	
Progression Factor		1.00	1.00		1.00	1.00					1.00	
Incremental Delay, d2		4.6	0.4		10.4	0.6					8.7	
Delay (s)		20.9	14.5		28.8	0.6					26.9	
Level of Service		C	B		C	A					C	
Approach Delay (s)		16.8			14.1			0.0			26.9	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM Average Control Delay	18.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	335	95	25	320	25	5	90	5	40	70	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	353	100	26	337	26	5	95	5	42	74	26
Pedestrians		3			6			5			7	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	370			458			897	851	414	892	888	360
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	370			458			897	851	414	892	888	360
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			97	67	99	78	73	96
cM capacity (veh/h)	1192			1109			192	286	637	187	271	683

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	463	389	105	142
Volume Left	11	26	5	42
Volume Right	100	26	5	26
cSH	1192	1109	286	265
Volume to Capacity	0.01	0.02	0.37	0.54
Queue Length 95th (ft)	1	2	41	73
Control Delay (s)	0.3	0.8	24.7	33.2
Lane LOS	A	A	C	D
Approach Delay (s)	0.3	0.8	24.7	33.2
Approach LOS			C	D

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	300	5	5	270	50	5	140	10	45	110	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	32	316	5	5	284	53	5	147	11	47	116	16
Pedestrians		12			3			3				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		1			0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	337			324			791	732	324	790	708	323
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	337			324			791	732	324	790	708	323
tC, single (s)	4.1			4.1			7.1	6.8	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.3	3.3	3.5	4.0	3.3
p0 queue free %	97			100			98	51	99	74	67	98
cM capacity (veh/h)	1234			1244			217	303	718	184	350	711

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	353	342	163	179
Volume Left	32	5	5	47
Volume Right	5	53	11	16
cSH	1234	1244	311	293
Volume to Capacity	0.03	0.00	0.52	0.61
Queue Length 95th (ft)	2	0	72	93
Control Delay (s)	0.9	0.2	28.7	34.7
Lane LOS	A	A	D	D
Approach Delay (s)	0.9	0.2	28.7	34.7
Approach LOS			D	D

Intersection Summary			
Average Delay	10.9		
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	25	120	455	30	90	610
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	26	126	479	32	95	642
Pedestrians			3			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						318
pX, platoon unblocked						
vC, conflicting volume	1329	495			511	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1329	495			511	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	78			91	
cM capacity (veh/h)	156	575			1055	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	26	126	511	737
Volume Left	26	0	0	95
Volume Right	0	126	32	0
cSH	156	575	1700	1055
Volume to Capacity	0.17	0.22	0.30	0.09
Queue Length 95th (ft)	15	21	0	7
Control Delay (s)	32.7	13.0	0.0	2.2
Lane LOS	D	B		A
Approach Delay (s)	16.4		0.0	2.2
Approach LOS	C			

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	125	185	35	175	0	0	0	0	30	1195	195
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	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.98		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.98	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		1782	1490		1744						3335	
Flt Permitted		1.00	1.00		0.93						1.00	
Satd. Flow (perm)		1782	1490		1640						3335	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	128	189	36	179	0	0	0	0	31	1219	199
RTOR Reduction (vph)	0	0	56	0	0	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	128	133	0	215	0	0	0	0	0	1428	0
Confl. Peds. (#/hr)	8		2	2		8						
Confl. Bikes (#/hr)			3			3						
Heavy Vehicles (%)	0%	1%	1%	9%	1%	0%	2%	2%	2%	2%	0%	2%
Turn Type			Perm	Perm						Perm		
Protected Phases		4			8						6	
Permitted Phases			4	8						6		
Actuated Green, G (s)		11.6	11.6		11.6						29.4	
Effective Green, g (s)		11.6	11.6		11.6						29.4	
Actuated g/C Ratio		0.24	0.24		0.24						0.60	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		422	353		388						2001	
v/s Ratio Prot		0.07										
v/s Ratio Perm			0.09		c0.13						0.43	
v/c Ratio		0.30	0.38		0.55						0.71	
Uniform Delay, d1		15.4	15.7		16.4						6.9	
Progression Factor		1.00	1.00		1.00						1.00	
Incremental Delay, d2		0.4	0.7		1.7						1.2	
Delay (s)		15.8	16.4		18.1						8.1	
Level of Service		B	B		B						A	
Approach Delay (s)		16.1			18.1			0.0			8.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	49.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	245	345	355	265	445	130
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1765	1447	1660	1765	1676	1443
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1765	1447	1660	1765	1676	1443
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	258	363	374	279	468	137
RTOR Reduction (vph)	0	176	0	0	0	46
Lane Group Flow (vph)	258	187	374	279	468	91
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		5				1
Heavy Vehicles (%)	2%	2%	3%	2%	2%	6%
Turn Type		Perm	Prot			pt+ov
Protected Phases	2		1	6	8	8 1
Permitted Phases		2				
Actuated Green, G (s)	21.7	21.7	24.1	49.3	28.8	56.4
Effective Green, g (s)	21.7	21.7	24.1	49.3	28.8	56.4
Actuated g/C Ratio	0.25	0.25	0.28	0.58	0.34	0.66
Clearance Time (s)	3.5	3.5	3.5	3.5	3.5	
Vehicle Extension (s)	6.0	6.0	2.3	6.0	2.3	
Lane Grp Cap (vph)	450	369	470	1022	567	956
v/s Ratio Prot	c0.15		c0.23	0.16	c0.28	0.06
v/s Ratio Perm		0.13				
v/c Ratio	0.57	0.51	0.80	0.27	0.83	0.09
Uniform Delay, d1	27.7	27.1	28.2	8.9	25.8	5.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.5	3.1	8.7	0.4	9.2	0.0
Delay (s)	31.2	30.2	36.9	9.4	35.1	5.2
Level of Service	C	C	D	A	D	A
Approach Delay (s)	30.6			25.1	28.3	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	28.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	10.5
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	455	5	120	620	40	5	20	115	25	25	45
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	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.97			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.89			0.94	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1709	1745		1708	1762			1556			1602	
Flt Permitted	0.29	1.00		0.34	1.00			0.99			0.89	
Satd. Flow (perm)	527	1745		603	1762			1538			1438	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	495	5	130	674	43	5	22	125	27	27	49
RTOR Reduction (vph)	0	1	0	0	3	0	0	109	0	0	43	0
Lane Group Flow (vph)	49	499	0	130	714	0	0	43	0	0	60	0
Confl. Peds. (#/hr)	6		9	9		6			9	9		
Confl. Bikes (#/hr)			3			1						
Heavy Vehicles (%)	0%	3%	0%	0%	1%	2%	0%	0%	0%	8%	0%	3%
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.7	21.5		28.7	24.5			5.6			5.6	
Effective Green, g (s)	22.7	21.5		28.7	24.5			5.6			5.6	
Actuated g/C Ratio	0.52	0.50		0.66	0.57			0.13			0.13	
Clearance Time (s)	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	
Lane Grp Cap (vph)	309	866		507	997			199			186	
v/s Ratio Prot	0.00	0.29		c0.02	c0.41							
v/s Ratio Perm	0.08			0.15				0.03			c0.04	
v/c Ratio	0.16	0.58		0.26	0.72			0.22			0.32	
Uniform Delay, d1	5.4	7.7		3.4	6.9			16.9			17.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	0.9		0.3	2.5			0.6			1.0	
Delay (s)	5.7	8.6		3.7	9.3			17.4			18.1	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		8.4			8.5			17.4			18.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	43.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	310	25	5	235	175	80
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	337	27	5	255	190	87
Pedestrians				2	2	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				1237		
pX, platoon unblocked						
vC, conflicting volume			366		619	355
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			366		619	355
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		58	87
cM capacity (veh/h)			1185		453	687

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	364	261	277
Volume Left	0	5	190
Volume Right	27	0	87
cSH	1700	1185	507
Volume to Capacity	0.21	0.00	0.55
Queue Length 95th (ft)	0	0	81
Control Delay (s)	0.0	0.2	20.3
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	20.3
Approach LOS			C

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	185	5	310	210	10	225
Sign Control	Free			Free	Stop	
Grade	1%			2%	2%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	195	5	326	221	11	237
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			200		1071	197
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			200		1071	197
tC, single (s)			4.1		6.6	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.3
p0 queue free %			76		94	72
cM capacity (veh/h)			1378		174	839

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	200	547	247
Volume Left	0	326	11
Volume Right	5	0	237
cSH	1700	1378	722
Volume to Capacity	0.12	0.24	0.34
Queue Length 95th (ft)	0	23	38
Control Delay (s)	0.0	5.9	12.6
Lane LOS		A	B
Approach Delay (s)	0.0	5.9	12.6
Approach LOS			B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	115	95	135	110	80	185
Sign Control	Stop		Free			Free
Grade	1%		8%			3%
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	117	97	138	112	82	189
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	546	194			250	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	546	194			250	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	89			94	
cM capacity (veh/h)	468	853			1327	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	214	250	270
Volume Left	117	0	82
Volume Right	97	112	0
cSH	588	1700	1327
Volume to Capacity	0.36	0.15	0.06
Queue Length 95th (ft)	42	0	5
Control Delay (s)	14.6	0.0	2.8
Lane LOS	B		A
Approach Delay (s)	14.6	0.0	2.8
Approach LOS	B		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	25	185	35	40	25	175	580	35	50	620	260
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5	3.5			3.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	0.95	
Frpb, ped/bikes	1.00	0.98			1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87			0.97		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1687	1537			1663		1581	1744		1710	3169	
Flt Permitted	0.73	1.00			0.85		0.27	1.00		0.32	1.00	
Satd. Flow (perm)	1304	1537			1431		449	1744		581	3169	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	27	201	38	43	27	190	630	38	54	674	283
RTOR Reduction (vph)	0	156	0	0	16	0	0	2	0	0	51	0
Lane Group Flow (vph)	141	72	0	0	92	0	190	666	0	54	906	0
Confl. Peds. (#/hr)	5		7	7		5	4					4
Confl. Bikes (#/hr)						2						1
Heavy Vehicles (%)	1%	0%	0%	4%	0%	3%	8%	2%	8%	0%	2%	3%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	12.4	12.4			12.4		35.2	35.2		35.2	35.2	
Effective Green, g (s)	12.4	12.4			12.4		35.2	35.2		35.2	35.2	
Actuated g/C Ratio	0.22	0.22			0.22		0.63	0.63		0.63	0.63	
Clearance Time (s)	3.5	3.5			3.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5			2.5		5.0	5.0		5.0	5.0	
Lane Grp Cap (vph)	291	343			319		284	1104		368	2006	
v/s Ratio Prot		0.05						0.38			0.29	
v/s Ratio Perm	c0.11				0.06		c0.42			0.09		
v/c Ratio	0.48	0.21			0.29		0.67	0.60		0.15	0.45	
Uniform Delay, d1	18.8	17.6			17.9		6.5	6.1		4.1	5.2	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.2			0.4		7.7	1.4		0.4	0.3	
Delay (s)	19.7	17.8			18.3		14.2	7.4		4.5	5.6	
Level of Service	B	B			B		B	A		A	A	
Approach Delay (s)		18.6			18.3			8.9			5.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	55.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	365	175	15	275	205
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	31	372	179	15	281	209
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	957	186			194	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	957	186			194	
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	56			79	
cM capacity (veh/h)	229	851			1367	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	403	194	490
Volume Left	31	0	281
Volume Right	372	15	0
cSH	706	1700	1367
Volume to Capacity	0.57	0.11	0.21
Queue Length 95th (ft)	91	0	19
Control Delay (s)	16.7	0.0	5.6
Lane LOS	C		A
Approach Delay (s)	16.7	0.0	5.6
Approach LOS	C		

Intersection Summary			
Average Delay	8.7		
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (vph)	5	365	70	15	295	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	1.00	1.00		0.96	0.95	
Satd. Flow (prot)	1800	1443		1729	1576	
Flt Permitted	1.00	1.00		0.96	0.95	
Satd. Flow (perm)	1800	1443		1729	1576	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	6	429	82	18	347	18
RTOR Reduction (vph)	0	380	0	0	2	0
Lane Group Flow (vph)	6	49	0	100	363	0
Heavy Vehicles (%)	0%	6%	0%	0%	8%	14%
Turn Type		Prot	Split			
Protected Phases	3	3	7	7	2 8	
Permitted Phases						
Actuated Green, G (s)	12.5	12.5		13.7	71.8	
Effective Green, g (s)	12.5	12.5		13.7	71.8	
Actuated g/C Ratio	0.11	0.11		0.12	0.65	
Clearance Time (s)	4.0	4.0		4.0		
Vehicle Extension (s)	3.0	3.0		3.0		
Lane Grp Cap (vph)	205	164		215	1029	
v/s Ratio Prot	0.00	c0.03		c0.06	c0.23	
v/s Ratio Perm						
v/c Ratio	0.03	0.30		0.47	0.35	
Uniform Delay, d1	43.4	44.7		44.7	8.6	
Progression Factor	1.00	1.00		1.00	0.27	
Incremental Delay, d2	0.3	4.6		1.6	0.2	
Delay (s)	43.6	49.3		46.3	2.5	
Level of Service	D	D		D	A	
Approach Delay (s)	49.2			46.3	2.5	
Approach LOS	D			D	A	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	0	0	0	620	0	80	0	380	55	270	230	0
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				0.97		1.00		0.95		1.00	1.00	
Frt				1.00		0.85		0.98		1.00	1.00	
Flt Protected				0.95		1.00		1.00		0.95	1.00	
Satd. Flow (prot)				3130		1404		3297		1644	1731	
Flt Permitted				0.95		1.00		1.00		0.95	1.00	
Satd. Flow (perm)				3130		1404		3297		1644	1731	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	0	0	729	0	94	0	447	65	318	271	0
RTOR Reduction (vph)	0	0	0	0	0	68	0	10	0	0	0	0
Lane Group Flow (vph)	0	0	0	729	0	26	0	502	0	318	271	0
Heavy Vehicles (%)	0%	0%	0%	6%	0%	9%	0%	2%	0%	4%	4%	0%
Turn Type				custom		custom				Split		
Protected Phases								7 3		2	2	
Permitted Phases				8		8						
Actuated Green, G (s)				30.8		30.8		30.2		37.0	37.0	
Effective Green, g (s)				30.8		30.8		30.2		37.0	37.0	
Actuated g/C Ratio				0.28		0.28		0.27		0.34	0.34	
Clearance Time (s)				4.0		4.0				4.0	4.0	
Vehicle Extension (s)				3.0		3.0				3.0	3.0	
Lane Grp Cap (vph)				876		393		905		553	582	
v/s Ratio Prot								c0.15		c0.19	0.16	
v/s Ratio Perm				c0.23		0.02						
v/c Ratio				0.83		0.07		0.55		0.58	0.47	
Uniform Delay, d1				37.2		29.1		34.1		30.0	28.7	
Progression Factor				1.00		1.00		0.80		1.38	1.39	
Incremental Delay, d2				6.8		0.1		0.5		4.1	2.5	
Delay (s)				44.0		29.1		27.7		45.5	42.5	
Level of Service				D		C		C		D	D	
Approach Delay (s)		0.0			42.3			27.7			44.1	
Approach LOS		A			D			C			D	

Intersection Summary			
HCM Average Control Delay	39.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	20	5	185	0	0	0	130	870	0	0	480	695
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
Lane Util. Factor		1.00	1.00				1.00	0.95			1.00	1.00
Frt		1.00	0.85				1.00	1.00			1.00	0.85
Flt Protected		0.96	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)		1566	1457				1449	3257			1698	1485
Flt Permitted		0.96	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)		1566	1457				1449	3257			1698	1485
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	5	195	0	0	0	137	916	0	0	505	732
RTOR Reduction (vph)	0	0	180	0	0	0	0	0	0	0	0	234
Lane Group Flow (vph)	0	26	15	0	0	0	137	916	0	0	505	498
Heavy Vehicles (%)	13%	0%	5%	0%	0%	0%	18%	5%	0%	0%	6%	3%
Turn Type	Perm		Perm				Prot					Perm
Protected Phases		4					1	6			2	
Permitted Phases	4		4									2
Actuated Green, G (s)		8.4	8.4				15.6	93.6			74.0	74.0
Effective Green, g (s)		8.4	8.4				15.6	93.6			74.0	74.0
Actuated g/C Ratio		0.08	0.08				0.14	0.85			0.67	0.67
Clearance Time (s)		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
Lane Grp Cap (vph)		120	111				205	2771			1142	999
v/s Ratio Prot							c0.09	0.28			0.30	
v/s Ratio Perm		0.02	0.01									c0.34
v/c Ratio		0.22	0.13				0.67	0.33			0.44	0.50
Uniform Delay, d1		47.7	47.4				44.7	1.7			8.4	8.9
Progression Factor		1.00	1.00				1.03	1.38			0.67	2.00
Incremental Delay, d2		0.9	0.6				5.7	0.2			1.0	1.4
Delay (s)		48.6	48.0				51.8	2.6			6.6	19.1
Level of Service		D	D				D	A			A	B
Approach Delay (s)		48.0			0.0			9.0			14.0	
Approach LOS		D			A			A			B	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	485	200	180	550	65	220	70	165	165	85	195
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	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.89		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1379	1765	1530	1676	1740		1710	1588		1644	1579	
Flt Permitted	0.26	1.00	1.00	0.22	1.00		0.45	1.00		0.51	1.00	
Satd. Flow (perm)	384	1765	1530	390	1740		811	1588		886	1579	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	47	505	208	188	573	68	229	73	172	172	89	203
RTOR Reduction (vph)	0	0	95	0	4	0	0	84	0	0	81	0
Lane Group Flow (vph)	47	505	113	188	637	0	229	161	0	172	211	0
Heavy Vehicles (%)	24%	2%	0%	2%	2%	0%	0%	0%	2%	4%	0%	3%
Turn Type	pm+pt		Perm	pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	33.9	31.9	31.9	45.3	39.3		28.1	28.1		28.1	28.1	
Effective Green, g (s)	33.9	31.9	31.9	45.3	39.3		28.1	28.1		28.1	28.1	
Actuated g/C Ratio	0.42	0.39	0.39	0.56	0.48		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	184	692	600	366	840		280	548		306	545	
v/s Ratio Prot	0.01	0.29		c0.06	c0.37			0.10			0.13	
v/s Ratio Perm	0.10		0.07	0.23			c0.28			0.19		
v/c Ratio	0.26	0.73	0.19	0.51	0.76		0.82	0.29		0.56	0.39	
Uniform Delay, d1	15.3	21.1	16.2	12.0	17.2		24.3	19.4		21.7	20.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	3.9	0.2	1.2	4.0		16.7	0.3		2.4	0.5	
Delay (s)	16.0	24.9	16.4	13.2	21.1		41.0	19.7		24.0	20.6	
Level of Service	B	C	B	B	C		D	B		C	C	
Approach Delay (s)		22.1			19.3			30.0			21.9	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	35	165	315	25	0	230	0	55	0	40	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	39	183	350	28	0	256	0	61	0	44	6

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	222	378	317	50
Volume Left (vph)	0	350	256	0
Volume Right (vph)	183	0	61	6
Hadj (s)	-0.46	0.22	0.08	-0.03
Departure Headway (s)	5.2	5.6	5.7	6.2
Degree Utilization, x	0.32	0.59	0.50	0.09
Capacity (veh/h)	631	615	585	478
Control Delay (s)	10.6	16.2	14.4	9.8
Approach Delay (s)	10.6	16.2	14.4	9.8
Approach LOS	B	C	B	A

Intersection Summary			
Delay	14.0		
HCM Level of Service	B		
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	110	0	0	0	0	335	310	0	650	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	116	0	0	0	0	353	326	0	684	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								343				
pX, platoon unblocked												
vC, conflicting volume	1037	1363	684	1153	1037	353	684			679		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1037	1363	684	1153	1037	353	684			679		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.4			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.5			2.2		
p0 queue free %	100	100	74	100	100	100	100			100		
cM capacity (veh/h)	211	149	452	130	233	696	795			923		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	116	0	353	326	684
Volume Left	0	0	0	0	0
Volume Right	116	0	0	326	0
cSH	452	1700	1700	1700	1700
Volume to Capacity	0.26	0.00	0.21	0.19	0.40
Queue Length 95th (ft)	25	0	0	0	0
Control Delay (s)	15.7	0.0	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	15.7	0.0	0.0		0.0
Approach LOS	C	A			

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	410	0	120	70	525	0	0	550	210
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
Lane Util. Factor				0.95	0.95	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1624	1624	1530	1629	1698			1667	1224
Flt Permitted				0.95	0.95	1.00	0.32	1.00			1.00	1.00
Satd. Flow (perm)				1624	1624	1530	555	1698			1667	1224
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	432	0	126	74	553	0	0	579	221
RTOR Reduction (vph)	0	0	0	0	0	98	0	0	0	0	0	47
Lane Group Flow (vph)	0	0	0	216	216	28	74	553	0	0	579	174
Heavy Vehicles (%)	4%	0%	7%	0%	0%	0%	5%	6%	0%	0%	8%	25%
Turn Type				Split		Perm	pm+pt					Perm
Protected Phases				4	4		1	6			2	
Permitted Phases						4	6					2
Actuated Green, G (s)				15.2	15.2	15.2	46.3	46.3			37.5	37.5
Effective Green, g (s)				15.7	15.7	15.7	46.3	46.3			37.5	37.5
Actuated g/C Ratio				0.22	0.22	0.22	0.66	0.66			0.54	0.54
Clearance Time (s)				4.5	4.5	4.5	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
Lane Grp Cap (vph)				364	364	343	441	1123			893	656
v/s Ratio Prot				c0.13	0.13		0.01	c0.33			c0.35	
v/s Ratio Perm						0.02	0.10					0.14
v/c Ratio				0.59	0.59	0.08	0.17	0.49			0.65	0.27
Uniform Delay, d1				24.3	24.3	21.5	9.7	6.0			11.6	8.8
Progression Factor				1.00	1.00	1.00	1.01	1.03			1.00	1.00
Incremental Delay, d2				2.6	2.6	0.1	0.1	1.0			3.6	1.0
Delay (s)				26.9	26.9	21.6	9.9	7.1			15.2	9.8
Level of Service				C	C	C	A	A			B	A
Approach Delay (s)		0.0			25.7			7.5			13.7	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	305	5	225	0	0	0	0	290	370	110	850	0
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					1.00		1.00	0.95	
Frt		1.00	0.85					0.92		1.00	1.00	
Flt Protected		0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1716	1485					1602		1629	3288	
Flt Permitted		0.95	1.00					1.00		0.21	1.00	
Satd. Flow (perm)		1716	1485					1602		364	3288	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	321	5	237	0	0	0	0	305	389	116	895	0
RTOR Reduction (vph)	0	0	132	0	0	0	0	62	0	0	0	0
Lane Group Flow (vph)	0	326	105	0	0	0	0	632	0	116	895	0
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	0%	5%	3%	5%	4%	0%
Turn Type	Split		Perm							pm+pt		
Protected Phases	8	8						6		5	2	
Permitted Phases			8							2		
Actuated Green, G (s)		15.9	15.9					38.3		45.6	45.6	
Effective Green, g (s)		16.4	16.4					38.3		45.6	45.6	
Actuated g/C Ratio		0.23	0.23					0.55		0.65	0.65	
Clearance Time (s)		4.5	4.5					4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0					3.0		3.0	3.0	
Lane Grp Cap (vph)		402	348					877		297	2142	
v/s Ratio Prot		c0.19						c0.39		0.02	c0.27	
v/s Ratio Perm			0.07							0.24		
v/c Ratio		0.81	0.30					0.72		0.39	0.42	
Uniform Delay, d1		25.3	22.1					11.8		8.0	5.8	
Progression Factor		1.00	1.00					1.14		1.12	1.26	
Incremental Delay, d2		11.7	0.5					4.4		0.8	0.5	
Delay (s)		37.1	22.6					17.8		9.7	7.9	
Level of Service		D	C					B		A	A	
Approach Delay (s)		31.0			0.0			17.8			8.1	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	0	110	0	5	20	15	600	5	20	705	350
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	42	0	116	0	5	21	16	632	5	21	742	368
Pedestrians		23			22			23			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		2			2			2			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								254			365	
pX, platoon unblocked	0.93	0.93	0.88	0.93	0.93	0.90	0.88			0.90		
vC, conflicting volume	1683	1682	601	1240	1863	658	1134			659		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1274	1273	278	797	1468	569	882			570		
tC, single (s)	7.6	6.5	6.9	7.5	6.5	6.9	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	55	100	81	100	95	95	98			98		
cM capacity (veh/h)	93	144	610	191	110	417	664			851		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	158	26	653	392	739
Volume Left	42	0	16	21	0
Volume Right	116	21	5	0	368
cSH	247	267	664	851	1700
Volume to Capacity	0.64	0.10	0.02	0.02	0.43
Queue Length 95th (ft)	99	8	2	2	0
Control Delay (s)	42.4	19.9	0.6	0.8	0.0
Lane LOS	E	C	A	A	
Approach Delay (s)	42.4	19.9	0.6	0.3	
Approach LOS	E	C			

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	225	40	20	35	130	120	70	275	15	145	290	380
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			1.00			1.00	1.00
Frpb, ped/bikes		0.99			0.97			1.00			1.00	0.92
Flpb, ped/bikes		0.98			1.00			1.00			0.99	1.00
Frt		0.99			0.94			0.99			1.00	0.85
Flt Protected		0.96			0.99			0.99			0.98	1.00
Satd. Flow (prot)		1678			1625			1749			1654	1394
Flt Permitted		0.52			0.94			0.85			0.77	1.00
Satd. Flow (perm)		902			1528			1507			1294	1394
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	237	42	21	37	137	126	74	289	16	153	305	400
RTOR Reduction (vph)	0	4	0	0	41	0	0	2	0	0	0	189
Lane Group Flow (vph)	0	296	0	0	259	0	0	377	0	0	458	211
Confl. Peds. (#/hr)	19		28	28		19	19		19	28		28
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	0%	6%	6%	1%
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		25.1			25.1			36.9			36.9	36.9
Effective Green, g (s)		25.1			25.1			36.9			36.9	36.9
Actuated g/C Ratio		0.36			0.36			0.53			0.53	0.53
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)		323			548			794			682	735
v/s Ratio Prot												
v/s Ratio Perm		c0.33			0.17			0.25			c0.35	0.15
v/c Ratio		0.91			0.47			0.47			0.67	0.29
Uniform Delay, d1		21.4			17.3			10.4			12.1	9.2
Progression Factor		1.00			1.00			1.48			0.58	0.21
Incremental Delay, d2		29.1			0.6			0.6			4.9	0.9
Delay (s)		50.6			18.0			16.0			12.0	2.9
Level of Service		D			B			B			B	A
Approach Delay (s)		50.6			18.0			16.0			7.7	
Approach LOS		D			B			B			A	

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	320	450	300	40	75	270
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.98		1.00	0.85
Flt Protected		0.98	1.00		0.95	1.00
Satd. Flow (prot)		1729	1727		1676	1453
Flt Permitted		0.67	1.00		0.95	1.00
Satd. Flow (perm)		1189	1727		1676	1453
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	348	489	326	43	82	293
RTOR Reduction (vph)	0	0	7	0	0	230
Lane Group Flow (vph)	0	837	362	0	82	63
Confl. Peds. (#/hr)				13	26	5
Turn Type	Perm					Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Actuated Green, G (s)		47.0	47.0		15.0	15.0
Effective Green, g (s)		47.0	47.0		15.0	15.0
Actuated g/C Ratio		0.67	0.67		0.21	0.21
Clearance Time (s)		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		798	1160		359	311
v/s Ratio Prot			0.21		c0.05	
v/s Ratio Perm		c0.70				0.04
v/c Ratio		1.05	0.31		0.23	0.20
Uniform Delay, d1		11.5	4.8		22.7	22.6
Progression Factor		1.00	1.00		1.25	2.38
Incremental Delay, d2		45.4	0.2		1.1	1.1
Delay (s)		56.9	4.9		29.4	54.9
Level of Service		E	A		C	D
Approach Delay (s)		56.9	4.9		49.4	
Approach LOS		E	A		D	

Intersection Summary			
HCM Average Control Delay	43.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	5	150	210	5	80	130	890	180	60	595	30
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	0.95	1.00	1.00	0.95	
Frt		0.89		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1530		1676	1546		1613	3353	1530	1710	3332	
Flt Permitted		0.95		0.59	1.00		0.35	1.00	1.00	0.22	1.00	
Satd. Flow (perm)		1462		1046	1546		592	3353	1530	396	3332	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	31	5	155	216	5	82	134	918	186	62	613	31
RTOR Reduction (vph)	0	114	0	0	60	0	0	0	95	0	6	0
Lane Group Flow (vph)	0	77	0	216	27	0	134	918	91	62	638	0
Heavy Vehicles (%)	0%	25%	4%	2%	0%	0%	6%	2%	0%	0%	2%	0%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		15.9		15.9	15.9		36.1	29.3	29.3	27.7	24.9	
Effective Green, g (s)		15.9		15.9	15.9		36.1	29.3	29.3	27.7	24.9	
Actuated g/C Ratio		0.27		0.27	0.27		0.60	0.49	0.49	0.46	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)		387		277	410		479	1637	747	244	1383	
v/s Ratio Prot					0.02		c0.03	c0.27		0.01	0.19	
v/s Ratio Perm		0.05		c0.21			0.13		0.06	0.11		
v/c Ratio		0.20		0.78	0.07		0.28	0.56	0.12	0.25	0.46	
Uniform Delay, d1		17.1		20.4	16.5		8.1	10.8	8.3	14.7	12.7	
Progression Factor		1.00		1.00	1.00		0.56	0.63	0.64	1.00	1.00	
Incremental Delay, d2		0.3		13.0	0.1		0.3	1.3	0.3	0.6	1.1	
Delay (s)		17.4		33.4	16.6		4.9	8.1	5.6	15.2	13.8	
Level of Service		B		C	B		A	A	A	B	B	
Approach Delay (s)		17.4			28.6			7.4			13.9	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	155	0	140	165	1060	0	0	355	600
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
Lane Util. Factor					1.00	1.00	1.00	0.95			0.95	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.95	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					1676	1485	1513	3386			3226	1515
Flt Permitted					0.95	1.00	0.47	1.00			1.00	1.00
Satd. Flow (perm)					1676	1485	746	3386			3226	1515
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	163	0	147	174	1116	0	0	374	632
RTOR Reduction (vph)	0	0	0	0	0	75	0	0	0	0	0	309
Lane Group Flow (vph)	0	0	0	0	163	72	174	1116	0	0	374	323
Heavy Vehicles (%)	0%	0%	0%	2%	0%	3%	13%	1%	0%	0%	6%	1%
Turn Type				Perm		Perm	pm+pt					Perm
Protected Phases					8		5	2			6	
Permitted Phases				8		8	2					6
Actuated Green, G (s)					11.0	11.0	41.0	41.0			30.7	30.7
Effective Green, g (s)					11.0	11.0	41.0	41.0			30.7	30.7
Actuated g/C Ratio					0.18	0.18	0.68	0.68			0.51	0.51
Clearance Time (s)					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
Lane Grp Cap (vph)					307	272	590	2314			1651	775
v/s Ratio Prot							0.03	c0.33			0.12	
v/s Ratio Perm					0.10	0.05	0.17					0.21
v/c Ratio					0.53	0.26	0.29	0.48			0.23	0.42
Uniform Delay, d1					22.2	21.0	3.6	4.5			8.1	9.1
Progression Factor					1.00	1.00	0.41	0.40			0.46	1.43
Incremental Delay, d2					1.8	0.5	0.2	0.6			0.3	1.5
Delay (s)					23.9	21.5	1.7	2.4			4.1	14.5
Level of Service					C	C	A	A			A	B
Approach Delay (s)		0.0			22.8			2.3			10.6	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	630	0	170	0	0	0	0	595	170	170	340	0
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	
Lane Util. Factor	0.95	0.95	1.00					0.95		1.00	1.00	
Frt	1.00	1.00	0.85					0.97		1.00	1.00	
Flt Protected	0.95	0.95	1.00					1.00		0.95	1.00	
Satd. Flow (prot)	1608	1608	1485					3241		1676	1748	
Flt Permitted	0.95	0.95	1.00					1.00		0.25	1.00	
Satd. Flow (perm)	1608	1608	1485					3241		443	1748	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	685	0	185	0	0	0	0	647	185	185	370	0
RTOR Reduction (vph)	0	0	132	0	0	0	0	40	0	0	0	0
Lane Group Flow (vph)	342	343	53	0	0	0	0	792	0	185	370	0
Heavy Vehicles (%)	1%	2%	3%	2%	2%	2%	0%	2%	2%	2%	3%	0%
Turn Type	Split		Perm							pm+pt		
Protected Phases	4	4						2		1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	17.3	17.3	17.3					24.6		34.7	34.7	
Effective Green, g (s)	17.3	17.3	17.3					24.6		34.7	34.7	
Actuated g/C Ratio	0.29	0.29	0.29					0.41		0.58	0.58	
Clearance Time (s)	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	
Lane Grp Cap (vph)	464	464	428					1329		382	1011	
v/s Ratio Prot	0.21	c0.21						c0.24		c0.05	0.21	
v/s Ratio Perm			0.04							0.23		
v/c Ratio	0.74	0.74	0.12					0.60		0.48	0.37	
Uniform Delay, d1	19.3	19.3	15.8					13.8		12.9	6.8	
Progression Factor	1.00	1.00	1.00					1.00		0.80	0.86	
Incremental Delay, d2	6.0	6.1	0.1					2.0		0.9	1.0	
Delay (s)	25.3	25.4	15.9					15.8		11.2	6.8	
Level of Service	C	C	B					B		B	A	
Approach Delay (s)		23.3			0.0			15.8			8.3	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	380	20	240	10	20	65	195	305	5	35	295	195
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	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.86		1.00	0.89		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1693	1551		1710	1594		1693	1592		1710	1748	1515
Flt Permitted	0.46	1.00		0.59	1.00		0.30	1.00		0.56	1.00	1.00
Satd. Flow (perm)	824	1551		1064	1594		533	1592		1014	1748	1515
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	400	21	253	11	21	68	205	321	5	37	311	205
RTOR Reduction (vph)	0	160	0	0	61	0	0	1	0	0	0	150
Lane Group Flow (vph)	400	114	0	11	28	0	205	325	0	37	311	55
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	1%	13%	0%	0%	3%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	32.6	28.0		8.4	7.8		35.8	29.7		22.6	20.5	20.5
Effective Green, g (s)	32.6	28.0		8.4	7.8		35.8	29.7		22.6	20.5	20.5
Actuated g/C Ratio	0.43	0.37		0.11	0.10		0.47	0.39		0.30	0.27	0.27
Clearance Time (s)	4.0	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	3.0
Lane Grp Cap (vph)	588	568		122	163		421	619		319	469	407
v/s Ratio Prot	c0.19	0.07		0.00	0.02		c0.07	0.20		0.00	c0.18	
v/s Ratio Perm	c0.11			0.01			0.16			0.03		0.04
v/c Ratio	0.68	0.20		0.09	0.17		0.49	0.53		0.12	0.66	0.14
Uniform Delay, d1	16.6	16.5		30.5	31.3		13.4	17.9		19.4	24.9	21.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.2	0.2		0.3	0.5		0.9	0.8		0.2	3.5	0.2
Delay (s)	19.8	16.7		30.8	31.8		14.3	18.7		19.5	28.4	21.4
Level of Service	B	B		C	C		B	B		B	C	C
Approach Delay (s)		18.6			31.7			17.0			25.2	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group