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AGENDA
KEIZER CITY COUNCIL
REGULAR SESSION
Monday, November 2, 2020
7:00 p.m.
Robert L. Simon Council Chambers
Keizer, Oregon

1. **CALL TO ORDER**
2. **ROLL CALL**
3. **FLAG SALUTE**
4. **SPECIAL ORDERS OF BUSINESS**
 - a. Swearing in of Keizer Police Officers Hein, Webb, and Stupfel
5. **COMMITTEE REPORTS**
 - a. Appointments to Keizer Points of Interest Committee, Budget Committee, Storm Water Advisory Committee, Parks Advisory Board, and Youth Committee Liaison for Arts Commission
6. **PUBLIC TESTIMONY**

This time is provided for citizens to address the Council on any matters other than those on the agenda scheduled for public hearing.
7. **PUBLIC HEARINGS**
8. **ADMINISTRATIVE ACTION**
 - a. **ORDINANCE** – Amending Keizer Development Code Regarding Section 1.200 (Definitions) and Section 2.122 (Flood Plain Overlay Zone); Amending Ordinance No. 98-389
 - b. **RESOLUTION** – Approving Report of Consultant Relating to Keizer Growth Transportation Impact Study

- c. ORDINANCE – Declaring a Third Local State of Emergency in the City of Keizer as a Result of COVID-19 Pandemic; Declaring an Emergency
- d. RESOLUTION – Relating to Wastewater Service Charges (2021-2022); Repeal of R2018-2919

9. CONSENT CALENDAR

- a. RESOLUTION – Authorizing the City Manager to Award and Enter Into An Agreement with DGS General Construction Inc. for the Keizer City Hall Minor Remodel
- b. Approval of October 19, 2020 City Council Regular Session Minutes

10. COUNCIL LIAISON REPORTS

11. OTHER BUSINESS

This time is provided to allow the Mayor, City Council members, or staff an opportunity to bring new or old matters before the Council that are not on tonight's agenda.

12. WRITTEN COMMUNICATIONS

To inform the Council of significant written communications.

13. AGENDA INPUT

November 9, 2020

6:00 p.m. – City Council Work Session

- Keizer Statement of Values – Justice, Equity, Diversity, and Inclusion

November 16, 2020

7:00 p.m. - City Council Regular Session

November 30, 2020

6:00 p.m. - City Council Work Session

- Housing Equity and Opportunities

December 7, 2020

7:00 p.m. - City Council Regular Session

14. ADJOURNMENT

City of Keizer Mission Statement

Keep City Government Costs And Services To A Minimum By Providing City Services To The Community In A Coordinated, Efficient, And Least Cost Fashion

COUNCIL MEETING: November 2, 2020

AGENDA ITEM NUMBER: _____

TO: MAYOR CLARK AND CITY COUNCIL MEMBERS

**THROUGH: CHRIS EPPLEY
CITY MANAGER**

**FROM: CHIEF JOHN TEAGUE
KEIZER POLICE DEPARTMENT**

SUBJECT: INTRODUCTION OF NEWLY HIRED OFFICERS

TOPIC:

A recruitment for full time officers was held earlier this year to fill vacancies.

Tim Hein is a 10-year officer from Silverton Police Department. He was recently promoted to sergeant at Silverton and was a long-time motor officer before that. He has a Bachelor of Science degree in Criminal Justice from Western Oregon University as well as intermediate and advanced certification from DPSST. Because he is already certified, Tim will not have to attend the basic police academy and will go through a modified FTEP program before going solo. Tim's hire date was October 26, 2020.

Cody Stupfel has a Bachelor of Science degree in Business Administration from Corban University. He officially resigned his commission earlier this year after 10 years in the Oregon Army National Guard where he was a medical evacuation pilot on the HH60M Blackhawk helicopter. As a new officer, he will need to attend the 16-week basic police academy. Cody's hire date was October 27, 2020.

Officer Trenton Webb was brought on in May 2019 as a Reserve Officer newly graduated from the MVRT Academy. He was hired full time in September and graduated from the basic police academy in March this year. He is now a solo officer and received his basic certification in June.

Please join us in congratulating and welcoming these officers to the Keizer Police Department.

wjb

CITY COUNCIL MEETING: November 2, 2020

AGENDA ITEM NUMBER: _____

TO: MAYOR CLARK AND CITY COUNCIL MEMBERS

THROUGH: CHRIS EPPLEY
CITY MANAGER

FROM: TRACY L. DAVIS, MMC
CITY RECORDER

SUBJECT: VOLUNTEER COORDINATING COMMITTEE RECOMMENDATIONS FOR
APPOINTMENT

The Volunteer Coordinating Committee met on October 15, 2020 to review applications and interview candidates for openings on various committees. The Committee is recommending the following applicants for appointments:

- Youth Committee Liaison: Arts Commission - **Isabella Biondi** to serve the remainder of the term beginning immediately and ending May 30, 2021.
- Keizer Budget Committee - **Hersch Sangster** for position #5 term beginning immediately ending August 31, 2023.
- Keizer Parks Advisory Board - **Dustin Karstetter** to fill the remainder of the term for position #7 beginning immediately and ending December 31, 2021 and **Clay Rushton, David Loudon** and **Mathew Poteet** for Positions #4 through #6 respectively, terms beginning January 1, 2021 and ending December 31, 2023.
- Keizer Points of Interest Committee - **Bob Busch** and **David Loudon** for Positions #3 and #4, terms beginning December 1, 2020 ending November 30, 2023.
- Stormwater Advisory Committee - **Natalie Janney** for Position #7, term beginning January 1, 2021 and ending December 31, 2023.

RECOMMENDATION:

It is recommended the City Council accept the recommendations of the Volunteer Coordinating Committee and appoint the applicants as outlined above.

CITY COUNCIL MEETING: October 19, 2020

AGENDA ITEM NUMBER:_____

TO: MAYOR CLARK AND COUNCIL MEMBERS

THROUGH: CHRISTOPHER C. EPPLEY, CITY MANAGER

FROM: E. SHANNON JOHNSON, CITY ATTORNEY

SUBJECT: ORDINANCE AMENDING KEIZER DEVELOPMENT CODE

At the September 21, 2020 Council meeting, Council directed staff to prepare an Ordinance approving the Keizer Development Code text changes to revise the Code relating to the flood plain overlay zone. Such Ordinance is attached for your review.

Staff indicated some additional changes would be appropriate. Council directed staff to show such revisions. The revisions are in blue.

RECOMMENDATION:

Adopt the attached Ordinance.

Please let me know if you have any questions. Thank you.

ESJ/tmh

1 A BILL ORDINANCE NO.
2 2020-_____
3 FOR
4
5 AN ORDINANCE

6 AMENDING KEIZER DEVELOPMENT CODE REGARDING
7 SECTION 1.200 (DEFINITIONS) AND SECTION 2.122 (FLOOD
8 PLAIN OVERLAY ZONE); **AMENDING ORDINANCE 98-389**
9

10 WHEREAS, the Keizer Planning Commission has recommended to the Keizer
11 City Council amendments to the Keizer Development Code (Ordinance No. 98-389);
12 and

13 WHEREAS, the City Council held a hearing on this matter on September 21,
14 2020 and considered the testimony given and the recommendation of the Keizer
15 Planning Commission; and

16 WHEREAS, the Keizer City Council has determined that it is necessary and
17 appropriate to amend the Keizer Development Code as set forth herein; and

18 WHEREAS, the Keizer City Council has determined that such amendments
19 meet the criteria set forth in state law, the Keizer Comprehensive Plan, and the Keizer
20 Development Code;

21 NOW, THEREFORE,

22 The City of Keizer ordains as follows:

23 Section 1. FINDINGS. The City of Keizer adopts the Findings set forth in
24 Exhibit "A" attached hereto and by this reference incorporated herein.

1 Section 2. AMENDMENT TO THE KEIZER DEVELOPMENT CODE.

2 The Keizer Development Code (Ordinance No. 98-389) is hereby amended by the
3 adoption of the changes to Section 1.200 (Definitions) and Section 2.122 (Flood Plain
4 Overlay Zone) as set forth in Exhibit "B" attached hereto, and by this reference
5 incorporated herein.

6 Section 3. SEVERABILITY. If any section, subsection, sentence, clause,
7 phrase, or portion of this Ordinance is for any reason held invalid or unconstitutional,
8 or is denied acknowledgment by any court or board of competent jurisdiction,
9 including, but not limited to the Land Use Board of Appeals, the Land Conservation
10 and Development Commission and the Department of Land Conservation and
11 Development, then such portion shall be deemed a separate, distinct, and independent
12 provision and such holding shall not affect the validity of the remaining portions
13 hereof.

14 Section 4. EFFECTIVE DATE. This Ordinance shall take effect thirty (30)
15 days after its passage.

16 PASSED this _____ day of _____, 2020.

17 SIGNED this _____ day of _____, 2020.

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24

Mayor

City Recorder

EXHIBIT “A”

Findings regarding the adoption of amendments to section 1.200 (Definitions) and section 2.122 (Flood Plain Overlay Zone) of the Keizer Development Code (KDC).

The City of Keizer finds that:

1. General Findings.

The particulars of this case are found within Planning file Text Amendment 2020-13. Public hearings were held before the Planning Commission on August 12, 2020 and before the City Council on September 21, 2020. Both the Planning Commission and the City Council voted unanimously in favor of the proposed revisions.

2. Criteria for approval are found in Section 3.111.04 of the Keizer Development Code. Amendments to the Comprehensive Plan or Development Code shall be approved if the evidence can substantiate the criteria are met. Amendments to the map shall be reviewed for compliance with all of the listed criteria in Section 3.1104, while text amendments shall only be reviewed for compliance with Section 3.111.04 B, C, and D. Given this is a text amendment, Section 3.111.04 A is not applicable.

3. **Section 3.111.04.B - A demonstrated need exists for the product of the proposed amendment -**

Findings: The proposed revisions to the zone code reflect a demonstrated need. The City participated in a Community Assistance Visit (CAV) with staff from the Department of Land Conservation and Development looking at the City’s floodplain management practices. As a part of the CAV process, the language of the City’s floodplain ordinance was reviewed and deficiencies were identified for correction. The changes provide consistency with the state model floodplain ordinance, which corrects the identified deficiencies to the City’s existing floodplain ordinance. Therefore, these text amendments are found to be necessary to enact the changes desired. Therefore, this proposal complies with this review criterion.

4. **Section 3.111.04.C- The proposed amendment to the Keizer Development Code complies with statewide land use goals and related administrative rules**

FINDINGS: The proposed text amendments comply with the statewide land use planning goals as discussed below.

Goal 1 – Citizen Involvement: The adoption of this ordinance followed notice, a public process involving public hearings, deliberation, and ordinance adoption. Public notice was provided in the Keizertimes. Public hearings were held before the Planning Commission on August 12, 2020, and before the City Council on September 21, 2020. Citizens were afforded the opportunity to participate in the

public process. This process is consistent with the provision for providing an opportunity for citizens to be involved in all phases of this proposed planning process as is required by this goal and with implementing administrative rules within Oregon Administrative Rules.

Goal 2 – Land Use Planning: This ordinance amends the Keizer Development Code. The city has an adopted comprehensive plan acknowledged by the state. The adoption proceeding was conducted in a manner consistent with the Keizer Comprehensive Plan, Keizer Development Code, and applicable state law. The proposed revisions to the Keizer Development Code are consistent with this statewide planning goal and administrative rules.

Goal 3 – Farm Land: The purpose of this goal is to protect lands that are designated for agricultural uses. Within the city limits the Exclusive Farm Use (EFU), Special Agriculture (SA), Urban Transition (UT), and Public (P) allow commercial agricultural uses. However, only the city’s SA zone is a state recognized EFU qualifying zone. The amendments involve flood plain regulations for all land within the City, regardless of zoning designation. They do not affect farm lands specifically. These provisions do not affect lands that are outside the city limits or any lawful uses occurring on those lands, nor does it amend any of those existing zoning designations. The proposed amendments will comply with the Farm Land Goal and with implementing administrative rules.

Goal 4 – Forest Land: The intent of this goal is to protect lands designated for commercial forest uses. There are no zoning districts specifically designated within the city limits that will allow for commercial forestry. Also, there are no commercial forest lands near, or adjacent to the city limits of Keizer. The amendments to the KDC do not involve any land which is designated as forest land, nor will it impact the use of any forest lands. The proposed amendments will comply with this Goal and with implementing administrative rules.

Goal 5 – Natural Resources: The intent of the Natural Resources Goal is to protect various natural resources such as wetlands, waterways, big game habitat, etc. The city has a local wetland inventory of sites where wetland soils may be present. The city has an adopted Willamette River Greenway Overlay zone to protect resources along the Willamette River. There are no identified big game habitats within the city limits of Keizer. The city established a Resource Conservation overlay zone to maintain, preserve and protect the natural features adjacent to Claggett Creek. In addition, the city has storm water regulations to protect water quality of the local water ways. The proposed amendments modify the City’s flood plain regulations to be consistent with the state model code. These amendments will ensure that lands within floodplains are regulated appropriately for protection. These changes will not preclude any of the city’s natural resources protection regulations nor the lawful use of any properties that

are within this overlay zone. Therefore, the proposed text amendments will be consistent with this goal and with administrative rules which implement this goal.

Goal 6 – Air, Water and Land Quality: The intent of this goal is to protect the city’s air, water and land qualities. The city provides its residents with city water from groundwater sources. The quality of the water is monitored to ensure that it complies with all state and federal water quality standards. New construction is required to be connected to the established sanitary sewer system thereby reducing the potential of groundwater contamination from failing on-site septic systems. The city has storm water regulations which are to maintain water quality in the Willamette River and local streams. Land quality is preserved through the city’s erosion control regulations and through zone code development regulations. Air quality is preserved through the city’s development code regulations which limit certain types of uses and are enforced by appropriate state agencies which govern air emission standards. The revisions to the city’s flood plain overlay zone will comply with this goal and with the administrative rules that implement this goal.

Goal 7 – Natural Hazards: The purpose of this goal is to protect life and property from hazards resulting from flooding, steep slopes or other natural occurrences. The city has floodplain regulations that govern the placement of structures within identified 100-year floodplains within the city limits. In Keizer, these are primarily located along the Willamette River and smaller streams such as Claggett Creek. The floodplains have been mapped by the federal government. The intent of the floodplain regulations is to minimize the loss of life and property damage by preventing development, elevating structures above the flood elevation, or flood proofing structures in the floodplain. While there are some steep slopes in the northwest quadrant of the city, there are no mapped areas of steep slopes in Keizer that might warrant any special engineering. The proposed text amendments will ensure the City’s flood plain overlay zone is consistent with the state model code and this goal. The changes proposed will improve the protective measures afforded by the development code and is therefore consistent with this goal and implementing administrative rules.

Goal 8 – Recreation: This goal requires the city to identify and plan for the current and future recreation needs of the residents of the city. The city has an adopted Parks and Recreation Master Plan that inventories parks, playgrounds, and recreational opportunities within the city limits and plans for the city’s future park and recreation needs. The proposed amendments will have no impact on the recreational activities that occur on any park land within the city and will not impact either this goal or any administrative rules that implement it.

Goal 9 – Economic Development: The intent of this goal is to ensure that the city plans for its overall economic vitality. Current employment needs were projected forward based on regional job growth estimates and target industry goals. The growth forecast calls for a total of 3,774 new jobs over the next 20

years. The adopted Economic Opportunities Analysis found there is a net need for commercial and institutional lands amounting to 63.3 gross acres above and beyond what the City's remaining buildable employment lands can accommodate. The proposed text amendments will not have any adverse impact on the economic development activities or uses within the city and does not affect the existing land supply. Therefore, the proposal is consistent with this goal.

Goal 10 – Housing: This goal requires the city to plan and provide for the housing needs of its residents. The adopted Housing Needs Analysis found that for the upcoming 20-year period that there will be a need for 4,513 new units to house the future population. The inventory of buildable residential lands contain a supply of 315.2 acres which are vacant, partially vacant or re-developable and can accommodate an estimated 2,422 units resulting in 2,090 units which must be accommodated beyond the City's existing capacity. When this remaining land need is apportioned to Keizer's residential zones, the HNA estimates a 20-year need of 267 gross acres of residential land. The proposed revisions to the city's flood plain overlay zone do not affect the land supply in any way, but rather clarifies regulations governing development with the floodplain. Therefore, the proposal is consistent with this goal.

Goal 11- Public Facilities and Services: The intent of this goal is to develop a timely, orderly and efficient arrangement of public facilities and services necessary to serve the residents of Keizer. The city provides its residents with water, an established street system, administrative services and police services. Sanitary sewer service is provided by the city of Salem through an intergovernmental agreement. Fire protection services are provided by the Keizer Fire District or Marion County Fire District #1. There is sufficient capacity in the municipal water delivery system and also within the sanitary sewer treatment system to accommodate planned growth within the upcoming 20 year planning period. The proposed text amendments will not impact any of the city's public facilities and services. Therefore, the revisions will comply with this goal and all administrative rules.

Goal 12 – Transportation: The city has an adopted Transportation System Plan that describes the city's transportation systems. This system includes streets, transit, bike, and pedestrian systems. It inventories the existing systems and contains plans for improving these systems. The proposed text amendment will not affect any transportation facility within the city limits and so is consistent with Section 3.111.05 regarding Transportation Planning Rule compliance. The proposed text amendments will have no adverse impact on the city's transportation systems and will not affect this goal or any implementing rules.

Goal 13 – Energy Conservation: This goal seeks to maximize the conservation of energy. All new construction requires compliance for review to applicable energy conservation standards. The proposed text amendments will have no impact on this goal or any of the implementing administrative rules.

Goal 14 – Urbanization: The intent of this goal to provide for an orderly and efficient transition from rural to urban land use. The city has an adopted Comprehensive Plan and zone code that complies with the goal. The proposed text amendments will affect only land that is within the city limits and will not impact the use of any land being transitioned from rural to urbanized uses and is therefore consistent with this goal.

Goal 15 – Willamette River: This goal seeks to protect, conserve, and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River. The revisions to the city’s development code will have no impact on the ability of the city to regulate uses along the river or the Willamette River Greenway Management overlay zone regulations. The proposed amendments to the flood plain overlay zone will ensure lands adjacent to the Willamette River, within the floodplain are appropriately and adequately protected and regulated for flood impacts. Therefore, the proposed amendments are consistent with this goal.

Goal 16 (Estuarine Resources), Goal 17 (Coastal Shorelands), Goal 18 (Beaches and Dunes), and Goal 19 (Ocean Resources) govern areas along the ocean. Since Keizer is not located along the coast these goals are not applicable.

In consideration of the above findings, the proposed zone code revisions comply with all applicable statewide land use goals and with all applicable administrative rules which implement the relevant goal.

5. **Section 3.111.04.D - The amendment is appropriate as measured by at least one of the following criteria:**
- a. It corrects identified error(s) in the previous plan.
 - b. It represents a logical implementation of the plan.
 - c. It is mandated by changes in federal, state, or local law.
 - d. It is otherwise deemed by the council to be desirable, appropriate, and proper.

FINDINGS: The proposed text amendment will revise two separate sections of the Keizer Development Code. These changes will modify the flood plain overlay zone to be consistent with the state model code provisions. The Comprehensive Plan contains goals and policies related to natural resource protection, specifically areas adjacent to the Willamette River, Claggett Creek, and Labish Ditch. These are also areas that are, in part, within identified floodplain boundaries. Therefore, the proposed changes to update the City’s floodplain ordinance provisions represent a logical implementation of the Keizer Comprehensive Plan. The City Council has, by this adoption, determined that the text revisions are desirable, appropriate, and proper. As such, the proposal complies with this criterion.

1.200 DEFINITIONS

1.200.01 General Provisions

- A. General and Specific Terms. The definitions contained in this Section include those that are applicable to the entire [Keizer Development Code](#) (general), and those terms that are [applicable](#) to specific Sections (specific). Terms used in specific Sections are identified as follows:
- | | |
|------------|---|
| [Adult] | Adult Entertainment Business; Section 2.418 |
| [Flood] | Floodplain Overlay Zone; Section 2.1220 |
| [Greenway] | Greenway Management Overlay Zone; Section 2.1231 |
| [Historic] | Historic Resources; Section 2.127 |
| [RV Park] | Recreational Vehicle Spaces and Park; Section 2.412 |
| [Signs] | Signs; Section 2.308 |
- B. Interpretation. When there are two definitions for the same word or phrase, then the definition most applicable for the given situation shall apply. If appropriate, specific terms may be applied to general situations. (5/98)

1.200.02 Grammatical Interpretation.

Words used in the masculine or feminine include all genders. Words used in the present tense include the future, and the singular includes the plural. The word "shall" is mandatory. Where terms or words are not defined, they shall have their ordinary accepted meanings within the context of their use. The contemporary edition of Webster's Third New International Dictionary of the English Language (principal copyright 1961) shall be considered as providing accepted meanings. (12/19)

1.200.03 Diagrams

Diagrams are provided for terms or phrases in order to provide an illustrative example. (5/98)

1.200.04 Definitions.

The following words and phrases, when used in this Ordinance, shall have the meanings ascribed to them in this Section:

Access: The way or means by which pedestrians and vehicles shall have ingress and egress to property. (5/98)

Accessory Dwelling: An interior, attached, or detached residential structure that is used in connection with, or that is accessory to, a single-family dwelling. (1/19)

Access Easement:

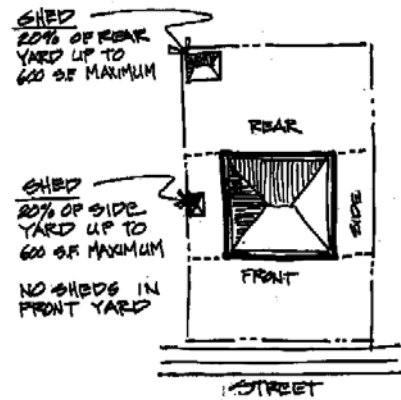
A narrow, private, limited use roadway, which provides access to a public street for properties that do not have usable public street frontage. (11/16)

Accessory Structure: A detached, subordinate building or portion of a main building, the use of which is incidental to the main building or use of the land, but does not include dwellings or living quarters. (5/98)

~~Accessory Structure [Flood]: Sheds or small garages less than 480 square feet in area that are exempt from elevation or flood proofing requirements. (5/98)~~

Accessory Use: A use incidental and subordinate to the main use of the parcel, lot or building. (5/98)

Adjacent: Near or close, but not necessarily abutting or contiguous. For example, a parcel next to, or across the street from, another parcel shall be considered "adjacent." (5/98)



Accessory Structure

Administrative Decision: A decision made by applying the existing standards contained in this Ordinance and without a public hearing. (5/98)

Adult entertainment business [Adult]: A term intended to cover a broad range of activities characterized by live, closed circuit, digital, or reproduced material which has an emphasis on nudity and/or sexual activity. Adult businesses limit their patrons to persons at least 18 years of age. The term "adult entertainment business" also includes the full range of adult motion picture or video theaters and related businesses, such as adult bookstores, adult theaters, adult massage parlors, adult lotion studios, adult arcades, adult cabarets, adult paraphernalia shops, and other establishments which make up a substantial or significant portion of the establishment's activities or merchandise and constitute a continuing course of conduct of exhibiting specified sexual activities and/or nudity in a manner which appeals to a prurient interest. The term "adult entertainment business" also includes other uses similar to the uses mentioned above, presenting material for patrons to view (live, closed circuit, or reproductions), providing massage or lotion studios for the purpose of fondling or other erotic touching of specified anatomical areas and/or purchase or rent of merchandise which emphasizes nudity and/or specified sexual activity in a manner which appeals to a prurient interest, and limiting entrance to patrons who are over 18 years of age. (5/98)

Alteration [Historical]: A change, addition, or modification to the exterior of a building. (5/98)

Alteration or Altered [Sign]: Any change in the size, shape, method of illumination, position, location, construction, or supporting structure of a sign. A change in sign copy or sign face shall not be considered an alteration. (5/98)

Alteration, Structural: Any change in the exterior dimensions of a building, or, a change which would affect a supporting member of a building, such as a bearing wall, column, beam, or girder. (5/98)

Appeal: A request for a review of a decision authority's action on an application. (5/98)

Appeal [Flood]: ~~A request for a review of the interpretation of any provision of this ordinance or a request for a variance. A request for a review of a decision authority's action on an application.~~ (5/98)

Applicant: The property owner of record or contract purchaser. (5/98)

Approved: Means approved by the Community Development Director, Hearings Officer, Planning Commission or City Council having the authority to grant such approval. (5/98)

~~Area of shallow flooding [flood]: A designated Zone AO, AH, AR/AO or AR/AH on a community's Flood Insurance Rate Map (FIRM) with a one percent or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.~~

~~Area of special flood hazard [flood]: The land in the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. It is shown on the Flood Insurance Rate Map (FIRM) as Zone A, AO, AH, A1-30, AE, A99, AR "Special flood hazard area" is synonymous in meaning and definition with the phrase "area of special flood hazard".~~

Architectural Front: For the purposes of determining building setbacks for residential single and multi-family buildings as permitted in the RL, RM, RH, RC and MU zones the architectural front of a building is opposite the architectural rear. The architectural front is typically the façade with the main point of entry into the building and may include doorways, stairs, windows, and other architectural features typically found on a front of the residential building. It may be oriented towards a street or towards an internal parking lot. (6/07)

Architectural Rear: For the purposes of determining building setbacks for residential single and multi-family buildings as permitted in the RL, RM, RH, RC and MU zones the architectural rear of a building is opposite the architectural front, or the façade with the main point of entry into the building. The architectural rear is

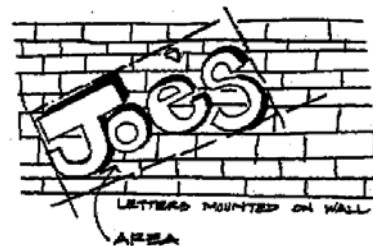
typically the side of the building that may include such features as porches, patios or other features for use of either individual or multiple units. (6/07)

Architectural Side: For the purposes of determining building setbacks for residential single and multi-family buildings as permitted in the RL, RM, RH, RC and MU zones the architectural side of a building is perpendicular to both the architectural front and rear. The architectural side is typically the façade without any significant architectural features found on either the front or rear of the building. (6/07)

Area: The total area circumscribed by the boundaries of a lot or parcel, except that:

1. When the legal instrument creating the property shows the boundary extending into a public street right-of-way, then for purposes of computing the lot or parcel area shall be the street right-of-way line, or if the right-of-way line cannot be determined, a line running parallel to and 30 feet from the center of the traveled portion of the street. (5/98)
2. Private access easements, and the access strips to flag-lots, shall not be included when calculating the area of a lot or parcel. (5/98)

Area [Sign]: The area of a sign shall be the entire area within any type of border, which encloses the outer limits of any writing, representation, emblem, figure, or character. If the sign is enclosed in a frame or cabinet the area is based on the inner dimensions of the frame or cabinet surrounding the sign face. When a sign is on a base material and attached without a frame, such as a wood board or Plexiglas panel, the dimensions of the base material are to be used. The area of a sign having no such perimeter, border, or base material shall be computed by enclosing the entire area within a parallelogram or a triangle of the smallest size sufficient to cover the entire message of the sign and computing the area of the parallelogram or a triangle. For the purpose of computing the number of signs, all writing included within such a border shall be considered one sign, except for multi-faced signs on a single sign structure, which shall be counted as one sign per structure. The area of multi-faced signs shall be calculated by including only one-half the total area of all sign faces. (5/98)



Sign Area

~~Area of Special Flood Hazard [Flood]: Land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. (5/98)~~

Attached Dwellings:

Two or more dwelling units on separate properties that share a common wall for a full story that adjoins enclosed habitable space on each side. Attached

dwellings shall be joined along a common wall for no less than one story for a distance of at least 10 feet. (01/02)

Automobile, Recreational Vehicle or Trailer Sales: A lot used for display, sale, or rental of new or used automobiles, recreational vehicles or trailers and where repair work is limited to minor, incidental repairs. (5/98)

Auto-oriented development: Development that is designed to accommodate customers who use automobiles to travel to the site. This type of development typically provides more than the minimum required number of parking spaces. Buildings entrances tend to emphasize providing convenient access to parking areas. Other typical characteristics are drive-through facilities, multiple driveways, and a low lot coverage percentages. (12/19)

Awning [Sign]: A shelter supported entirely from the exterior wall of a building and composed of non-rigid materials, except for the supporting framework. (5/98)



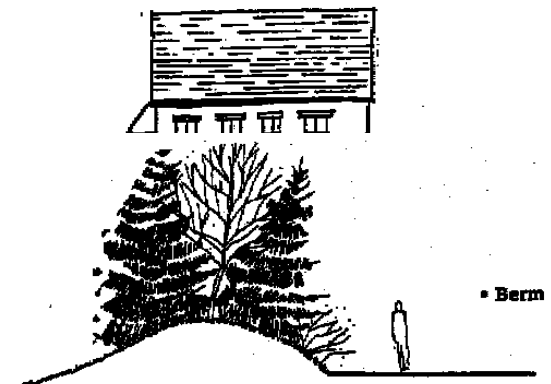
Sign Awning

Base Flood [Flood]: The flood having a one percent chance of being equaled or exceeded in any given year.

Base Flood Level (BFE) [Flood]: The flood level having a 1 percent chance of being equaled or exceeded in any given year ~~(100-year flood plain)~~. (5/98)

Base Flood Elevation (BFE) [Flood]: The elevation to which floodwater is anticipated to rise during the base flood.

Basement: That habitable portion of a building between floor and ceiling which is all below, or partly below and partly above, grade, but so located that for all exterior walls the average vertical distance from grade to the floor below is equal to or greater than the vertical distance from grade to ceiling. If such portion of a building is not a basement, then it shall be considered a story. (5/98)



Berm

Basement [Flood]: Any area of the building having its floor subgrade (below ground level) on all sides.

Bed and Breakfast Establishment: A structure designed and occupied as a residence and in which sleeping rooms are provided on a daily or weekly basis with a morning meal provided. (5/98)

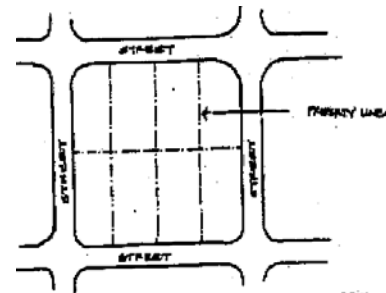
Berm: A linear mound of soil. (5/98)

Bicycle Facilities: Improvements which provide for the needs of cyclists, including bicycle paths, bicycle routes and bicycle parking. (5/98)

Biomass Facility: An electric generating facility that burns wood, agricultural products, other plant or animal waste or material solid waste as fuel to produce steam which is converted to electricity. This definition also includes a gasification, methane fermentation, or alcohol fuel production facility. (5/98)

Block: A parcel of land bounded by 3 or more through streets. (5/98)

Building: A structure having a roof and built for the support, shelter, or enclosure of persons, animals, or property of any kind. Recreational vehicles shall not be considered buildings. (5/98)

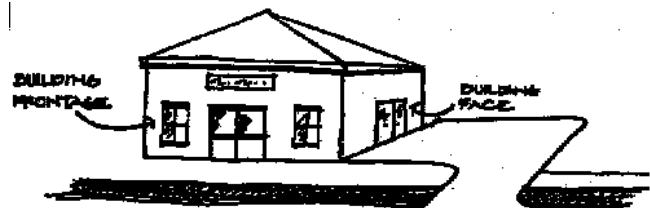


Block

Building Coverage: The portion of a lot or parcel covered or occupied by buildings or other structures. (5/98)

Building Face [Sign]: The single wall surface of a building facing a given direction. (5/98)

Building Frontage [Sign]: The portion of a building face most closely in alignment with an adjacent right-of-way or fronting a parking lot. A service station may use the longest side of an overhanging canopy for building frontage. (5/98)



Building Face & Frontage

Building Height: The vertical distance from the average elevation of the finished grade to the highest point of the structure. By definition, building height does not include architectural and building features exempt from height restrictions. (5/98)



Building Height

Building, Main: A building within which is conducted the principal use of the property. (5/98)

Building Official: An individual empowered by the City to administer and enforce the Uniform Building Code (UBC). (5/98)

Building Plane: The plane of a building wall that extended from the ground to the top of each wall of a structure. Area is determined by multiplying the length of each wall by the height. The plane does not include roof area. (12/18)

Cabana: A stationary structure with two or more walls, used in conjunction with a manufactured home to provide additional living space and meant to be moved with the manufactured home. (5/98)

Canopy Sign [Sign]: A sign hanging from a canopy or eve, at an angle to the adjacent wall. (5/98)

Carpool: A group of two or more commuters, including the driver, who share the ride to and from work or other destinations. (5/98)

Carport: A structure consisting of a roof and supports for covering a parking space and of which not more than one side shall be enclosed by a wall or storage cabinet. (5/98)



Canopy Sign

Cemetery: Land used or intended to be used for the burial of the dead, and dedicated for cemetery purposes, including a columbarium, crematory, mausoleum, or mortuary, when operated in conjunction with and within the boundary of such cemetery. (5/98)

Change of Use: A change from one type of use of a building or land to another type of use. (5/98)

Change of Use [Greenway]: Making a different use of the land than that which existed on December 6, 1975. It includes a change which requires construction, alterations of the land, water or other areas outside of existing buildings or structures and which substantially alters or affects the land or water. It does not include a change of use of a building or other structure which does not substantially alter or affect the land or water upon which it is situated. The sale of property is not in itself considered to be a change of use. An existing open storage area shall be considered to be the same as a building. Landscaping, construction of driveways, modifications of existing structures, or the construction or placement of such subsidiary structures or facilities as are usual and necessary to the use and enjoyment of existing improvements shall not be considered a change of use. (5/98)

Child Foster Home: Any home maintained by a person who has under the care of the person in such home any child under the age of 18 years not related to the person by blood or marriage and unattended by the parent or guardian for the purpose of providing such child's care, food and lodging. This use must have a current certificate of approval issued by the State of Oregon (6/99)

Church: See House of Worship. (5/98)

City: The City of Keizer, Oregon. (5/98)

Clinic: A facility operated by a group of physicians, dentists, or other licensed health practitioners on an out-patient basis and not involving overnight housing of patients. (5/98)

Club: An organization, group, or association supported by the members, the purpose of which is to render a service primarily for members and their guests, but shall not include any organization, group, or association the chief activity of which is to render a service customarily carried on as a business for profit. (5/98)

Commission: The Planning Commission of Keizer, Oregon. (5/98)

Common Open Space: An area, feature, building or other facility within a development intended for the use by the residents of the development. (5/98)

Community [Flood]: The city limits of the City of Keizer.

Community Building: A publicly owned and operated facility used for meetings, recreation, or education. (5/98)

Comprehensive Plan: The officially adopted City of Keizer Comprehensive Plan, as amended. (5/98)

Conditional Use: A use, which is permitted in a particular zone or elsewhere in this ordinance only after review and approval as a conditional use, including non-conforming" conditional uses. (5/98)

Condominium: A building or group of buildings, broken into separate units with each unit being separately owned, while the parcel on which the building(s) is located is held in a separate ownership. Condominiums are subject to the provisions of ORS 94.004 to 94.480, and 94.991. (5/98)

Conforming: In compliance with the regulations of the Code. (5/98)

Construct [Sign]: Build, erect, attach, hang, place, suspend, paint in new or different word, affix, or otherwise bring into being. (5/98)

~~Conveyance [Flood]: Refers to the carrying capacity of all or a part of the flood plain. It reflects the quantity and velocity of flood waters. Conveyance is measured in cubic feet per second (CFS). If the flow is 30,000 CFS at a cross section, this means that 30,000 cubic feet of water pass through the cross section each second.~~ (5/98)

Corner Lot: See "Lot, Corner." (5/98)

Council: The City Council of Keizer, Oregon. (5/98)

~~Critical Feature [Flood]: An integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised. (5/98)~~

Critical Facility [Flood]: A facility for which even a slight chance of flooding might be too great. Critical facilities include, but are not limited to schools, nursing homes, hospitals police, fire and emergency response installations, installations which produce, use or store hazardous materials or hazardous waste.

Day Care Facility: An establishment or place, not a part of a public school system, in which are commonly received 3 or more children, not of common parentage, under the age of 14 years, for a period not exceeding 12 hours per day for the purpose of being given board, care, or training apart from their parents or guardians. (5/98)

Decision: The formal act by which the Community Development Director, Hearings Officer, Planning Commission or City Council makes its final disposition of a land use action. (5/98)

Demolish [Historical]: To raze, destroy, dismantle, deface or in any other manner cause partial or total destruction of a resource. (9/18)

Density: The number of dwellings units per gross acre. (5/98)

Develop: To construct or alter a structure; or, to make alterations or improvements to land for the purpose of enhancing its value. (5/98)

Development: Man-made changes to property, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations. (5/98)

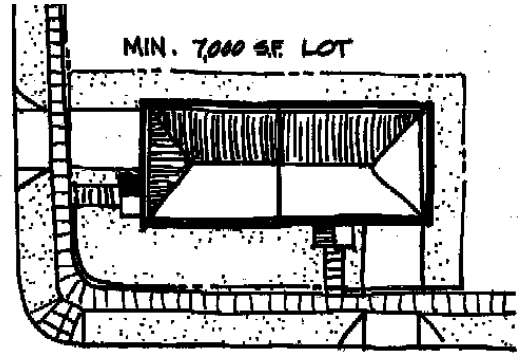
Development [Flood]: Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials. Any activity that has the potential to cause erosion or increase the velocity or depth of floodwater. Development may include, but is not limited to, residential and non-residential structures, fill, utilities, transportation facilities, and the storage and stockpiling of buoyant or hazardous materials. (5/98)

Dormitory: A building, under single management, where group sleeping accommodations are provided for in one room or in a series of closely associated rooms and where meals may be provided. (5/98)

Driveway: A private way used by vehicles and pedestrians to gain access from a public access or right-of-way onto a lot or parcel of land. (5/98)

Drop Station: Vehicles or structures of less than a total of 400 square feet maintained on a lot solely to provide shelter for no more than four types of recyclable material (such as paper, tin cans, plastic and bottles) deposited by members of the public and collected at regular intervals for further transfer or processing elsewhere. (5/98)

Duplex: See: "Dwelling, Two-Family (Duplex)." (5/98)



Duplex

Dwelling Unit: One or more rooms designed for occupancy by one family and not having more than one cooking facility. (5/98)

Dwelling, Multi-Family: A building on a single parcel or lot containing 3 or more dwelling units designed for occupancy by 3 or more families living independently of each other. (5/98)

Dwelling, Single Family Detached: A detached building containing one dwelling unit designed exclusively for occupancy by 1 family. (5/98)

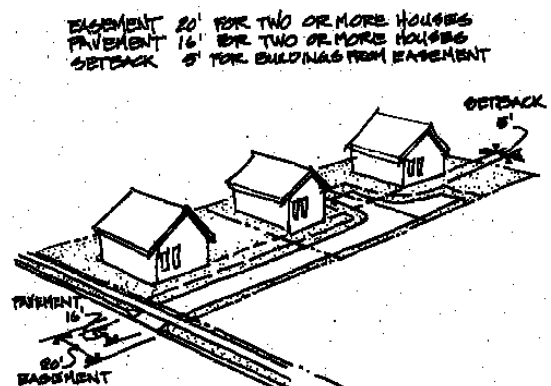
Dwelling, Townhouse: A multi-family structure so designed that each individual dwelling unit is located upon a separate lot or parcel. (5/98)

Dwelling, Two-Family (Duplex): A detached building on a single parcel or lot containing 2 dwelling units designed exclusively for occupancy by 2 families living independently of each other. (5/98)

Easement: A grant of right to use an area of land for a specific purpose. (5/98)

Employees: All persons, including proprietors, performing work on a premise. (5/98)

Encroachment [Flood]: Any obstruction in the flood plain which affects flood flows. (5/98)



Easement

Existing Mobile/Manufactured Home Park or Manufactured Home Subdivision [Flood]: A parcel (or contiguous parcels) of land divided into two or more mobile/manufactured home lots for rent or sale for which the construction of facilities for servicing the lot on which the mobile/manufactured home is to be affixed (including, at a minimum, the installation of utilities, either final site grading or the pouring of concrete pads, and the construction of streets) is completed before the effective date of this Ordinance. (5/98)

~~Expansion to an Existing Mobile/Manufactured Home Park or Manufactured Home Subdivision [Flood]: The preparation of additional sites by the construction of facilities for servicing the lots on which the mobile/manufactured homes are to be affixed (including the installation of utilities, either final site grading or pouring of concrete pads, or the construction of streets).~~ (5/98)

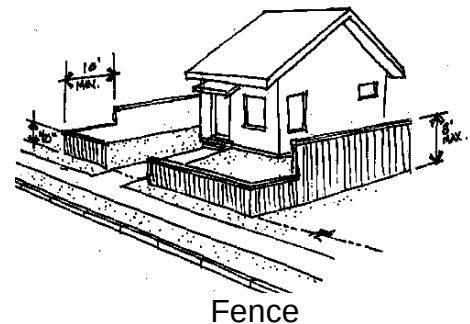
Family: An individual or two or more persons related by blood, marriage, adoption, or legal guardianship, or a group of not more than 5 unrelated individuals, living together as a single housekeeping unit. (5/98)

Family Day Care Provider: A day care provider who regularly provides child care in the family living quarters of the home of the provider. (5/98)

Farming: The use of land for purposes defined in ORS Chapter 215. (5/98)

Federal Emergency Management Agency (FEMA) [Flood]: The federal organization responsible for administering the National Flood Insurance Program. (5/98)

Fence: An unroofed barrier or an unroofed enclosing structure or obstruction constructed of any materials including but not limited to, wire, wood, cement, brick, and plastic. (5/98)



Fence, Sight Obscuring: A fence arranged or constructed to obstruct vision. (5/98)

Fill [Flood]: The placement of any material on the land for the purposes of increasing its elevation in relation to that which exists. Fill material includes, but is not limited to, the following: soil, rock, concrete, bricks, wood stumps, wood, glass, garbage, plastics, metal, etc. (5/98)

Final Decision: A decision made in accordance with, and pursuant to, the provisions of this ordinance, or decisions made by the Land Use Board of Appeals or the Courts, after the applicable appeal periods have expired. (5/98)

Finish Ground Level [Sign]: The average elevation of the ground (excluding mounds or berms, etc. located only in the immediate area of the sign) adjoining the structure or building upon which the sign is erected, or the curb height of the closest street, whichever is the lowest. (5/98)

Flag Lot: See "Lot, Flag." (5/98)

Flashing Sign [Sign]: A sign any part of which pulsates or blinks on and off, except time and temperature signs and message signs allowed by conditional use. (5/98)

Flood or Flooding [Flood]:

- (a) A general and temporary condition of partial or complete inundation of normally dry land areas from:
- (1) The overflow of inland or tidal waters.
 - (2) The unusual and rapid accumulation or runoff of surface waters from any source.
 - (3) Mudslides (i.e., mudflows) which are proximately caused by flooding as defined in paragraph (a)(2) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.
- (b) The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (a)(1) of this definition.

~~A general and temporary condition of partial or complete inundation of usually dry land areas from the unusual and rapid accumulation or runoff of surface waters from any source.~~ (5/98)

~~Flood Boundary Floodway Map (FBFM) [Flood]: The map portion of the Flood Insurance Study (FIS) issued by the Federal Insurance Agency on which is delineated the Flood Plan, Floodway (and Floodway Fringe), and cross sections (referenced in the text portion of the FIS).~~ (5/98)

~~Flood Elevation Certificate (FEC) [Flood]: Certification by a professional surveyor or other authorized official indicating the height of the lowest floor of a building.~~ (5/98)

~~Flood Insurance Rate Map (FIRM) [Flood]: The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards (flood plain) and the risk premium zones applicable to the community and is on file with the City of Keizer.~~ (5/98)

~~Flood elevation study: An examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.~~

Flood Insurance Rate Map (FIRM) [Flood]: The official map of a community, on which the Federal Insurance Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community. A FIRM

that has been made available digitally is called a Digital Flood Insurance Rate Map (DFIRM).

Flood Insurance Study (FIS) [Flood]: An examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

~~Flood Insurance Study (FIS) [Flood]: The official report provided by the Federal Insurance Administration that includes flood profiles, the Flood Boundary Floodway map and the water surface elevation of the base flood and is on file with the City of Keizer. (5/98)~~

~~Flood Plain [Flood]: Lands within the City that are subject to a one (1) percent or greater chance of flooding in any given year as identified on the official zoning maps of the City of Keizer. (5/98)~~

Floodplain Management [Flood]: The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, and floodplain management regulations.

Floodproofing [Flood]: A combination of structural ~~or~~ and non-structural provisions~~additions~~, changes, or adjustments to structures, ~~land or waterways for which the reduction or elimination of risk~~ of flood damage to real estate or improved real property, properties, water and sanitary facilities, structures and their contents ~~of buildings in a flood hazard area~~. (5/98)

Floodway [Flood]: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order ~~remain unobstructed~~ to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Also referred to as "Regulatory Floodway." ~~one (1) foot. Once established, nothing can be placed in the floodway that would cause any rise in the base flood elevation.~~ (5/98)

~~Floodway Fringe [Flood]: The area of the flood plain lying outside of the floodway as delineated on the FBFM where encroachment by development will not increase the flood elevation more than one foot during the occurrence of the base flood discharge. (5/98)~~

Floor Area: The sum of the gross horizontal areas of the several floors of a building, measured from the exterior faces of the exterior walls or from the centerline of walls separating two buildings, but not including:

1. Attic space providing headroom of less than seven feet;
2. Basement, if the floor above is less than six feet above grade;
3. Uncovered steps or fire escapes;

4. Private garages, carports, or porches;
5. Accessory water towers or cooling towers;
6. Off-street parking or loading spaces. (5/98)

Forest Use: The use of land for the production of trees; the processing of forest products; open space; water sheds; wildlife and fisheries habitat; vegetative soil stabilization; air and water quality maintenance; outdoor recreational activities or related support services; wilderness; or, livestock grazing. (5/98)

Free-Standing Sign [Sign]: A sign supported by one or more uprights, poles or braces placed in or upon the ground, or a sign supported by any structure primarily for the display and support of the sign. (5/98)



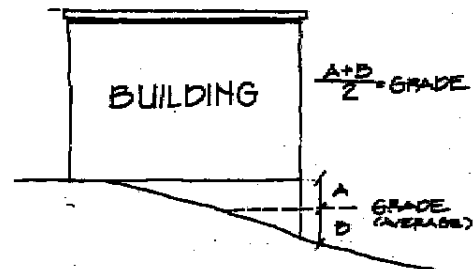
Free-Standing Sign

Front Lot Line: See "Lot Line, Front." (5/98)

Functionally Dependent Use [Flood]: A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, and does not include long term storage or related manufacturing facilities.

Garage: A building, or portion of a building, used for the storage or parking of a vehicle. (5/98)

Grade: The average elevation of the finished ground at the centers of all walls of a building, except that if a wall is parallel to and within five feet of a sidewalk, the sidewalk elevation opposite the center of the wall shall constitute the ground elevation. (5/98)



Grade

Group Living: Characterized by the long-term (i.e., more than 28 days) residential occupancy of a structure by a group of people who do not meet the definition of Household Living. The size of the group typically is larger than the average size of a household. Group Living structures do not include self-contained units but rather have common facilities for residents including those for dining, social and recreational and laundry. Group Living is differentiated into two subcategories based on whether residents receive personal care, training and/or treatment.

- a. Room and board facilities where no personal care, training and/or treatment is provided include examples such as dormitories, fraternities, sororities, boarding houses, monasteries and convents, residential hotels, lodging houses operated by organizations for members only, and similar uses.
- b. Long-term facilities where some level of care is provided includes examples such as hospice, nursing and personal care facilities, homes for the deaf or blind, and similar uses.

Exceptions include: (1) Lodging where tenancy may be arranged for periods less than one month is considered a hotel or motel use and is classified in the Retail Sales and Service category. However, in certain situations, lodging where tenancy may be arranged for periods less than one month may be classified as a Community Service use such as short term housing or mass shelters. (2) Facilities for people who are under judicial detainment and are under the supervision of sworn officers are included in the Detention Facilities category. (12/19)

Habitable Space: A room or space in a structure for living, sleeping, eating, or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility space, and similar areas, are not considered habitable space. (5/98)

~~Hazardous Material [Flood]: Combustible, flammable, corrosive, explosive, toxic or radioactive substance which is potentially harmful to humans and the environment.~~ (5/98)

Hearings Action: Those actions where opportunity for a public hearing of a land use action is provided by this Ordinance. (5/98)

Hearings Officer: The person(s) so designated by the Council to conduct a quasi-judicial public hearing for certain land use actions. (5/98)

Highest Adjacent Grade [Flood]: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic Structure: Any structure that is:

1. Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
2. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

3. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of Interior; or
4. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
 - a. By an approved state program as determined by the Secretary of the Interior or
 - b. Directly by the Secretary of the Interior in states without approved programs.

Home Occupation: A business or professional activity engaged in by a resident of a dwelling unit as a secondary use of the residence, and in conformance with the provisions of the Ordinance. Such term does not include the lease or rental of a dwelling unit, the rental of guest rooms on the same premises, or the operation of a day care facility. (5/98)

Hotel: Any building in which lodging is provided to guests for compensation and in which no provision is made for cooking in individual rooms. (5/98)

Household Living: Characterized by the occupancy of a residential dwelling unit by a household. Tenancy is arranged on a month-to-month basis or for a longer period. Uses where tenancy may be arranged for a shorter period (i.e., less than one month) are not considered residential; they are considered to be a form of transient lodging (Retail Sales And Service and Community Service use categories). Apartment complexes that have accessory services such as food service, dining rooms, and housekeeping are included as Household Living, as are Single Room Occupancy housing (SROs) when at least two thirds of the units are rented on a monthly basis and meals are prepared by the residents.

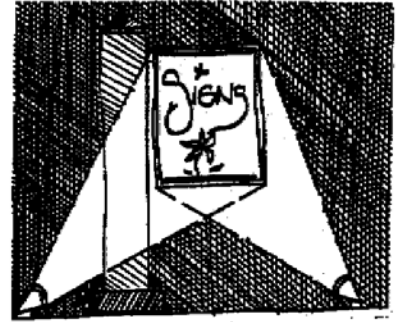
Examples include living in houses, duplexes, apartments, condominiums, retirement center apartments, manufactured housing, houseboats, other structures with self-contained dwelling units, and SROs depending on the number of units rented on a monthly basis and meal preparation.

Exceptions include: (1) Lodging in a dwelling unit or SRO where less than two thirds of the units are rented on a monthly basis is considered a hotel or motel use and is classified in the Retail Sales And Service category. (2) SROs that contain programs which include common dining are classified as Group Living. (3) Guest houses that contain kitchen facilities are prohibited as accessory to Household Living uses. (4) In certain situations, lodging where tenancy may be arranged for periods less than one month may be classified as a Community Service use, such as short term housing or mass shelter. (12/19)

House of Worship: A church, synagogue, temple, mosque, or other permanently located building primarily used for religious worship. A house of worship may also include accessory buildings for related religious activities and a residence. (5/98)

Incidental Signs [Sign]: A sign which is normally incidental to the allowed use of the property, but can contain any message or content. Such signs can be used for, but are not limited to, nameplate signs, warning or prohibition signs, and directional signs not otherwise allowed. (5/98)

Indirect Illumination [Sign]: A source of illumination directed toward such sign so that the beam of light falls upon the exterior surface of the sign. (5/98)



Indirect Illumination

Infill Development: Residential infill development is development at densities allowed under existing zoning on vacant, or partially used land. Infill development occurs on lands which may have been by-passed in the urbanization process or which may have a use that could be or has been removed. (01/02)



Integrated Business Center - Large

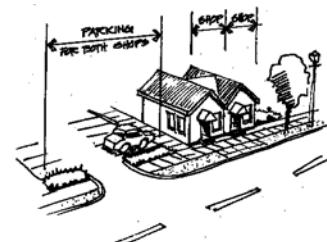
Infill Development Parcel:

Any parcel that meets the criteria for an infill development parcel specified in Section 2.316.03. (01/02)

Integrated Business Center [Sign]: A group of two or more businesses which are planned or designed as a center, and share a common off-street parking area or access, whether or not the businesses, buildings or land are under common ownership. (5/98)

Intensification [Greenway]: Any additions which increase or expand the area or amount of an existing use, or the level of activity. Remodeling of the exterior of a structure not excluded below is an intensification when it will substantially alter the appearance of the structure. Maintenance and repair usual and necessary for the continuance of an existing use is not an intensification of use.

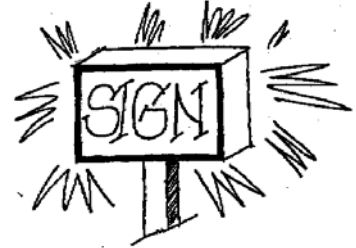
Reasonable emergency procedures necessary for the safety or the protection of property are not an intensification of use. Residential use of lands within the Greenway includes the practices and activities customarily related to the use and enjoyment of one's home. Landscaping, construction of



Integrated Business Center - Small

driveways, modification of existing structures, or construction or placement of such subsidiary structures or facilities adjacent to the residence as are usual and necessary to such use and enjoyment shall not be considered an intensification for the purpose of this Goal. Seasonal increases in gravel operations shall not be considered an intensification of use. (5/98)

Internal Illumination [Sign]: A source of illumination from within a sign. (5/98)



Internal Illumination

Joint Use Sign [Sign]: When two or more businesses combine part or all of their total allowed sign area into free-standing sign for each common frontage of such business. (5/98)



Joint Use Sign

Junk: The term "junk" regardless of value, includes but is not be limited to, any derelict, neglected, or wrecked motor vehicle or parts thereof, glass, paper, waste tire, waste or discarded material, or any of the following old items: machinery or parts thereof, used fixtures, metal, lumber, or wood. For the purposes of this definition the following meanings apply:

1. "Derelict vehicle" means any used motor vehicle without a valid vehicle license or with an expired license. (5/98)
2. "Neglected Vehicle" means a motor vehicle that is missing its engine or transmission, but has all of its body parts intact, including fenders, hood, trunk, glass, and tires. (5/98)
3. "Fixture" means any item that is designed to be used indoors or otherwise protected from the elements. This includes, but is not limited to upholstered furniture, and heating, plumbing, and electrical fixtures. (5/98)
4. "Waste tire" means a tire that is not longer suitable for its original intended purpose because of wear, damage, or defect. (5/98)
5. "Wrecked vehicle" means a motor vehicle that is dismantled, or partially dismantled, or having a broken or missing window or windshield, or lacking a wheel or tire. (5/98)

Junk Yard: The use of more than 200 square feet of the area of any lot for the storage of salvage materials, including scrap metals or other scrap materials, or for the dismantling or "wrecking" of automobiles or other vehicles or machinery, whether or not such uses are conducted as a business for profit or otherwise. (5/98)

Kennel: Any lot or premises on which four or more dogs and/or cats over the age of four months are kept for sale, lease, boarding, or training. (5/98)

Land Division: Any partition or subdivision of a lot or parcel. (5/98)

Land Use Action: An amendment to the City of Keizer Comprehensive Plan or this Ordinance, or a decision on a zone change, variance, conditional use, partitioning or subdivision, or administrative permits, including appeals from any of the foregoing decisions. Issuance of a building permit is not a land use action. (5/98)

Landscaped: Areas primarily devoted to the planting and preservation of trees, shrubs, lawn and other organic ground cover, together with other natural or artificial supplements such as watercourses, ponds, fountains, decorative lighting, benches, arbors, gazebos, bridges, rock or stone arrangements, pathways sculpture, trellises, and screens. (5/98)

Legislative Action: A land use action involving amendments to the Comprehensive Plan, the text of this Ordinance, or an amendment to the Comprehensive Plan map or Zoning map involving more than 5 separate property ownerships. (5/98)

Letter of Map Change (LOMC) [Flood]: Means an official FEMA determination, by letter, to amend or revise effective Flood Insurance Rate Maps and Flood Insurance Studies. The following are categories of LOMCs:

1. Conditional Letter of Map Amendment (CLOMA): A CLOMA is FEMA's comment on a proposed structure or group of structures that would, upon construction, be located on existing natural ground above the base (1-percent-annual-chance) flood elevation on a portion of a legally defined parcel of land that is partially inundated by the base flood.
2. Conditional Letter of Map Revision (CLOMR): A CLOMR is FEMA's comment on a proposed project that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective base flood elevations, or the special flood hazard area.
3. Conditional Letter of Map Revision based on Fill (CLOMR-F): A CLOMR-F is FEMA's comment on a proposed project that would, upon construction, result in a modification of the special flood hazard area through the placement of fill outside the existing regulatory floodway.
4. Letter of Map Amendment (LOMA): An official amendment, by letter, to the Flood Insurance Rate Maps (FIRMs) based on technical data showing that an existing structure, parcel of land or portion of a parcel of land that is naturally high ground, (i.e., has not been elevated by fill) above the base flood, that was inadvertently included in the special flood hazard area.

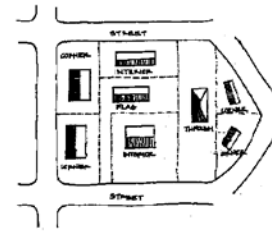
5. Letter of Map Revision (LOMR): A LOMR is FEMA's modification to an effective Flood Insurance Rate Map (FIRM), or Flood Boundary and Floodway Map (FBFM), or both. LOMRs are generally based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective base flood elevations, or the SFHA. The LOMR officially revises the FIRM or FBFM, and sometimes the Flood Insurance Study (FIS) report, and, when appropriate, includes a description of the modifications. The LOMR is generally accompanied by an annotated copy of the affected portions of the FIRM, FBFM, or FIS report.
6. Letter of Map Revision based on Fill (LOMR-F): A LOMR-F is FEMA's modification of the special flood hazard area shown on the Flood Insurance Rate Map (FIRM) based on the placement of fill outside the existing regulatory floodway.
7. PMR: A PMR is FEMA's physical revision and republication of an effective Flood Insurance Rate Map (FIRM) or Flood Insurance Study (FIS) report. PMRs are generally based on physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective base flood elevations, or the special flood hazard area.

Livestock: Domestic animals of types customarily raised or kept on farms for profit or food. (5/98)

Loading Space: An off-street space or berth on the same lot with a building, or group of buildings, used for the parking of a vehicle while loading or unloading merchandise, materials or passengers. Loading space excludes fire lanes, as they are not considered useable space for loading and unloading. (5/98)

Lot: A unit of land created by a subdivision as defined in ORS 92.010 in compliance with all applicable zoning, subdivision ordinances; or created by deed or land sales contract if there were no applicable zoning, subdivision or partitioning ordinances, exclusive of units of land created solely to establish a separate tax account. Such lots may consist of:

1. Single lot of record;
2. Portion of a lot of record; or
3. Combination of complete lots of record and portions of lots of record. (5/98)



Lot Types

Lot Area: The total area of a lot, measured in a horizontal plane within the lot boundary lines, and exclusive of public and private roads and easements of access to other property. For flag-shaped lots, the access strip shall not be included in lot area for the purposes of minimum lot area requirements of this Ordinance. (5/98)

Lot, Corner: A lot abutting on two intersecting streets, other than an alley or private access easement, where the angle of intersecting streets is no greater than 135 degrees. (5/98)

Lot Coverage: Area covered by buildings and by roofed but unenclosed structures, whether or not attached to buildings. Covered structures less than five feet in height and having less than 20 square feet of gross floor area shall not be included in calculating lot coverage. (12/19)

Lot Depth: The horizontal distance measured from the midpoint of the front lot line to the midpoint of the rear lot line. (5/98)

Lot, Flag: A lot or parcel of land with access by a relatively narrow strip of land between the major portion of the parcel and the point of public access to the parcel, all of which is in the same ownership. (5/98)

Lot, Frontage: The distance between the two side lot lines measured at the minimum front setback line, parallel to the street line. (5/98)

Lot, Interior: A lot other than a corner lot. (5/98)

Lot Line, Front:

A lot line abutting a public street, private street, or access easement. In the case of a corner lot, through lot or a lot where vehicular access is provided off an alley and there is no frontage on a public or private street, the front line is based on the structure's orientation and at least two of the following factors:

- a. Location of the front door;
- b. Location of the driveway (when accessed off a public or access easement); and/or
- c. Legal street address.

For flag lots and lots with access from an easement, the Zoning Administrator shall have the authority to designate another line as the front lot line in which case it shall be clearly noted on the final plat. (01/02)

Lot Line, Rear: A property line which is opposite and most distant from the front lot line. In the case of an irregular, triangular or other shaped lot, a line ten (10) feet in length within the lot, parallel to and at a maximum distance from the front line. (5/98)

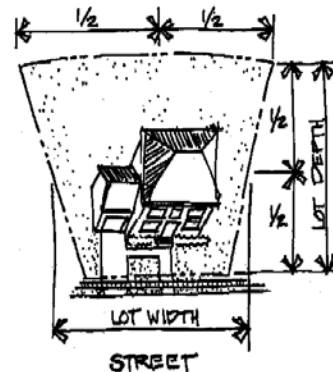
Lot Line, Side: Any property line which is not a front or rear lot line. (5/98)

Lot of Record: A lawfully created lot or parcel established by plat, deed, or contract as duly recorded in Marion County property records. (5/98)

Lot, Through: An interior lot having frontage on two streets. Lots having their access off a private access easement or adjacent to a private access easement shall not be construed as qualifying as through lots. (6/07)

Lot Width: The average horizontal distance between the side lot lines, ordinarily measured parallel to the front lot line. (5/98)

Lowest Floor [Flood]: The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance. (5/98)



Lot Width and Depth

Main Entrance: The principle building entrance intended for the use by the general public, employees or residences. A main entrance door may not be a door that is locked during normal business hours. This entrance is designated the address bearing entrance for the purpose of Emergency Responders. (5/98)

Major Public Improvement [Historical]: The expenditure of public funds or the grant of permission by a public body to undertake change in the physical character of property on a resource site, except for the repair or maintenance of existing public improvements. (9/18)

Manufactured Home: A home, a structure with a Department of Housing and Urban Development label certifying that the structure is constructed in accordance with the National Housing Construction and Safety Standards Act of 1974 (42 U.S.C. 5401 et seq.), as amended August 22, 1981 and constructed after June 15, 1976. (5/98)

Manufactured Dwelling Home [Flood]: A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities.

The term "manufactured dwelling" does not include a "recreational vehicle" and is synonymous with "manufactured home".

~~For flood plain management purposes, the term "manufactured home" also includes mobile homes. For insurance and floodplain management purposes, the term "manufactured home" does not include park trailers, travel trailers, and other similar vehicles. (5/98)~~

Manufactured Dwelling Park or Subdivision [Flood]: A parcel (or contiguous parcels) of land divided into two or more manufactured dwelling lots for rent or sale.

Manufactured Home Park: Any place where four or more manufactured homes are located within 500 feet of one another on property under the same ownership, the primary purpose of which is to rent or lease space to any person, or, to offer space free in connection with securing the trade or patronage of such person. A person shall not construct a new manufactured home park or add lots to an existing manufactured home park without approval by the Department of Commerce.

"Manufactured home park" does not include a lot or lots located within a subdivision being rented or leased for occupancy by no more than one manufactured home per lot if the subdivision was approved pursuant to this Ordinance. (5/98)

~~Manufactured home park or subdivision [Flood]: A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale. (5/98)~~

Marijuana Grow Site: A Marijuana Grow Site that is registered by the Oregon Health Authority Under ORS 475.304 or applicable state law at a specific location used by a grower to produce marijuana for medical use by specific qualifying patients. (10/14)

Marijuana Processor: A Marijuana Processor means a person who processes marijuana items in this state and is licensed by the Oregon Liquor Control Commission under applicable state law. (1/16)

Marijuana Producer: A Marijuana Producer means a person who produces marijuana in this state and is licensed by the Oregon Liquor Control Commission under applicable state law. (1/16)

Marijuana Retailer: A Marijuana Retailer is a person who sells marijuana items to a consumer in this state and is licensed by the Oregon Liquor Control Commission under applicable state law. (1/16)

Marijuana Wholesaler: A Marijuana Wholesaler means a person who purchases marijuana items in this state for resale to a person other than a consumer and is licensed by the Oregon Liquor Control Commission under applicable state law. (1/16)

Master Plan: A presentation showing the ultimate development lay-out of a parcel or property that is to be developed in successive stages or subdivisions. (5/98)

Mean sea level [Flood]: For purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced. (5/98)

Medical Marijuana Facility or Facilities: A Medical Marijuana Facility that is registered by the Oregon Health Authority under ORS 475.300-475.346 or other applicable state law and that sells, distributes, transmits, gives, dispenses or otherwise provides Medical Marijuana to qualifying patients. *In addition, as allowed by state law and applicable regulation only, "early sales" of recreational marijuana is permitted.**

*(THIS AMENDMENT SUNSETS ON DECEMBER 31, 2016 AND IS OF NO FORCE OR EFFECT AFTER SUCH DATE). (10/15)

Message Sign [Sign]: A sign which can change its message electronically and is designed to display various messages, including but not limited to signs displaying time and temperature. (5/98)

Mini-Storage Warehouse: An area or areas located within an enclosed building or structure used only in connection with the storage of personal property. (5/98)

Mobile Food Vendor: A non-permanent use that typically is a truck, van, or trailer which have their wheels intact and have been outfitted to prepare and serve food. (9/16)

~~Mobile home [Flood]: A vehicle or structure, transportable in one or more sections, which is eight feet or more in width, is 32 feet or more in length, is built on a permanent chassis to which running gear is or has been attached, and is designed to be used as a dwelling with or without permanent foundation when connected to the required utilities. Such definition does not include any recreational vehicle as defined by this Section. (5/98)~~

Modular or Prefabricated Home: A dwelling unit whose components are assembled and brought to the site and erected. The dwelling unit is intended and designed to be placed upon a permanent foundation and substantial construction is needed before it is complete and ready for permanent occupancy. Modular or prefabricated homes are regulated by the Uniform Building Code (UBC). (5/98)

Motel: A building or group of buildings on the same lot containing rooms designed for lodging, with or without cooking facilities, which are available for rent and in which each lodging unit has a separate entrance from the building exterior. The term includes auto courts, tourist courts, tourist homes, and motor lodges. (5/98)



Multi-Faced Sign

Multi-faced Sign [Sign]: A sign which has 2 or more identical sign faces, contained in a single sign structure. (5/98)

Multi-family Dwelling [Sign]: A residential structure or complex of structures which include 3 or more separate dwelling units, whether rented or owned by the occupants. (5/98)

Mural [Sign]: An illustration (with or without words or numbers) which is painted or otherwise applied (without projections) to an outside wall of a structure, or, inside the window of a structure. (5/98)

Natural Register Resource: Buildings, structures, object, sites, or districts listed in the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966 (PL 89-665; 16 U.S.C. 470). (9/18)

Neighborhood Activity Center: A use, or combination of uses, which is a common destination or focal point for community activities, including primary and secondary schools, neighborhood parks and playgrounds and shopping centers. (5/98)

Neighborhood Association: An association recognized by the City Council as being a Neighborhood Association in accordance with the Neighborhood Association Ordinance. (5/98)

New Construction: Structures for which construction was initiated on or after the effective date of this Ordinance. (5/98)

New Construction [Flood]: Structure(s) for which the start of construction commenced on or after the ~~original~~ effective date of ~~the a f~~ Floodplain management regulation adopted by the City of Keizer and includes any subsequent improvements to such structures.

Overlay Zone: (5/98)

Nonconforming Sign [Sign]: Any sign which lawfully exists prior to the effective date of this chapter but, which due to the requirements adopted herein, no longer complies with the height, area and placement regulations or other provisions of these regulations. (5/98)

Non-Conforming Structure or Use: A lawfully existing structure or use at the time this Ordinance, or any amendments, becomes effective, which does not conform to the requirements of the zone in which it is located. (5/98)

Notification Area: An area bounded by a line, parallel to the boundary of a subject lot. As used in this section "subject lot" includes not only the lot that is the subject of the proceeding for which notice is required, but also includes any contiguous lot in which any applicant or owner of the subject lot has either sole, joint, or common ownership, or an option to purchase, in whatever form. In the event that the application does not apply to the entire lot, the boundary of the notification area shall be measured from the lot line, not the boundary of the portion of the lot. (5/98)

Notification List: A certified list prepared by a Title Company, the Marion County Assessor's Office or the City which includes the names and addresses of all property owners within the notification area as shown in the County Assessor's records. (5/98)

Nudity or nude [Adult]: Being devoid of an opaque material covering the human genitals, pubic region, buttocks, and female breasts below a point immediately above the top of the areola and where such opaque material does not simulate the organ covered. (5/98)

Nursing Home: A home, place or institution which operates and maintains facilities providing convalescent and/or nursing care for period exceeding 24 hours. Convalescent care may include, but is not limited to, the procedures commonly employed in the nursing and caring for the aged and includes rest homes and convalescent homes, but does not include a boarding home for the aged, a retirement home, hotel, hospital, or a chiropractic facility licensed under ORS. (5/98)

~~Obstruction [Flood]: Any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, channel bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill, structure or matter in, along, across or projecting into any channel, watercourse, or regulatory flood hazard area which may impede, retard or change the direction of the flow of water, either in itself or by catching or collecting debris carried by such water, or that it is placed where the flow of water might carry the same downstream to the damage of life or property. (5/98)~~

Official Zoning Map: The map which indicates the zones in the City of Keizer. (5/98)

Original Jurisdiction: The authority and responsibility for rendering the first decision in a land use proceeding. (5/98)

Owner: The owner of record of real property as shown on the latest tax rolls or deed records of the county, or a person who is purchasing a parcel or property under written contract. (5/98)

Owner [Sign]: As used in these regulations, "owner" means owner or lessee of the sign. If the owner or lessee of the sign cannot be determined, then "owner" means owner or purchaser of the land on which the sign is placed. (5/98)

Parcel: A unit of land that is created by a partitioning of land. (5/98)

Parking Lot or Area: An open area, building or structure, other than a street or alley, used for the parking of automobiles and other motor vehicles and available for use by persons patronizing a particular building, establishment or area. (5/98)

Parking Space: A designated space in a parking lot or area for the parking of one motor vehicle. (5/98)

Partial Harvesting of Timber [Greenway]: A timber harvest that leaves at least 25 percent of the trees at least 6 inches DBH standing beyond the vegetative fringe. (5/98)

Partition: To divide an area or tract of land into two or three parcels within a calendar year when such area or tract of land exists as a unit or contiguous units of land under single ownership at the beginning of such year. "Partition" does not include:

1. Divisions of land resulting from lien foreclosures, divisions of land resulting from contracts for the sale of real property, and divisions of land resulting from the creation of cemetery lots; or,
2. Any adjustment of a lot line by the relocation of a common boundary where an additional parcel is not created and where the existing parcel reduced in size by the adjustment is not reduced below the minimum lot size established by any applicable zoning ordinance; or,
3. A sale or grant by a person to a public agency or public body for state highway, county road, or other right-of-way purposes provided that such road or right-of-way complies with the applicable comprehensive plan and ORS 215.213 (2)(q) to (s) and 215.283 (2)(p) to (r). (5/98)

Pedestrian Circulation System: Pedestrian connection(s) between building entrance(s) of the proposed development and adjacent street(s), the parking area, and the existing or future development on adjacent properties. (5/98)

Pedestrian Facilities: Improvements which provide for public pedestrian foot traffic including sidewalks, walkways, crosswalks and other improvements, such as lighting or benches, which provide safe, convenient and attractive walking conditions. (5/98)

Pedestrian Scale Lighting: Light standards or placement no greater than 14 feet in height located along walkways. (5/98)

Permit (noun): Any action granting permission to do an act or to engage in activity where such permission is required by this Ordinance. (5/98)

Permitted Use: Those uses permitted in a zone that are allowed without obtaining a conditional use permit. (5/98)

Person: Every natural person, firm, partnership, association, social or fraternal organization, corporation, estate, trust, receiver, syndicate, branch of government, or any other group or combination acting as a unit. (5/98)

Pet: A domestic animal customarily kept, and cared for, by the occupants of a dwelling for personal pleasure, and which are not raised for food, fur, or monetary gain. Typically, dogs, cats, birds and other small mammals and reptiles, but not including fowl, herd animals, pigs, goats or horses of any type or breed. (5/98)

Place of Public Assembly: Structure or place where 50 or more people gather which the public may enter for such purposes as deliberation, education, worship, shopping, entertainment, amusement, awaiting transportation or similar activity. (5/98)

Plan Map: An officially adopted map of the City, including urban growth boundary, showing land use designations identified in the Comprehensive Plan. (5/98)

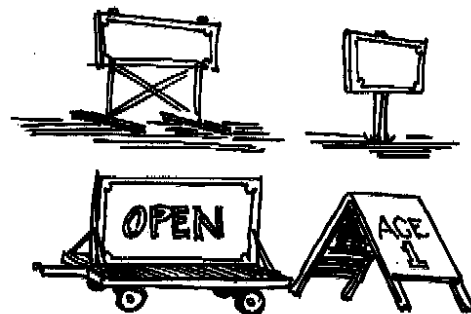
Planned Unit Development: A type of development of a site which, as a single project, is based on a design which incorporates all elements of land, structures and uses in conformance with the applicable standards of this Ordinance. (5/98)

Planning Commission: The Planning Commission of Keizer, Oregon. (5/98)

Plat: The final map which is a diagram, drawing, re-plat or other writing containing all the descriptions, locations, specifications, dedications, provisions, and information concerning a subdivision or partition. (5/98)

Portable Sign [Sign]: Any sign that is not originally designed to be permanently affixed to a building, structure, or the ground. A sign originally designed, regardless of its current modification, to be moved from place to place. These signs primarily include, but are not limited to, A-frame or sandwich board signs, signs attached to wood or metal frames and designed to be self supporting and movable, and also including trailer reader boards.

Portable signs are not to be considered temporary signs as defined and used in this chapter. (5/98)



Portable Signs

Primary Building Façade:

Primary building façade means the side of a building that faces the street and has a main pedestrian entrance from the street. (01/02)

Professional Office: An office occupied by an accountant, architect, attorney-at-law, engineer, surveyor, city or regional planner, insurance agent, real estate broker, landscape architect, or practitioner of the human healing arts, or other professional business similar in type, scale and character. (5/98)

Property Line Adjustment: The realignment of a common boundary between two or more abutting lots or parcels which does not involve the creation of a new lot or parcel. (6/16)



Projecting Sign

Projecting Signs [Sign]: A sign the face of which is not parallel to the wall on which it is mounted, projecting more than 12 inches from a structure. (5/98)

Public Facilities and Services: Projects, activities, and facilities which are necessary for the public health, safety, and welfare. These may include, but are not limited to, water, gas, sanitary sewer, storm sewer, electricity, telephone and wire communication service, and cable television service lines, mains, pumping stations, reservoirs, poles, underground transmission facilities, substations, and related physical facilities which do not include buildings regularly occupied by employees, parking areas, or vehicle, equipment or material storage areas. (5/98)

Quasi-Judicial Review: A decision affecting land use within the City which requires the interpretation and/or amendment of existing standards or maps contained in this Ordinance. (5/98)

Ramada: A stationary structure having a roof extending over a manufactured home, which may also extend over a patio or parking space and is used principally for protection from the elements. (5/98)

Real Estate Sign [Sign]: A sign for the purpose of rent, lease, sale, etc. of real property, building opportunities, or building space. (5/98)

Rear Lot Line: See "Lot Line, Rear." (5/98)

Recreational Vehicle [RV Park]: A unit, with or without motive power, which is designed for human occupancy and intended to be used for recreational or temporary living purposes. (5/98)

Recreational vehicle includes:

1. Camping Trailer: A non-motorized vehicle unit mounted on wheels and constructed with sides that can be collapsed when the unit is towed by another vehicle. (5/98)
2. Motor Home: A vehicular unit built on or permanently attached to a motorized vehicle chassis cab or van which is an integral part of the complete vehicle. (5/98)
3. Travel Trailer: A vehicular unit without motive power which has a roof, floor, and sides and is mounted on wheels and designed to be towed by a motorized vehicle, but which is not of such size or weight as to require special highway movement permits. (5/98)
4. Truck Camper: A portable unit which has a roof, floor, and sides and is designed to be loaded onto and unloaded out of the bed of a truck or pick-up truck. (5/98)
5. Boat, licensed or unlicensed, including trailer. (5/98)
6. All-terrain vehicle (ATV). (5/98)

Recreational Vehicle [Flood]: A vehicle which is:

1. Built on a single chassis;
2. 400 square feet or less when measured at the largest horizontal projection;
3. Designed to be self-propelled or permanently towable by a light duty truck; and
4. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

~~A "camper," "motor home," "travel trailer," as defined in ORS 801.180, 801.350, and 801.565 that is intended for human occupancy and is equipped with plumbing, sinks, or toilet, and does not meet the definition of a Mobile Home (Flood), of this Section. (5/98)~~

Recreational Vehicle Park [RV Park]: Any area operated and maintained for the purposes of providing space for overnight use by recreational vehicles. (5/98)

Recreational Vehicle Space [RV Park]: The area under a parked and occupied recreational vehicle. (5/98)

Recycling Depot: A area used for the collection, sorting, and temporary storage of non-putrescible waste and discarded materials which are taken elsewhere to be re-used or recycled. This definition does not include drop stations. (5/98)

Repair: The reconstruction or renewal of any part of an existing building for the purpose of its maintenance. The word "repair" or "repairs" shall not include structural changes. (5/98)

Residential Facility: A facility licensed by or under the authority of the Department of Human Resources under ORS 443.400 to 443.460 which provides residential care alone or in conjunction with treatment or training or a combination thereof for six to fifteen individuals who need not be related. Staff persons required to meet Department of Human Resources licensing requirements shall not be counted in the number of facility residents, and need not be related to each other or to and resident of the residential facility. (5/98)

Residential Home: A home licensed by or under the authority of the Department of Human Resources under ORS 443.400 to 443.825 which provides residential care alone or in conjunction with treatment or training or a combination thereof for five or fewer individuals who need not be related. Staff persons required to meet Department of Human Resources licensing requirements shall not be counted in the number of facility residents, and need not be related to each other or to any resident of the residential facility. (5/98)

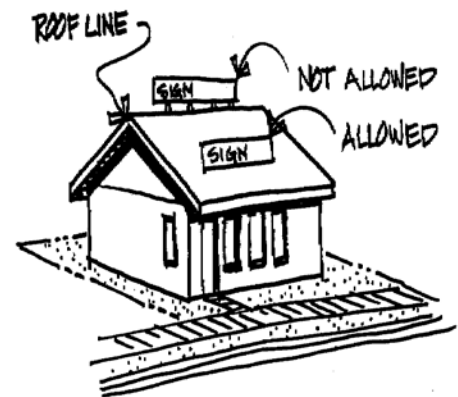
Resource [Historical]: A site, object, building, or structure designated by the Council under Section 2.127.04. (9/18)

Retail Trade: The process of selling to the consumer for direct consumption and not for resale. (5/98)

Right-of-Way: The full length and width of a public street or way, planned or constructed. (5/98)

Roof Line [Sign]: Either the eaves of the roof or the top of the parapet, at the exterior wall. A "mansard roof" is below the top of a parapet and is considered a wall for sign purposes. (5/98)

Roof Sign [Sign]: A sign or any portion of which is displayed above the highest point of the roof, whether or not such sign also is a wall sign. (5/98)



Roof Line & Roof Sign

Rooming and Boarding House: A residential building or portion thereof with guest rooms, providing lodging, or lodging and meals, for 3 or more persons for compensation. (5/98)

Rotating/Revolving Sign [Sign]: A sign, all or a portion of which, moves in some manner. (5/98)

School, Elementary, Middle School, or High School: An institution, public or parochial, offering instruction in the several branches of learning and study, in

accordance with the rules and regulations of the State Department of Education.
(5/98)

School, Trade or Commercial: A building where the instruction is given to pupils for a fee, which fee is the principal reason for the existence of the school. (5/98)

Scrap and Waste Materials Establishment: An business that is maintained, operated or used for storing, keeping, buying or selling old or scrap copper; brass, rope, rags, batteries, paper, rubber, or debris; waste or junked, dismantled, wrecked, scrapped, or ruined motor vehicles or motor vehicle parts (except wrecking yards), iron, steel, or other old scrap metal or non-metal materials. Scrap and waste materials establishments does not include drop stations, solid waste transfer stations, or recycling depot. (5/98)

Semi-Public Use: A structure or use intended for a public purpose by a non-profit organization. (5/98)

Serial additions, alterations or expansions: Two or more additions, alterations or expansions to the existing building gross floor area and/or impervious surface area within a 3-year time period. (12/03)

Service Station: A site and associated buildings designed for the supplying of motor fuel, oil, lubrication and accessories to motor vehicles, but excluding major repair and overhaul. "Major repair and overhaul", as used in this definition, shall be considered to include such activities at painting, bodywork, steam cleaning, tire recapping, and major engine or transmission overhaul or repair involving the removal of a cylinder head or crankcase. (5/98)

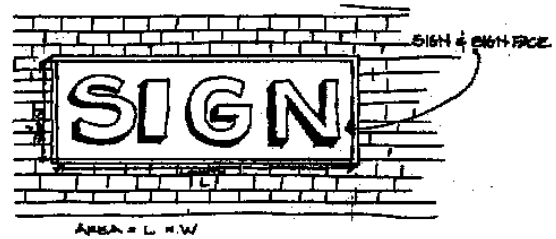
Setback: The distance between a specified lot line and the foundation or exterior wall of a building or structure. (5/98)

Shallow Flooding Area [Flood]: A designated Zone AO, AH, AR/AO or AR/AH on a community's Flood Insurance Rate Map (FIRM) with a one percent or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Side Lot Line: See "Lot Line, Side." (5/98)

Sign [Sign]: Any writing, including letter, word, or numeral; pictorial presentation, including mural, illustration or decoration; emblem, including device, symbol or trademark; flag, including banner or pennant; or any other device, figure or similar thing which is a structure or any part thereof, or is attached to, painted on, or in any other manner represented on a building or structure or device; and is used to announce, direct attention to, or advertise; and is visible from any public right-of-way. (5/98)

Sign Face [Sign]: Surface of a sign containing the message. The sign face shall be measured as set forth in Section 15.10(2). (5/98)



Sign Face

Sign Height [Sign]: The distance from the finish ground level, to the top of the sign or the highest portion of the sign structure or frame, whichever is greater. (5/98)

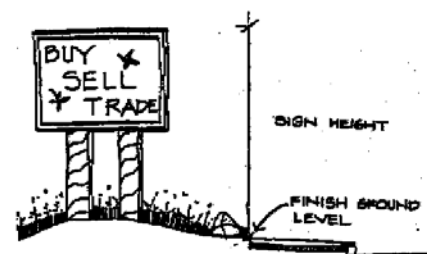
Sign Structure [Sign]: The supports, uprights, braces, framework and other structural components of the sign. (5/98)

Site, Development, or Complex: A group of structures or other development that is functionally or conceptually integrated, regardless of the ownership pattern of the development or underlying land. (5/98)

Solid Waste Transfer Station: A fixed or mobile facility, used as an adjunct to collection vehicle(s), resource recovery facility, disposal site between the collection of the waste/solid waste and disposal site, including but not limited to, another vehicle, a concrete slab, pit, building, hopper, railroad gondola or barge. The term does not include a self-propelled compactor type solid waste collection vehicle into which scooters, pick-ups, small packers or other satellite collection vehicles dump collected solid waste for transport to a transfer, disposal, landfill or resource recovery site or facility. (5/98)

Space, Manufactured Home: An area or lot reserved exclusively for the use of a manufactured home occupant. This definition excludes individual lots within a subdivision. (5/98)

Special Flood Hazard Area [Flood]: The land in the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. It is shown on the Flood Insurance Rate Map (FIRM) as Zone A, AO, AH, A1-30, AE, A99, AR "Special flood hazard area" is synonymous in meaning and definition with the phrase "area of special flood hazard". See "Area of special flood hazard" for this definition.



Sign Height

Special Permitted Use: A use which is a permitted use in a particular zone subject to compliance with the applicable standards of Section 2.400. (5/98)

Specified sexual activities [Adult]: Real or simulated acts of sexual intercourse, human/animal sexual intercourse, masturbation, sadomasochistic abuse, sodomy or the exhibition of human organs in a simulated state, or the characterization

thereof in a printed or visual form, or fondling or other erotic touching of human genitals, pubic region, buttocks, or female breasts. (5/98)

Standard Industrial Classification (SIC): The document so entitled, published in 1987 by the Office Management and Budget, and used in this Ordinance to identify land uses. (5/98)

Start of Construction: The actual start of construction, repair, reconstruction, placement or other improvement. (5/98)

Start of Construction [Flood]: Includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days from the date of the permit. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured dwelling on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

~~1. — The first placement or permanent construction of a structure (other than a mobile/manufactured home) on a site, such as the pouring of slabs or footings or any work beyond the stage of excavation. Permanent construction does not include land preparation, such as clearing, grading, and filling, nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not used as part of the main structure. (5/98)~~

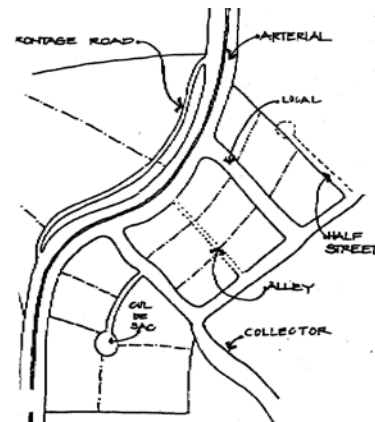
~~2. — For a structure (other than a mobile/manufactured home) without a basement or poured footings, the "start of construction" includes the first permanent framing or assembly of the structure or any part thereof on its piling or foundation. (5/98)~~

~~3. — For mobile/manufactured homes not within a mobile/manufactured home park or manufactured home subdivision, "start of construction" means affixing of the mobile/manufactured home to its permanent site. For mobile/manufactured homes within mobile/manufactured home parks or manufactured home subdivisions, "start of construction" is the date on which the construction of facilities for servicing the~~

~~site on which the mobile/manufactured home is to be affixed (including at a minimum, the construction of streets with final site grading or the pouring of concrete pads, and installation of utilities) is completed.~~ (5/98)

Story: That portion of a building included between the upper surface of any floor and the upper surface of the floor next above, except that the top-most story shall be that portion of a building included between the upper surface of the top-most floor and the ceiling or roof above. Any basement, as defined herein, that is habitable shall be deemed a story for the purpose of administering all fire, life, safety codes including the Uniform Fire Code. (5/98)

Street: The entire width between the boundary lines of every way of travel which provides for ingress and egress for vehicular and pedestrian traffic and the placement of utilities to one or more lots, parcels, areas, or tracts of land. Streets shall follow the locally adopted street designations. A private way created to provide ingress and egress to land in conjunction with the use of such land for forestry, mining, or agricultural purposes is excluded from this definition. (5/98)



Street Types

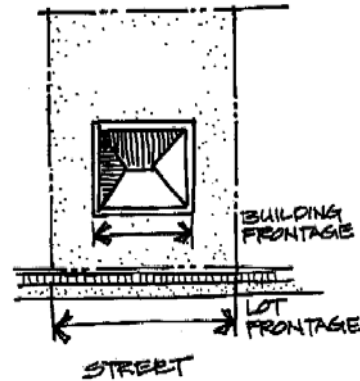
1. **Alley:** A narrow street through a block used primarily for access by service vehicles to the back or side of properties fronting on another street. (5/98)
2. **Arterial:** A street of considerable continuity which is used primarily for through traffic and interconnection between major areas of the City. (5/98)
3. **Collector:** A street supplementary to the arterial street system, used partly by through traffic and partly for access to abutting properties. (5/98)
4. **Cul-de-sac (dead-end):** A short street with one end open to traffic and the other terminated by a vehicle turn-around. (5/98)
5. **Half Street:** A portion of the width of a street, usually along the edge of a subdivision, where the remaining portion of the street could be provided in another subdivision of development. (5/98)
6. **Frontage Road, Marginal Access Road:** A service road parallel and adjacent to a major arterial street providing access to abutting properties, but protected from through traffic. (5/98)
7. **Local Street:** A street intended primarily for access to abutting properties, but protected from through traffic. (5/98)

8. **Private Access Easement:** A right-of-way across private property granted by the property owner to owners of one or more lots and allowing vehicles access from a street or roadway to those lots. (5/98)

Street Frontage [Sign]: That portion of a property which abuts a paved street right-of-way and measured by the lineal distance of the property adjacent to such right-of-way. (5/98)

Structural Alteration: Any change to the supporting members of a structure, including foundation bearing walls or partitions, columns, beams or girders, or any structural change in the roof or in the exterior walls. (5/98)

Structure: That which is built or constructed, an edifice or building of any kind, or a piece of work artificially built up or composed of parts joined together in some definite manner. (5/98)



Street & Building Frontage

Structure [Flood]: a walled and roofed building, Roofed buildings that have two or more walls, including and gas or liquid storage tanks that are principally above ground, as well as a manufactured dwelling.

-(5/98)

Subdivide: To divide an area or tract of land into four or more parcels within a calendar year for the purpose of transfer of ownership or building development, whether immediate or future, when such parcel exists as a unit or contiguous units under a single ownership as shown on the tax roll for the year preceding the division of property. (5/98)

Subdivision: All divisions of property which create four or more lots in a single calendar year. (5/98)

Subject Property: The lot or parcel that is the location of the proposed use or structure. (5/98)

Substantial Damage [Flood]: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial Improvement [Flood]: Any ~~repair~~, reconstruction, addition, rehabilitation or other improvements of a structure, the cost of which equals or exceeds 50% of the market ~~or assessed~~ value of the structure before the "start of construction" of the improvement. This term includes structures which has incurred "substantial

damage", regardless of the actual repair work performed. The term does not, however, include either:

1. ~~Before the improvement or repair is started; or~~
2. ~~If the structure has been damaged and is being restored, before the damage occurred. For purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences whether or not that alteration affects the external dimensions of the structures. The term does not include:~~
 - 1.a. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local building code enforcement official and which are the minimum necessary to assure safe living conditions, or
 - 2b. Any alteration of a "historic structure" listed on the National Register of Historic Places or State Inventory of Historic Places, provided, the alteration will not preclude the structure's continued designation as a "n-historic structure". (5/98)

Substantial or significant portion [Adult]: More than 10 percent of the total cost of the inventory of merchandise for sale in the establishment, whether at wholesale or retail, or more than 10 percent of the establishment's gross sales per month, whether wholesale or retail, or more than 10 percent of a film or video or live performance. (5/98)

Temporary Business: A business of a temporary nature authorized through a Temporary Business Permit issued by the City of Keizer. (12/03)

Temporary Sign [Sign]: A sign not permanently affixed to a structure on a property. These signs primarily include, but are not limited to, canvas, cloth, or paper banners or posters hung on a building wall or on a permanent pole such as on a free-standing sign support. (5/98)

Temporary Use: A primary, secondary, or accessory use that occurs on a lot for less than 6 months in any calendar year, or a lesser period as prescribed by this Ordinance. (5/98)

Trailer (Travel or Vacation): See Recreational Vehicle. (5/98)

Transit Facilities: Transit related improvements including, but not limited to, bus pullouts, shelters, waiting areas, information and directional signs, benches and lighting. (5/98)

Transit Route: An existing or planned route for public intra-city or intra-urban transit service in the local or regional transit plan. Transit routes do not include temporary routes or routes which are planned to be replaced or relocated in the relevant plan. Transit routes are also referred to as transit streets and transit corridors. (5/98)

Transit Stop: Improvements and facilities at selected points along transit routes for passenger pick-up, drop-off, and waiting. Facilities and improvements may include shelters, benches, pavement, sign structures and other improvements to provide security, protection from the weather and access to nearby services. (5/98)

Transit Street: All streets designated by the adopted Transportation Plan as a major or minor arterial street plus any street used as an existing bus route. (5/98)

Transmission Facility: High voltage power lines and related support structures used to convey electricity from a power generator facility to electric substations along a line or corridor. (5/98)

Transmission Towers: A single structure and related unoccupied buildings transmitting or relaying electronic signals to the surrounding area or along a communication corridor including radio and television transmitters and microwave relay station. (5/98)

Travel Trailer Parks: Recreational Vehicle Park. (5/98)

Urban Growth Boundary: An adopted boundary around the City which defines the area in which the City expects to grow, where public facilities will be extended, and where joint planning responsibilities are exercised with Marion County. (5/98)

Uniform Building Code (UBC): The code of building design and construction standards adopted by the City of Keizer. (5/98)

Use: The purpose for which land or a structure is designed, arranged or intended, or, for which it is occupied or maintained. (5/98)

Utility: See "Public Facilities and Services." (5/98)

Vanpool: A group from 5 to 15 commuters, including the driver, who share the ride to and from work or other destinations on a regularly scheduled basis. (5/98)

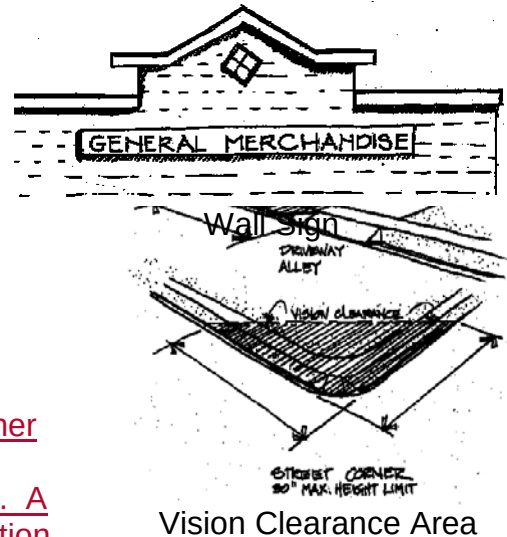
Variance [Flood]: A grant of relief by The City of Keizer from the terms of a flood plain management regulation.

Vegetative Fringe [Greenway]: A line generally parallel with the water line at least 30 feet upland from the ordinary high water mark including riparian and other vegetation screening upland development or activity areas from visibility from the water surface in the summer months. (5/98)

Vehicle: For purpose of this Ordinance vehicle shall have the same meaning as the definition in the rules and regulations of the Oregon Department of Transportation Driver and Motor Vehicle Division. (5/98)

Veterinary Clinic: A facility designed to contain treatment and temporary care facilities for domestic animals, including both pets and farm animals, under the direction of a licensed veterinarian. (5/98)

Violation [Flood]: The failure of a structure or other development to be fully compliant with the community's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in this ordinance is presumed to be in violation until such time as that documentation is provided.



Vision Clearance Area: A triangular area at the intersection of two streets, or a street and a driveway, two sides of which are lines measured from the corner intersection for a specific distance. The third side of the triangle is a line across the corner of the lot joining the ends of the other two sides. Where the lines at the intersections have rounded corners the lines will be extended in a straight line to a point of intersection. The vision clearance area shall be measured from the face of the curb and extend at right angles the designated distance in both directions along the intersection. Where there is no curb, the vision clearance area shall be measured from the edge of the pavement and extend at right angles for the appropriate distance in both directions along the intersection. (5/98)

Wall Sign [Sign]: A sign attached to, erected against or painted on a wall of a building or structure, with the exposed face of the sign in a plane approximately parallel to the face of said wall and not projecting more than 12 inches. A sign painted on an awning in which the face of the sign is approximately parallel to and within 3.5 feet of the wall shall also be considered a wall sign. (5/98)

Warehouse: A place for the safekeeping of goods and materials for an industrial or commercial enterprise (also see "Mini-Storage Warehouse"). (5/98)

Water-Dependent [Greenway]: A use or activity which can be carried out only on, in or adjacent to water areas because the use requires access to the water body for water-borne transportation, recreation, energy production, or source of water. (5/98)

Water-Related [Greenway]: Uses which are not directly dependent upon access to a water body, but which provide goods or services that are directly associated with

water-dependent land or waterway use, and which, if not located adjacent to water, would result in a public loss of quality in the goods or services offered. Except as necessary for water-dependent or water-related uses or facilities, residences, parking lots, spoil and dump sites, roads and highways, restaurants, businesses, factories and trailer parks are not generally considered dependent on or related to water location needs. (5/98)

Watercourse [Flood]: A natural or artificial channel in which a flow of water occurs either continually or intermittently in identified floodplain. (5/98)

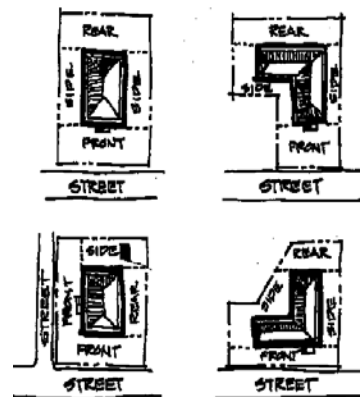
Wholesale Trade: The bulk sale of goods for resale to a person other than the direct consumer. (5/98)

Wrecking Yard: Property used for the business of buying, selling or dealing in vehicles and parts for the purpose of wrecking, dismantling, disassembling and offering for sale a used vehicle or components, and is licensed under the laws of the State for that purpose. "Vehicles" include all means of transportation that are registered with the Department of Motor Vehicles. (5/98)

Yard, Front: A yard extending across the full width of the lot, the depth of which is the minimum horizontal distance between the front lot line and a line parallel to the nearest point of the foundation of the main building; but no structures may encroach on any easement. (12/19)

Yard, Rear: A yard extending across the full width of the lot between the most rear portion of a main building and the rear lot line; but for determining the depth of the required rear yard, it shall be measured horizontally from the nearest point of the rear lot line; or, if the rear lot line adjoins an alley, then from the centerline of the alley, toward the nearest part of the foundation of the main building; but no structures may encroach on any easement. (12/19)

Yard, Side: A yard, between the main building and side lot line, extending from the front yard, or front lot line where no front yard is required, to the rear yard. The width of the required side yard shall be measured horizontally from the nearest point of the side lot line toward the nearest part of the foundation of the main building; but no structures may encroach on any easement. (12/19)



Yards

Zero Lot Line Wall:

Zero lot line wall means any exposed building wall that is constructed along the lot line as part of a zero lot line development and is visible from the public right-of-way or access easement. This definition includes any building wall that may be part of a zero lot line development and set off the property line but closer to the property line than would normally be required by yard or setback requirements of the zone. (01/02)

Zero Side Yard Dwelling Unit: An attached or detached dwelling unit constructed contiguous to a side lot



Zero Side Yard Dwelling Unit

2.122 FLOOD PLAIN OVERLAY ZONE (FPO)

2.122.01 Statutory Authority, Findings of Fact, Purpose, and Methods

Statutory Authorization: The State of Oregon has in ORS 197.175 delegated the responsibility to local governmental units to adopt floodplain management regulations designed to promote the public health, safety, and general welfare of its citizenry.

A. Findings of Fact

1. The flood hazard areas of City of Keizer are subject to periodic inundation which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.
2. These flood losses may be caused by the cumulative effect of obstructions in special flood hazard areas which increase flood heights and velocities, and when inadequately anchored, cause damage in other areas. Uses that are inadequately floodproofed, elevated, or otherwise protected from flood damage also contribute to flood loss.

B. Statement of Purpose. It is the purpose of this Chapter to promote public health, safety, and general welfare, and to minimize public and private losses due to flooding in flood hazard areas by provisions designed to:

1. Protect human life and health;
2. Minimize expenditure of public money for costly flood control projects;
3. Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
4. Minimize prolonged business interruptions;
5. Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone and sewer lines; and streets and bridges located in special flood hazard areas;

6. Help maintain a stable tax base by providing for the sound use and development of flood hazard areas so as to minimize blight areas caused by flooding;
7. Notify potential buyers that the property is in a special flood hazard area;
8. Notify those who occupy special flood hazard areas that they assume responsibility for their actions;
9. Participate in and maintain eligibility for flood insurance and disaster relief.

C. Methods of Reducing Flood Losses. In order to accomplish its purposes, this Chapter includes methods and provisions for:

1. Restricting or prohibiting development which is dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
2. Requiring that development vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
3. Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
4. Controlling filling, grading, dredging, and other development which may increase flood damage;
5. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards in other areas.

2.122.02 General Provisions

- A. Lands to Which this Chapter Applies. This Chapter shall apply to all special flood hazard areas within the jurisdiction of the City of Keizer.
- B. Basis for Establishing the Special Flood Hazard Areas. The special flood hazard areas identified by the Federal Insurance Administrator in a scientific and engineering report entitled "The Flood Insurance Study (FIS) for Marion County and incorporated areas, Oregon dated January 2, 2003" or any

revisions thereto, with accompanying Flood Insurance Rate Maps (FIRMs) and are hereby adopted by reference and declared to be a part of this Chapter. The FIS and FIRM panels are on file at the Community Development Department located in the City of Keizer City Hall

- C. Coordination with State of Oregon Specialty Code. Pursuant to the requirement established in ORS 455 that the City of Keizer administers and enforces the State of Oregon Specialty Codes, the City of Keizer does hereby acknowledge that the Oregon Specialty Codes contain certain provisions that apply to the design and construction of buildings and structures located in special flood hazard areas. Therefore, this Chapter is intended to be administered and enforced in conjunction with the Oregon Specialty Codes.
- D. Compliance and Penalties for Noncompliance
 - 1. Compliance. All development within special flood hazard areas is subject to the terms of this Chapter and required to comply with its provisions and all other applicable regulations.
 - 2. Penalties for Noncompliance. No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this Chapter and other applicable regulations. Violations of the provisions of this Chapter by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a violation and subject to the violation procedures in KDC Section 1.102.06. Nothing contained herein shall prevent the City of Keizer from taking such other lawful action as is necessary to prevent or remedy any violation.
- E. Abrogation and Severability
 - 1. Abrogation. This Chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this Chapter and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.
 - 2. Severability. This Chapter and the various parts thereof are hereby declared to be severable. If any section clause, sentence, or phrase of this Chapter is held to be invalid or unconstitutional by any court of competent jurisdiction, then said holding shall in no way effect the validity of the remaining portions of this Chapter.

F. Interpretation. In the interpretation and application of this Chapter, all provisions shall be:

1. Considered as minimum requirements;
2. Liberally construed in favor of the governing body; and
3. Deemed neither to limit nor repeal any other powers granted under state statutes.

G. Warning and Disclaimer of Liability

1. **Warning.** The degree of flood protection required by this Chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This Chapter does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages.
2. **Disclaimer Of Liability.** This Chapter shall not create liability on the part of the City of Keizer, any officer or employee thereof, or the Federal Insurance Administrator for any flood damages that result from reliance on this Chapter or any administrative decision lawfully made hereunder.

2.122.03 Administration

A. Designation of the Floodplain Administrator. The Zoning Administrator and their designee, is hereby appointed to administer, implement, and enforce this Chapter ordinance by granting or denying development permits in accordance with its provisions. The Floodplain Administrator may delegate authority to implement these provisions.

B. Duties and Responsibilities of the Floodplain Administrator. Duties of the floodplain administrator, or their designee, shall include, but not be limited to:

1. **Permit Review.** Review all development permits to determine that:
 - a. The permit requirements of this Chapter have been satisfied;
 - b. All other required local, state, and federal permits have been obtained and approved;
 - c. Review all development permits to determine if the proposed development is located in a floodway. If located in the floodway

assure that the floodway provisions of ~~this Chapter in Section 2.122.04.B.4~~ are met; ~~and~~

- d. Review all development permits to determine if the proposed development is located in an area where Base Flood Elevation (BFE) data is available either through the Flood Insurance Study (FIS) or from another authoritative source. If BFE data is not available then ensure compliance with the provisions of Sections 2.122.04.A.7; ~~and~~
 - e. Provide to building officials the Base Flood Elevation (BFE) applicable to any building requiring a development permit;:-
 - f. Review all development permit applications to determine if the proposed development qualifies as a substantial improvement as defined in Section 1.200.04;:-
 - g. Review all development permits to determine if the proposed development activity is a watercourse alteration. If a watercourse alteration is proposed, ensure compliance with the provisions in section 2.122.04.A.1;:-
 - h. Review all development permits to determine if the proposed development activity includes the placement of fill or excavation.
2. Information to be Obtained and Maintained. The following information shall be obtained and maintained and shall be made available for public inspection as needed:
- a. Obtain, record, and maintain the actual elevation (in relation to mean sea level) of the lowest floor (including basements) and all attendant utilities of all new or substantially improved structures where Base Flood Elevation (BFE) data is provided through the Flood Insurance Study (FIS), Flood Insurance Rate Map (FIRM), or obtained in accordance with Section 2.122.04.A.7;:-
 - b. Obtain and record the elevation (in relation to mean sea level) of the natural grade of the building site for a structure prior to the start of construction and the placement of any fill and ensure that the requirements of Sections 2.122.03.B.1.b. and 2.122.04.B.4; ~~2.122.03.B.1~~ are adhered to;:-
 - c. Upon placement of the lowest floor of a structure (including basement) but prior to further vertical construction, obtain documentation, prepared and sealed by a professional licensed surveyor or engineer, certifying the elevation (in relation to mean sea level) of the lowest floor (including basement);:-

- d. Where base flood elevation data are utilized, obtain As-built certification of the elevation (in relation to mean sea level) of the lowest floor (including basement) prepared and sealed by a professional licensed surveyor or engineer, prior to the final inspection;
- e. Maintain all Elevation Certificates (EC) submitted to the City of Keizer;
- f. Obtain, record, and maintain the elevation (in relation to mean sea level) to which the structure and all attendant utilities were floodproofed for all new or substantially improved floodproofed structures where allowed under this Chapter and where Base Flood Elevation (BFE) data is provided through the FIS, FIRM, or obtained in accordance with Section 2.122.04.A.7; 1.220.05.A.7;
- g. Maintain all floodproofing certificates required under this Chapter;
- h. Record and maintain all variance actions, including justification for their issuance;
- i. Obtain and maintain all hydrologic and hydraulic analyses performed as required under Section 2.122.04.B.4;
- j. Record and maintain all Substantial Improvement and Substantial Damage calculations and determinations as required under Section 2.122.03.B.4;
- k. Maintain for public inspection all records pertaining to the provisions of this Chapter.

3. Requirement to Notify Other Entities and Submit New Technical Data

- a. **Community Boundary Alterations.** The Floodplain Administrator shall notify the Federal Insurance Administrator in writing whenever the boundaries of the community have been modified by annexation or the community has otherwise assumed authority or no longer has authority to adopt and enforce floodplain management regulations for a particular area, to ensure that all Flood Hazard Boundary Maps (FHBM) and Flood Insurance Rate Maps (FIRM) accurately represent the community's boundaries. Include within such notification a copy of a map of the community suitable for reproduction, clearly delineating the new corporate limits or new area for which the community has assumed or relinquished floodplain management regulatory authority.

- b. **Watercourse Alterations.** The Floodplain Administrator shall notify adjacent communities, the Department of Land Conservation and Development, and other appropriate state and federal agencies, prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration. This notification shall be provided by the applicant to the Federal Insurance Administration as a Letter of Map Revision (LOMR) along with either:
- a) A proposed maintenance plan to assure the flood carrying capacity within the altered or relocated portion of the watercourse is maintained; or
 - b) Certification by a registered professional engineer that the project has been designed to retain its flood carrying capacity without periodic maintenance.

The applicant shall be required to submit a Conditional Letter of Map Revision (CLOMR) when required under Section 2.122.03.B.3.c. and ensure compliance with all applicable requirements in Sections 2.122.03.B.3.c and 2.122.04.A.1.

- c. **Requirement to Submit New Technical Data.** A community's base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Federal Insurance Administrator of the changes by submitting technical or scientific data in accordance with Section 44 of the Code of Federal Regulations (CFR), Sub-Section 65.3. The community may require the applicant to submit such data and review fees required for compliance with this Ssection through the applicable FEMA Letter of Map Change (LOMC) process.

The Floodplain Administrator shall require a Conditional Letter of Map Revision prior to the issuance of a floodplain development permit for:

- A. Proposed floodway encroachments that increase the base flood elevation; and
- B. Proposed development which increases the base flood elevation by more than one foot in areas where FEMA has provided base flood elevations but no floodway.

An applicant shall notify FEMA within six (6) months of project completion when an applicant has obtained a Conditional Letter of Map Revision (CLOMR) from FEMA. This notification to FEMA shall be provided as a Letter of Map Revision (LOMR).

The applicant shall be responsible for preparing all technical data to support CLOMR/LOMR applications and paying any processing or application fees associated with the CLOMR/LOMR.

The Floodplain Administrator shall be under no obligation to sign the Community Acknowledgement Form, which is part of the CLOMR/LOMR application, until the applicant demonstrates that the project will or has met the requirements of this Chapter and all applicable state and federal permits.

4. Substantial Improvement and Substantial Damage Assessments and Determinations. The Floodplain Administrator shall:
 - a. Conduct Substantial Improvement (SI) (as defined in Section 1.200.04) reviews for all structural development proposal applications and maintain a record of SI calculations within permit files in accordance with Section 2.122.03.B.2.
 - b. Conduct Substantial Damage (SD) (as defined in Section 1.200.04) assessments when structures are damaged due to a natural hazard event or other causes.
 - c. Make SD determinations whenever structures within the special flood hazard area (as established in Section 2.122.02.B) are damaged to the extent that the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

C. Establishment of Development Permit

1. Floodplain Development Permit Required. A development permit shall be obtained before construction or development begins within any area horizontally within the special flood hazard area established in Section 2.122.02.B. The development permit shall be required for all structures, including manufactured dwellings, and for all other development, as defined in Section 1.200.04, including fill and other development activities.
2. Application for Development Permit. Application for a development permit may be made on forms furnished by the Floodplain Administrator

and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing. Specifically the following information is required:

- a. In riverine flood zones, the proposed elevation (in relation to mean sea level), of the lowest floor (including basement) and all attendant utilities of all new and substantially improved structures; in accordance with the requirements of Section 2.122.03.B.2;
- b. Proposed elevation in relation to mean sea level to which any non-residential structure will be floodproofed;
- c. Certification by a registered professional engineer or architect licensed in the State of Oregon that the floodproofing methods proposed for any non-residential structure meet the floodproofing criteria for non-residential structures in Section 2.122.04.B.3.c;
- d. Description of the extent to which any watercourse will be altered or relocated;
- e. Base Flood Elevation data for subdivision proposals or other development when required per Sections 2.122.03.B.1 and 2.122.04.A.6;
- f. Substantial improvement calculation for any improvement, addition, reconstruction, renovation, or rehabilitation of an existing structure;
- g. The amount and location of any fill or excavation activities proposed.

D. Variance Procedure. The issuance of a variance is for floodplain management purposes only. Flood insurance premium rates are determined by federal statute according to actuarial risk and will not be modified by the granting of a variance.

1. Conditions for Variances~~Criteria. The applicant shall demonstrate compliance with all of the following criteria:~~

- a. Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the provisions of Sections 2.122.03.D.1.c and e, and 2.122.03.D.2. As the lot size increases beyond one-half

acre, the technical justification required for issuing a variance increases;

- b. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief;
 - c. Variances shall not be issued within any floodway if any increase in flood levels during the base flood discharge would result;
 - d. Variances shall only be issued upon:
 - a) A showing of good and sufficient cause;
 - b) A determination that failure to grant the variance would result in exceptional hardship to the applicant;
 - c) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
 - e. Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that the criteria of Section 2.122.03.D.1.b, c and d are met, and the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.
2. Variance Notification. Any applicant to whom a variance is granted shall be given written notice that the issuance of a variance to construct a structure below the Base Flood Elevation will result in increased premium rates for flood insurance and that such construction below the base flood elevation increases risks to life and property. Such notification and a record of all variance actions, including justification for their issuance shall be maintained in accordance with Section 2.122.03.B.

2.122.04 Provisions for Flood Hazard Reduction

A. General Standards

In all special flood hazard areas, the following standards shall be adhered to:

- 1. Alteration of Watercourses. Require that the flood carrying capacity within the altered or relocated portion of said watercourse is

maintained. Require that maintenance is provided within the altered or relocated portion of said watercourse to ensure that the flood carrying capacity is not diminished. Require compliance with Sections 2.122.03.B.3.b and 2.122.03.B.3.c.

2. Anchoring

- a. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
- b. All manufactured dwellings shall be anchored per Section 2.122.04.B.3.d.

3. Construction Materials and Methods

- a. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
- b. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

4. Utilities and Equipment

- a. Water Supply, Sanitary Sewer, and On-Site Waste Disposal Systems
 - a) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.
 - b) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters.
 - c) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding consistent with the Oregon Department of Environmental Quality.
- b. Electrical, Mechanical, Plumbing, and Other Equipment. Electrical, heating, ventilating, air-conditioning, plumbing, duct systems, and other equipment and service facilities shall be elevated at or above the base flood level or shall be designed

and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during conditions of flooding. In addition, electrical, heating, ventilating, air-conditioning, plumbing, duct systems, and other equipment and service facilities shall:

- a) If replaced as part of a substantial improvement shall meet all the requirements of this section.

5. Tanks

- a. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood.
- b. Above-ground tanks shall be installed at or above the base flood level or shall be anchored to prevent flotation, collapse, and lateral movement under conditions of the base flood.

6. Subdivision Proposals and Other Proposed Developments

- a. All new subdivision proposals and other proposed new developments (including proposals for manufactured dwelling parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, shall include within such proposals, Base Flood Elevation data.
- b. All new subdivision proposals and other proposed new developments (including proposals for manufactured dwelling parks and subdivisions) shall:
 - a) Be consistent with the need to minimize flood damage.
 - b) Have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage.
 - c) Have adequate drainage provided to reduce exposure to flood hazards.

- 7. Use of Other Base Flood Data. When Base Flood Elevation data has not been provided in accordance with Section 2.122.02.B the local floodplain administrator shall obtain, review, and reasonably utilize any Base Flood Elevation data available from a federal, state, or other source, in order to administer Section 2.122.04. All new subdivision proposals and other proposed new developments (including proposals

for manufactured dwelling parks and subdivisions) must meet the requirements of Section 2.122.04.A.6.

Base Flood Elevations shall be determined for development proposals that are 5 acres or more in size or are 50 lots or more, whichever is lesser in any A zone that does not have an established base flood elevation. Development proposals located within a riverine unnumbered A Zone shall be reasonably safe from flooding; the test of reasonableness includes use of historical data, high water marks, FEMA provided Base Level Engineering data, and photographs of past flooding, etc. where such information is available. Failure to elevate at least two feet above grade in these zones may result in higher insurance rates.

8. Structures Located in Multiple or Partial Flood Zones. In coordination with the State of Oregon Specialty Codes:
 - a. When a structure is located in multiple flood zones on the community's Flood Insurance Rate Maps (FIRM) the provisions for the more restrictive flood zone shall apply.
 - b. When a structure is partially located in a special flood hazard area, the entire structure shall meet the requirements for new construction and substantial improvements.
9. Critical Facilities. Construction of new critical facilities shall be, to the extent possible, located outside the limits of the special flood hazard area. Construction of new critical facilities shall be permissible within the Special Flood Hazard Area (SFHA) only if no feasible alternative site is available. Critical facilities constructed within the SFHA shall have the lowest floor elevated three (3) feet above the Base Flood Elevation (BFE) or to the height of the 500-year flood, whichever is higher. Access to and from the critical facility shall also be protected to the height utilized above. Floodproofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters.
10. Willamette River Riverwall. In addition to any requirements within this section affecting the use of property within a floodplain, there shall be no physical alterations to the riverwall constructed along the Willamette River in the areas of Cummings Lane (west of Shoreline Drive), and Rafael Avenue without the prior written approval of the City Engineer.

Nothing in these regulations reduces or modifies any terms or obligations under any riverwall easements granted to the City.

B. Specific Standards for Riverine (Including all Non-Coastal) Flood Zones

These specific standards shall apply to all new construction and substantial improvements in addition to the General Standards contained in Section 2.122.04.A of this Chapter.

1. **Flood Openings.** All new construction and substantial improvements with fully enclosed areas below the lowest floor (excluding basements) are subject to the following requirements. Enclosed areas below the Base Flood Elevation, including crawl spaces shall:
 - a. Be designed to automatically equalize hydrostatic flood forces on walls by allowing for the entry and exit of floodwaters;
 - b. Be used solely for parking, storage, or building access;
 - c. Be certified by a registered professional engineer or architect or meet or exceed all of the following minimum criteria:
 - a) A minimum of two openings;
 - b) The total net area of non-engineered openings shall be not less than one (1) square inch for each square foot of enclosed area, where the enclosed area is measured on the exterior of the enclosure walls;
 - c) The bottom of all openings shall be no higher than one foot above grade;
 - d) Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area;
 - e) All additional higher standards for flood openings in the State of Oregon Residential Specialty Codes Section R322.2.2 shall be complied with when applicable.
2. **Garages**
 - a. Attached garages may be constructed with the garage floor slab below the Base Flood Elevation (BFE) in riverine flood zones, if the following requirements are met:
 - a) If located within a floodway the proposed garage must comply with the requirements of Section 2.122.04.B.4;

- b) The floors are at or above grade on not less than one side;
 - c) The garage is used solely for parking, building access, and/or storage;
 - d) The garage is constructed with flood openings in compliance with Section 2.122.04.B.1 to equalize hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwater;
 - e) The portions of the garage constructed below the BFE are constructed with materials resistant to flood damage;
 - f) The garage is constructed in compliance with the standards in Section 2.122.04.A; and
 - g) The garage is constructed with electrical, and other service facilities located and installed so as to prevent water from entering or accumulating within the components during conditions of the base flood.
 - b. Detached garages must be constructed in compliance with the standards for appurtenant structures in Section 2.122.04.B.3.f or non-residential structures in Section 2.122.04.B.3.c depending on the square footage of the garage.
3. For Riverine (Non-Coastal) Special Flood Hazard Areas With Base Flood Elevations. In addition to the general standards listed in Section 2.122.04.A the following specific standards shall apply in Riverine (non-coastal) special flood hazard areas with Base Flood Elevations (BFE): Zones A1-A30, AH, and AE.
- a. Before Regulatory Floodway. In areas where a regulatory floodway has not been designated, no new construction, substantial improvement, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's Flood Insurance Rate Map (FIRM), unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
 - b. Residential Construction. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated at least 1 foot above the Base Flood Elevation (BFE).

Enclosed areas below the lowest floor shall comply with the flood opening requirements in Section 2.122.04.B.1.

c. Non-Residential Construction.

- a) New construction and substantial improvement of any commercial, industrial, or other non-residential structure shall:
 - i. Have the lowest floor, including basement elevated at least 1 foot above the Base Flood Elevation (BFE);
 - ii. ~~Or, together with attendant utility and sanitary facilities;~~ OR
 - iii. ~~(a) Be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water; AND~~
 - iv. ~~(b) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; AND~~
 - v. ~~(c) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this Section based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the Floodplain Administrator as set forth Section 2.122.03.B.2.~~
 - b) Non-residential structures that are elevated, not floodproofed, shall comply with the standards for enclosed areas below the lowest floor in Section 2.122.04.B.1.
 - c) Applicants floodproofing non-residential buildings shall be notified that flood insurance premiums will be based on rates that are one (1) foot below the floodproofed level (e.g. a building floodproofed to the base flood level will be rated as one (1) foot below).
- d. Manufactured Dwellings
- a) New or substantially improved manufactured dwellings supported on solid foundation walls shall be constructed

with flood openings that comply with Section 2.122.04.B.1;

- b) The bottom of the longitudinal chassis frame beam shall be at or above Base Flood Elevation₁; The finished floor of the manufactured home must be elevated to a minimum of 18 inches above the base flood elevation.
- c) New or substantially improved manufactured dwellings shall be anchored to prevent flotation, collapse, and lateral movement during the base flood. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors, ~~and;~~
- d) Electrical crossover connections shall be a minimum of twelve (12) inches above Base Flood Elevation (BFE).
- e. Recreational Vehicles
 - a) Recreational vehicles placed on sites are required to:
 - b) i. Be on the site for fewer than 180 consecutive days,
 - c) ii. Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or
 - d) iii. Meet the requirements of Section 2.122.04.B.3.d, including the anchoring and elevation requirements for manufactured dwellings.
- f. Appurtenant (Accessory) Structures. Relief from elevation or floodproofing requirements for residential and non-residential structures in Riverine (Non-Coastal) flood zones may be granted for appurtenant structures that meet the following requirements:
 - a) Appurtenant structures located partially or entirely within the floodway must comply with requirements for development within a floodway found in Section 2.122.04.B.4₁;
 - b) Appurtenant structures must only be used for parking, access, and/or storage and shall not be used for human habitation;
 - c) In compliance with State of Oregon Specialty Codes, appurtenant structures on properties that are zoned residential are limited to one-story structures less than 200 square feet, or 400 square feet if the property is greater than two (2) acres in area and the proposed appurtenant structure will be located a minimum of 20 feet

from all property lines. Appurtenant structures on properties that are zoned as non-residential are limited in size to 120 square feet;

- d) The portions of the appurtenant structure located below the Base Flood Elevation must be built using flood resistant materials;
- e) The appurtenant structure must be adequately anchored to prevent flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, during conditions of the base flood;
- f) The appurtenant structure must be designed and constructed to equalize hydrostatic flood forces on exterior walls and comply with the requirements for flood openings in Section 2.122.04.B.1;
- g) Appurtenant structures shall be located and constructed to have low damage potential;
- h) Appurtenant structures shall not be used to store toxic material, oil, or gasoline, or any priority persistent pollutant identified by the Oregon Department of Environmental Quality unless confined in a tank installed in compliance with Section 2.122.04.A.5;
- i) Appurtenant structures shall be constructed with electrical, mechanical, and other service facilities located and installed so as to prevent water from entering or accumulating within the components during conditions of the base flood.

g. Below-grade crawl spaces

- a) The building must be designed and adequately anchored to resist flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. Hydrostatic loads and the effects of buoyancy can usually be addressed through the required flood openings stated in Section 2.122.04.B.1. Because of hydrodynamic loads, crawlspace construction is not allowed in areas with flood velocities greater than five (5) feet per second unless the design is reviewed by a qualified design professional, such as a registered architect or professional engineer. Other types of foundations are recommended for these areas.
- b) The crawlspace is an enclosed area below the Base Flood Elevation (BFE) and, as such, must have openings

that equalize hydrostatic pressures by allowing the automatic entry and exit of floodwaters. The bottom of each flood vent opening can be no more than one (1) foot above the lowest adjacent exterior grade.

- c) Portions of the building below the BFE must be constructed with materials resistant to flood damage. This includes not only the foundation walls of the crawlspace used to elevate the building, but also any joists, insulation, or other materials that extend below the BFE. The recommended construction practice is to elevate the bottom of joists and all insulation above BFE.
- d) Any building utility systems within the crawlspace must be elevated above BFE or designed so that floodwaters cannot enter or accumulate within the system components during flood conditions. Ductwork, in particular, must either be placed above the BFE or sealed from floodwaters.
- e) The interior grade of a crawlspace below the BFE must not be more than two (2) feet below the lowest adjacent exterior grade.
- f) The height of the below-grade crawlspace, measured from the interior grade of the crawlspace to the top of the crawlspace foundation wall must not exceed four (4) feet at any point. The height limitation is the maximum allowable unsupported wall height according to the engineering analyses and building code requirements for flood hazard areas.
- g) There must be an adequate drainage system that removes floodwaters from the interior area of the crawlspace. The enclosed area should be drained within a reasonable time after a flood event. The type of drainage system will vary because of the site gradient and other drainage characteristics, such as soil types. Possible options include natural drainage through porous, well-drained soils and drainage systems such as perforated pipes, drainage tiles or gravel or crushed stone drainage by gravity or mechanical means.
- h) The velocity of floodwaters at the site shall not exceed five (5) feet per second for any crawlspace. For velocities in excess of five (5) feet per second, other foundation types should be used.

4. Floodways. Located within the special flood hazard areas established in Section 2.122.02.B are areas designated as floodways. Since the

floodway is an extremely hazardous area due to the velocity of the floodwaters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

- a. Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless either:
 - a) Certification by a registered professional civil engineer is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment shall not result in any increase in flood levels within the community during the occurrence of the base flood discharge; OR,
 - b) A community may permit encroachments within the adopted regulatory floodway that would result in an increase in Base Flood Elevations, provided that a Conditional Letter of Map Revision (CLOMR) is applied for and approved by the Federal Insurance Administrator, and the requirements for such revision as established under Volume 44 of the Code of Federal Regulations, section 65.12 are fulfilled.

If an encroachment proposal resulting in an increase in Base Flood Elevation meets the following criteria:

1. Is for the purpose of fish enhancement;
2. Does not involve the placement of any structures (as defined in section 1.2) within the floodway;
3. Has a feasibility analysis completed documenting that fish enhancement will be achieved through the proposed project;
4. Has a maintenance plan in place to ensure that the stream carrying capacity is not impacted by the fish enhancement project;
5. Has approval by the National Marine Fisheries Service, the State of Oregon Department of Fish and Wildlife, or the equivalent federal or state agency; and
6. Has evidence to support that no existing structures will be negatively impacted by the proposed activity;

Then an approved CLOMR may be required prior to approval of a floodplain permit.

- b. If the requirements of Section 2.122.04.B.4.a are satisfied, all new construction, substantial improvements, and other development shall comply with all other applicable flood hazard reduction provisions of Section 2.122.04.
- 5. Standards for Shallow Flooding Areas. Shallow flooding areas appear on FIRMs as AO zones with depth designations or as AH zones with Base Flood Elevations. For AO zones the base flood depths range from one (1) to three (3) feet above ground where a clearly defined channel does not exist, or where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is usually characterized as sheet flow. For both AO and AH zones, adequate drainage paths are required around structures on slopes to guide floodwaters around and away from proposed structures.
 - a. Standards for AH Zones. Development within AH Zones must comply with the standards in Sections 2.122.04.A, 2.122.04.B, and 2.122.04.B.5.
 - b. Standards for AO Zones. In AO zones, the following provisions apply in addition to the requirements in Sections 2.122.04.A and 2.122.04.B.5:
 - a) New construction and substantial improvement of residential structures and manufactured dwellings within AO zones shall have the lowest floor, including basement, elevated above the highest grade adjacent to the building, at minimum to or above the depth number specified on the Flood Insurance Rate Maps (FIRM) (at least two (2) feet if no depth number is specified). For manufactured dwellings the lowest floor is considered to be the bottom of the longitudinal chassis frame beam.
 - b) New construction and substantial improvements of non-residential structures within AO zones shall either:
 - i. Have the lowest floor (including basement) elevated above the highest adjacent grade of the building site, at minimum to or above the depth number specified on the Flood Insurance Rate Maps (FIRMS) (at least two (2) feet if no depth number is specified); or
 - ii. Together with attendant utility and sanitary facilities, be completely floodproofed to or above the depth number specified on the FIRM or a minimum of two (2) feet above the highest adjacent grade if no depth number is specified, so that any

space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy. If this method is used, compliance shall be certified by a registered professional engineer or architect as stated in Section 2.122.04.B.3.c.a)ii.(c).

- c) Recreational vehicles placed on sites within AO Zones on the community's Flood Insurance Rate Maps (FIRM) shall either:
 - i. Be on the site for fewer than 180 consecutive days; ~~and~~
 - ~~ii.~~ Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or
 - ~~iii.~~ii. Meet the elevation requirements of Section 2.122.04.B.5.b.a)2, and the anchoring and other requirements for manufactured dwellings of Section 2.122.04.B.3.d.
- d) In AO zones, new and substantially improved appurtenant structures must comply with the standards in Section 2.122.04.B.3.f.
- e) In AO zones, enclosed areas beneath elevated structures shall comply with the requirements in Section 2.122.04.B.1.

CITY COUNCIL MEETING: November 2, 2020

AGENDA ITEM NUMBER:_____

TO: MAYOR CLARK AND COUNCIL MEMBERS

THROUGH: CHRISTOPHER C. EPPLEY, CITY MANAGER

FROM: E. SHANNON JOHNSON, CITY ATTORNEY

**SUBJECT: APPROVAL OF CONSULTANT’S REPORT RELATING TO
KEIZER GROWTH TRANSPORTATION IMPACTS STUDY**

At its October 19, 2020 Council meeting, the Council directed staff to prepare an appropriate Resolution approving the consultant’s report relating to the Keizer Growth Transportation Impacts Study. The study is to assist the City to better understand the impacts of growth both within the City and within a potential urban growth boundary expansion and the cost of such growth. As such, it is not an amendment or subset of the Comprehensive Plan or Development Code.

RECOMMENDATION:

Adopt the attached Resolution approving and acknowledging the “Keizer Growth Transportation Impacts Study – October 2020” report.

Please contact me if you have any questions in this regard. Thank you.

ESJ/tmh

CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON

Resolution R2020-_____

APPROVING REPORT OF CONSULTANT RELATING TO KEIZER
GROWTH TRANSPORTATION IMPACTS STUDY

WHEREAS, staff has been working with DKS Associates to conduct a transportation study to better understand the impacts of growth both within the City and within a potential urban growth boundary expansion in the City of Keizer and prepare a report of findings;

WHEREAS, the report was presented to the Planning Commission and the Planning Commission recommended that the Council approve the report;

WHEREAS, the City Council desires to approve the report as prepared;

NOW, THEREFORE,

BE IT RESOLVED by the City Council of the City of Keizer that the attached “Keizer Growth Transportation Impacts Study – October 2020” is hereby approved and acknowledged by the City Council.

BE IT FURTHER RESOLVED that such study is not an amendment or subset of the Keizer Comprehensive Plan or the Keizer Development Code and this Resolution does not constitute a land use decision.

1 BE IT FURTHER RESOLVED that this Resolution shall take effect immediately
2 upon the date of its passage.

3 PASSED this _____ day of _____, 2020.

4

5 SIGNED this _____ day of _____, 2020.

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10

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Mayor

City Recorder

KEIZER GROWTH TRANSPORTATION IMPACTS STUDY

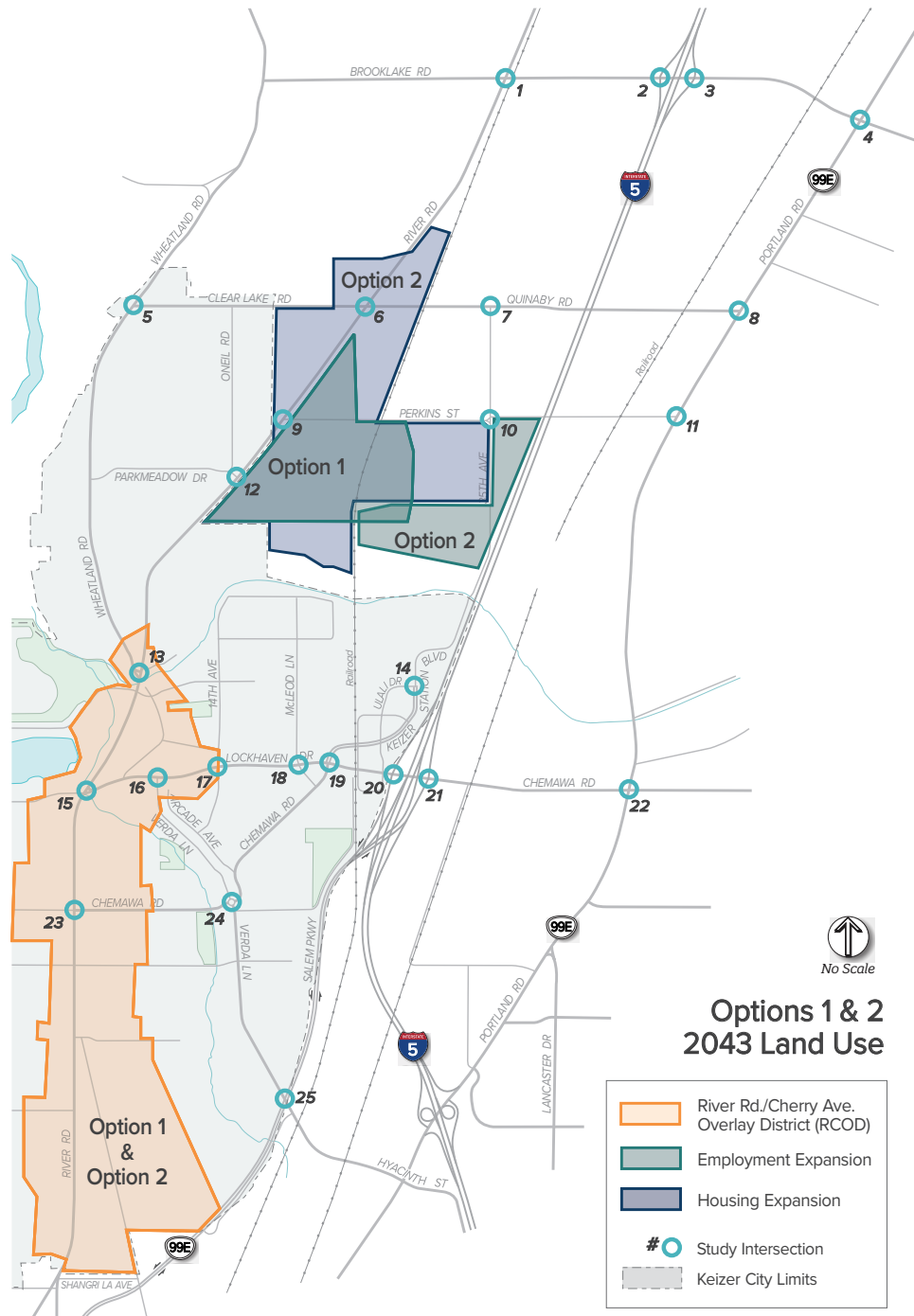
OCTOBER 2020

INTRODUCTION

The purpose of the Keizer Growth Transportation Study is to illustrate the level of investment in the transportation system needed to support conceptual planned expansion of the City's Urban Growth Boundary (UGB).

This study evaluated two candidate sites just north of the City limit that differed in size and mix of proposed land uses that will be referred as Option 1 and Option 2. The study findings estimated the expected magnitude of added vehicular traffic, and flagged portions of the street system that would be expected to require improvements or upgrades to provide safe and convenient access consistent with City standards. Necessary system improvements were tabulated and a rough preliminary cost estimate for each

option was developed and compared. To be clear, this study does not recommend or provide the basis for any planned or proposed city growth expansions, it only presents illustrative examples of possible growth options for Keizer, and identifies the trade-offs involved in selected growth sites, and land use mixes for consideration.



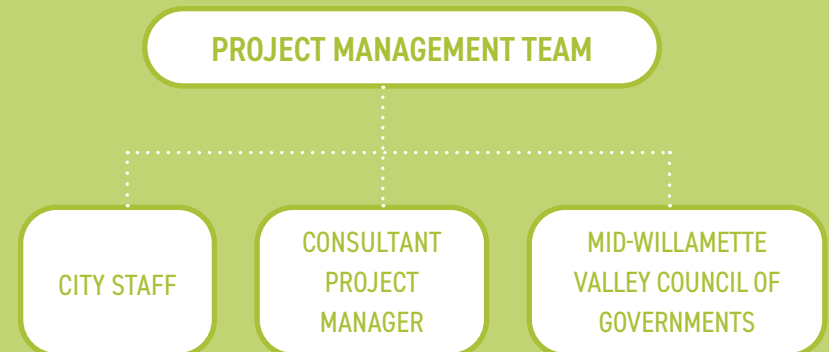
STUDY AREA

The study area for the Keizer Growth Transportation Study is shown in **Figure 1**. Performance assessments were conducted at 25 study intersections across multiple agency jurisdictions.

These locations were selected by the project management team, which included city staff, the consultant project manager, and senior staff from the Mid-Willamette Valley Council of Governments. The two illustrative UGB expansion areas are shown in the map.

The River Road/Cherry Avenue Overlay District (RCOD) includes housing infill that is included in both options.

◀ **FIGURE 1. STUDY AREA**



STUDY PROCESS

The following technical process was performed in this illustrative study.

- 1 Two conceptual growth areas on the northern end of the city's UGB were identified.
- 2 The scale and mix of land use types (housing and employment) for each growth option were defined, consistent with similar existing development in Keizer and Salem.
- 3 The regional travel forecasting model used by the Mid-Willamette Valley Council of Governments (MWVCOG) was used to estimate traffic growth.
- 4 The transportation system was assessed to see how it operates today and how that might change with full development trips for each of the two growth options.
- 5 Based on the performance assessment, a roster of expected added transportation system improvements was identified.
- 6 The additional investments needed to comply with agency performance standards were identified and evaluated for each option.

GROWTH OPTIONS

Two conceptual growth options were developed in coordination with the City of Keizer, MWVCOG, and the consultant team. The intent was to develop two options that address the housing needs and projected employment growth in Keizer.

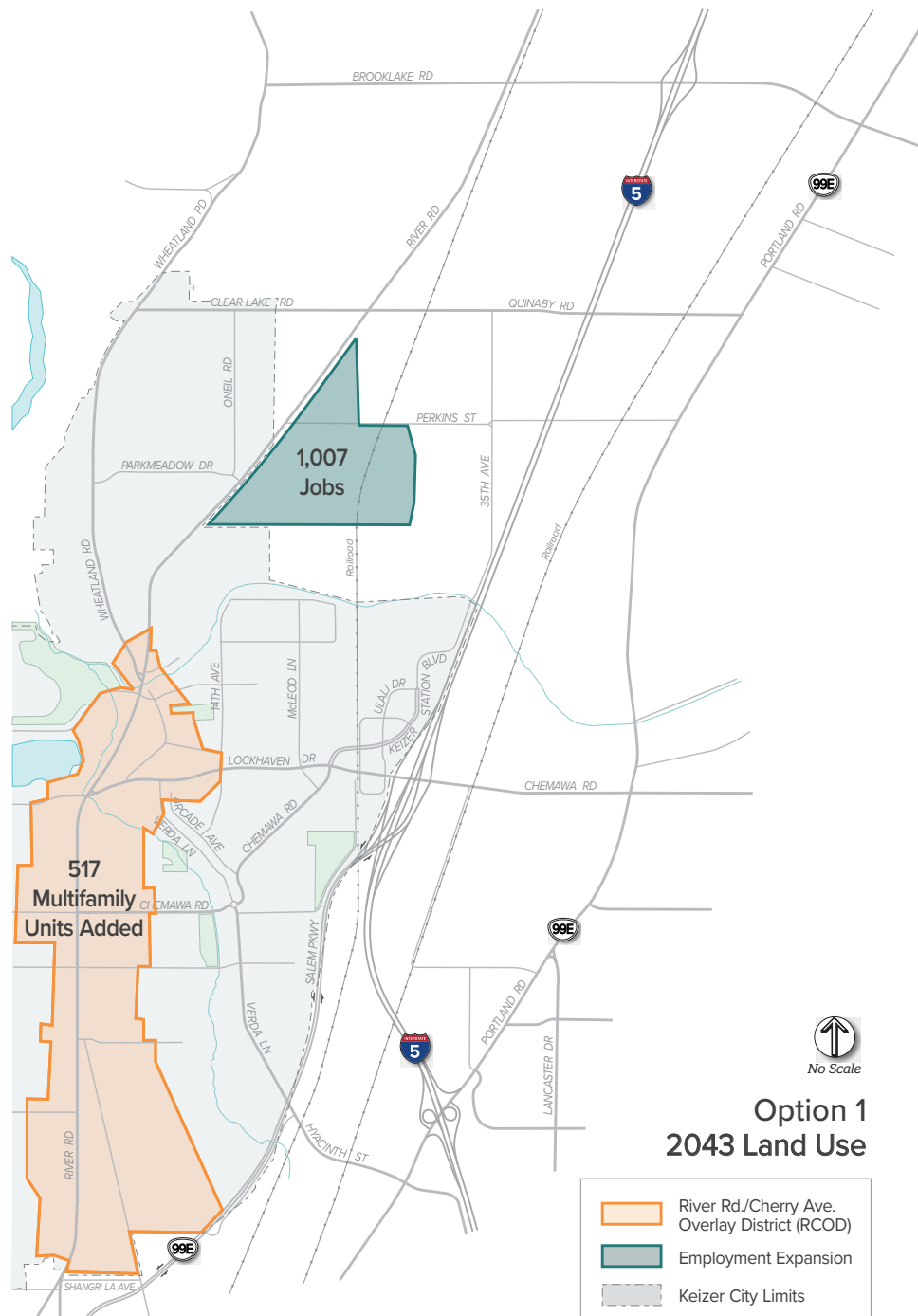
For each option, the City provided a number of housing units and jobs, which was converted to peak hour model trips using trip generation assumptions and the future 2043 Salem-Keizer travel demand model (SKATS). The existing year (2017) and future year (2043) models were used to forecast the transportation impacts of the two options. In the SKATS model, vehicle and transit trips are assigned to the network, while bicycling and walking trips are forecast but not assigned to the network. For this analysis, only vehicle trips are reported.



HOUSING UNITS & JOBS

PEAK HOUR MODEL TRIPS

◀ A separate technical memorandum is provided in the appendix with more details regarding the travel forecasting methods and assumptions.

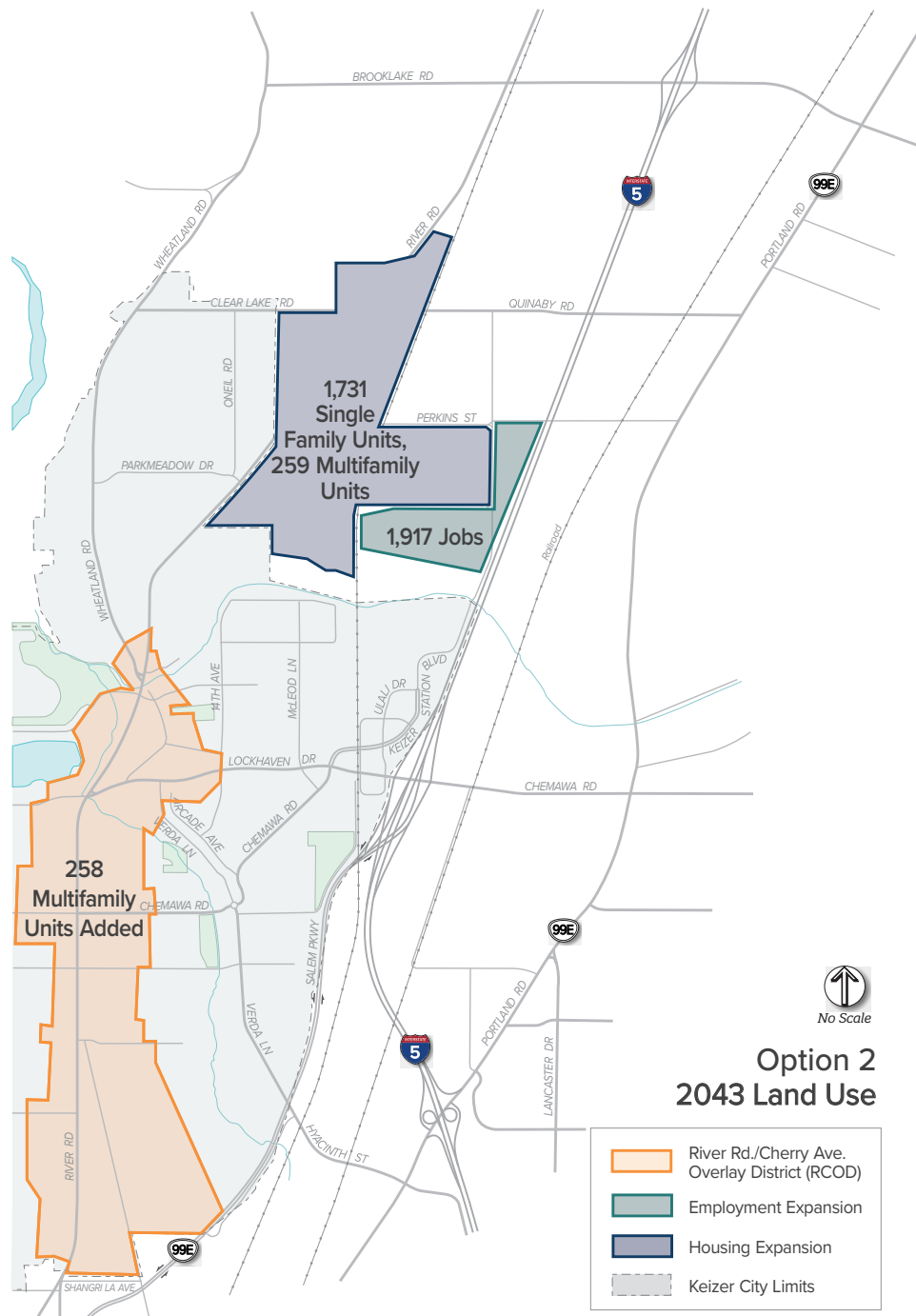


LAND USE OPTION 1

Option 1 includes an additional 517 multi-family housing units within the River Road/Cherry Avenue Overlay District (RCOD) and a small employment expansion outside of the Urban Growth Boundary (UGB) (**Figure 2**). The employment expansion is located outside the northeast corner of the UGB along River Road and covers about 63 acres, split into two thirds industrial and one third commercial land use. This employment growth in the expansion area results in an additional 350 PM peak hour trips added to the future roadway network. Note that the multi-family residential units in the RCOD are included in the baseline future scenario and thus don't add any further trips to the Option 1 expansion.

This development is assumed to be served mostly by existing roadways and new internal site roadways. The employment expansion area would have access to River Road via Perkins Street. The multi-family housing units would be dispersed across the RCOD, with accesses along River Road.

◀ **FIGURE 2. LAND USE OPTION 1**



LAND USE OPTION 2

Option 2 is a larger expansion of the UGB. This option would expand the UGB in the northeast corner to include both sides of River Road up past Quinaby Road, expanding to I-5 to the east (**Figure 3**). The housing growth includes 258 multi-family units within the RCOD, plus an additional 259 multi-family units and 1,731 single family units in the expansion area. The employment growth includes roughly 120 acres split between industrial (two-thirds) and commercial (one-third). This growth in the expansion area results in an additional 1,660 PM peak hour trips added to the future roadway network - almost five times more than Option 1. Note that the multi-family residential units in the RCOD are included in the baseline future scenario and thus don't add any further trips to Option 2.

The second option will require more transportation infrastructure including roadway connections in the form of new collectors and internal site roadways. This analysis assumes trips access River Road at two new accesses besides Quinaby Road and Perkins Street. One new north-south collector roadway is assumed parallel to River Road in addition to internal site circulation. Trips may also access the site via the east or south on Quinaby Road, Perkins Street, and 35th Avenue.

◀ **FIGURE 3. LAND USE OPTION 2**

LAND USE OPTION SUMMARY IN EXPANSION AREA*

OPTION 1

EMPLOYMENT EXPANSION



0

MULTI-FAMILY
UNITS



0

SINGLE FAMILY
UNITS



42

ACRES
INDUSTRIAL



19

ACRES
COMMERCIAL



350

VEHICLE TRIPS DURING
PM PEAK HOUR

OPTION 2

MAJOR HOUSING AND EMPLOYMENT EXPANSION



259

MULTI-FAMILY
UNITS



1,731

SINGLE FAMILY
UNITS



80

ACRES
INDUSTRIAL



40

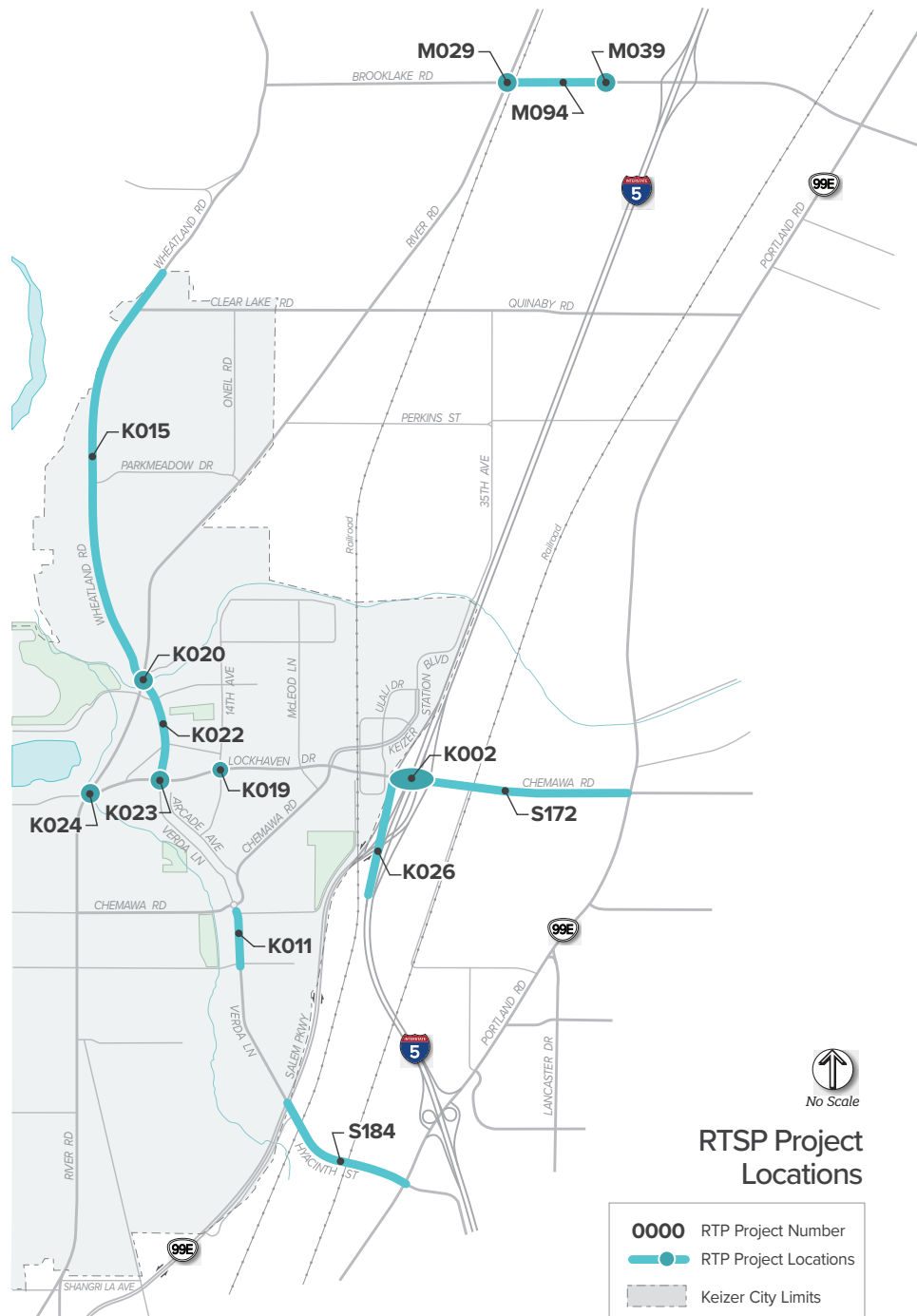
ACRES
COMMERCIAL



1,660

VEHICLE TRIPS DURING
PM PEAK HOUR

* Note: This does not include the multi-family units assumed in the RCOD, as previously described.



REGIONALLY IDENTIFIED SYSTEM IMPROVEMENTS

For the purposes of this study, it was assumed that the growth options would be fully developed by the horizon year of the plan forecast, year 2043. By that time, local agencies are expected to complete a series of transportation improvements to the study area roadway system independent of these growth options moving forward. They are identified in the Regional Transportation System Plan (RTSP), and have been identified as being likely to be funded, which is labeled as “Included” in that plan. The cost for the City of Keizer to complete these projects totaled just over \$12 million in 2009. Accounting for inflation, this is about \$16 million in 2019. Without these projects, the following intersections would experience severe congestion:

- River Road / Brooklake Road
- River Road / Lockhaven Drive
- Verda Lane / Lockhaven Drive
- Kafir Drive / 14th Avenue / Lockhaven Drive
- Chemawa Road / I-5 SB Ramp

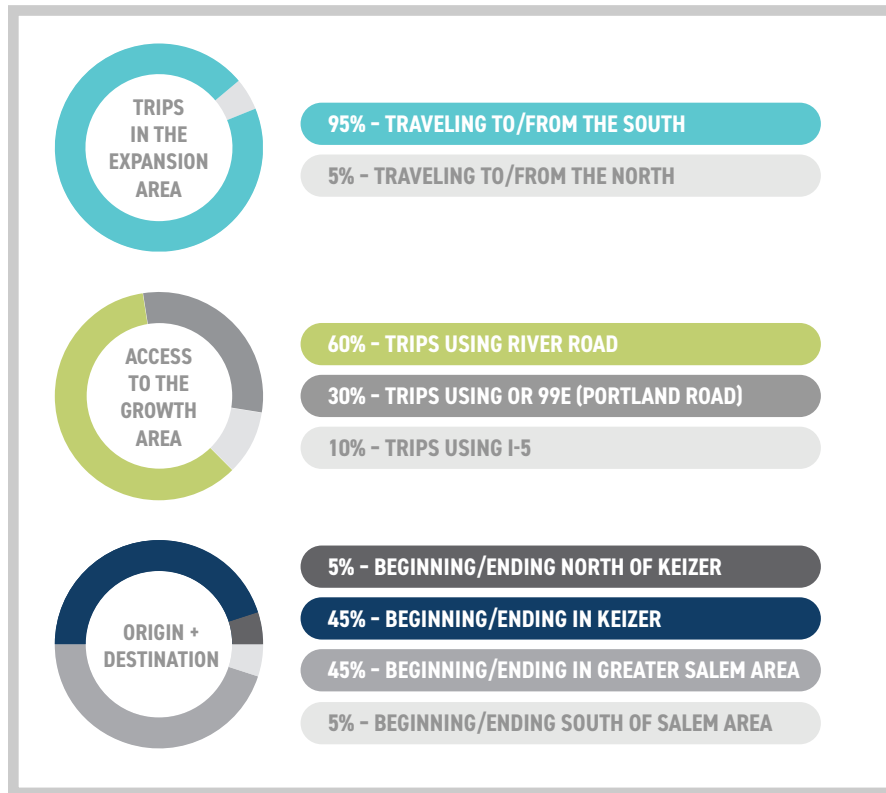
A complete list of the improvements applicable to the study area are included in the Appendix. These future improvements have been assumed to be in place for all future year scenarios.

Note that although existing funding for project K015 (multi-modal improvements) has been reallocated to another project, this project is still anticipated to be funded before the planning horizon year. In addition, this project has no impact on the vehicle capacity analysis.

◀ **FIGURE 4. RTSP PROJECT LOCATIONS**

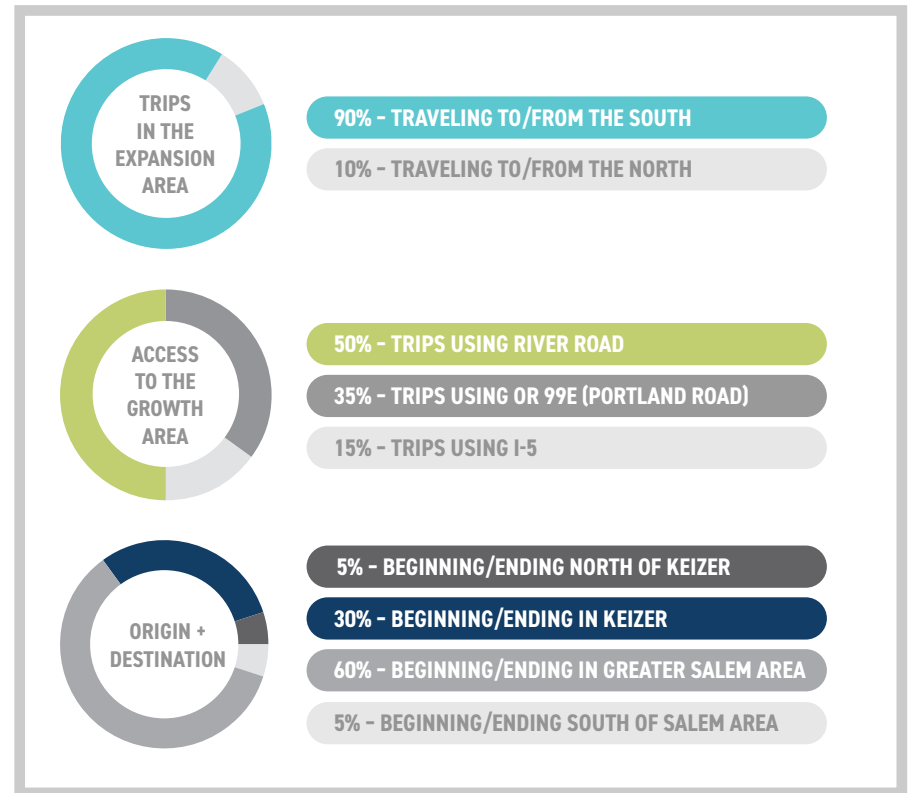
TRIP DISTRIBUTION PATTERNS FOR THE GROWTH AREAS

LAND USE OPTION 1



Under current conditions, there is little existing land use north of Keizer in the expansion area. The 2043 SKATS regional travel demand model was used to determine future travel patterns for this analysis. Land use type, such as proportion of residential vs commercial and industrial uses, impact trip patterns. Residential areas have trips coming into the expansion area during the PM peak hour, while the majority of employment areas have trips leaving the expansion area during the PM peak hour.

LAND USE OPTION 2



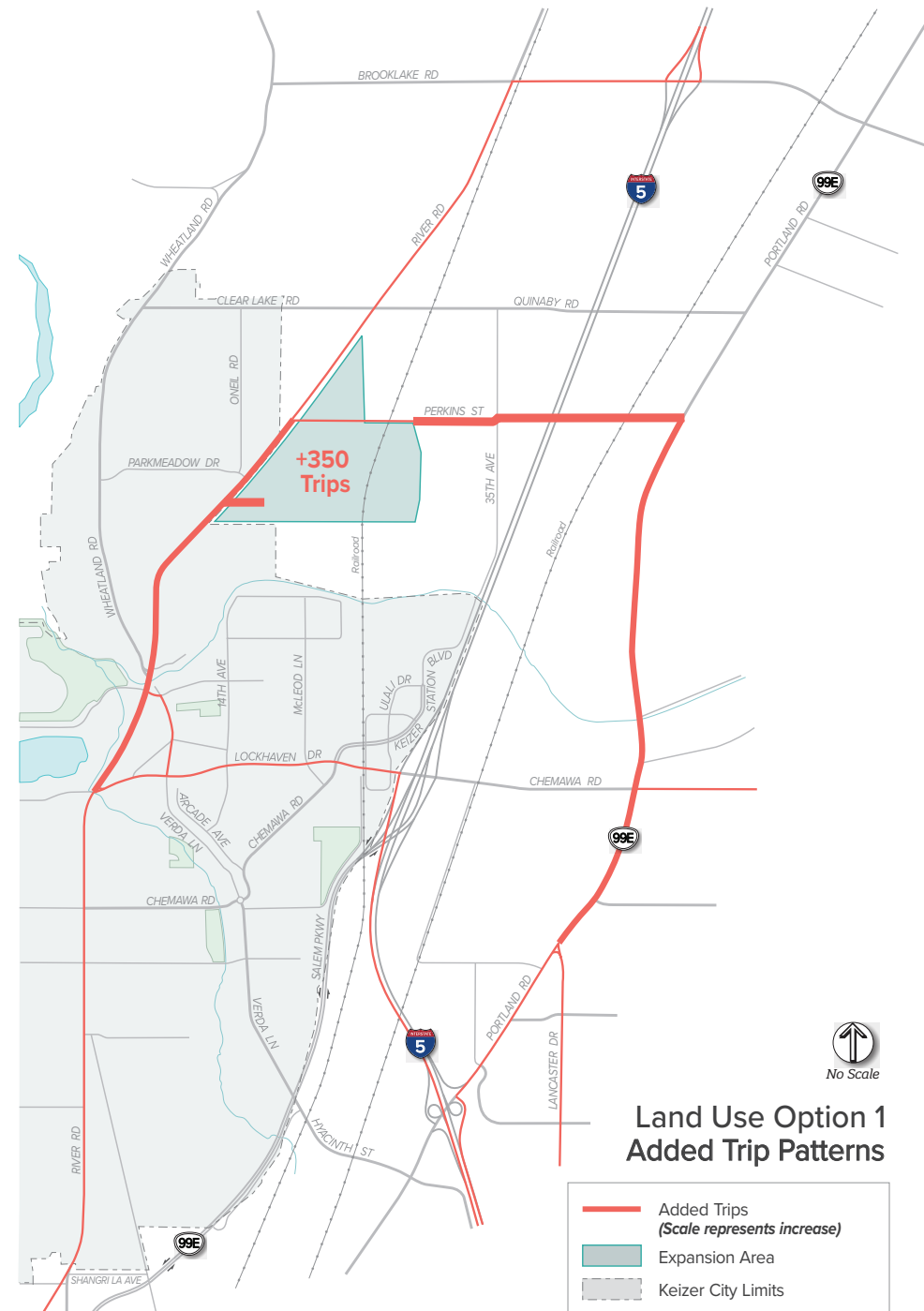
One reason the travel patterns are not the same between the two options is that Option 2 has a larger magnitude of additional trips, so once the Keizer housing or job demand has been filled, more trips are headed to and from the greater Salem area, as well as areas outside of Salem. Further details on trip distribution for the two growth options can be found in the Growth Impacts section.

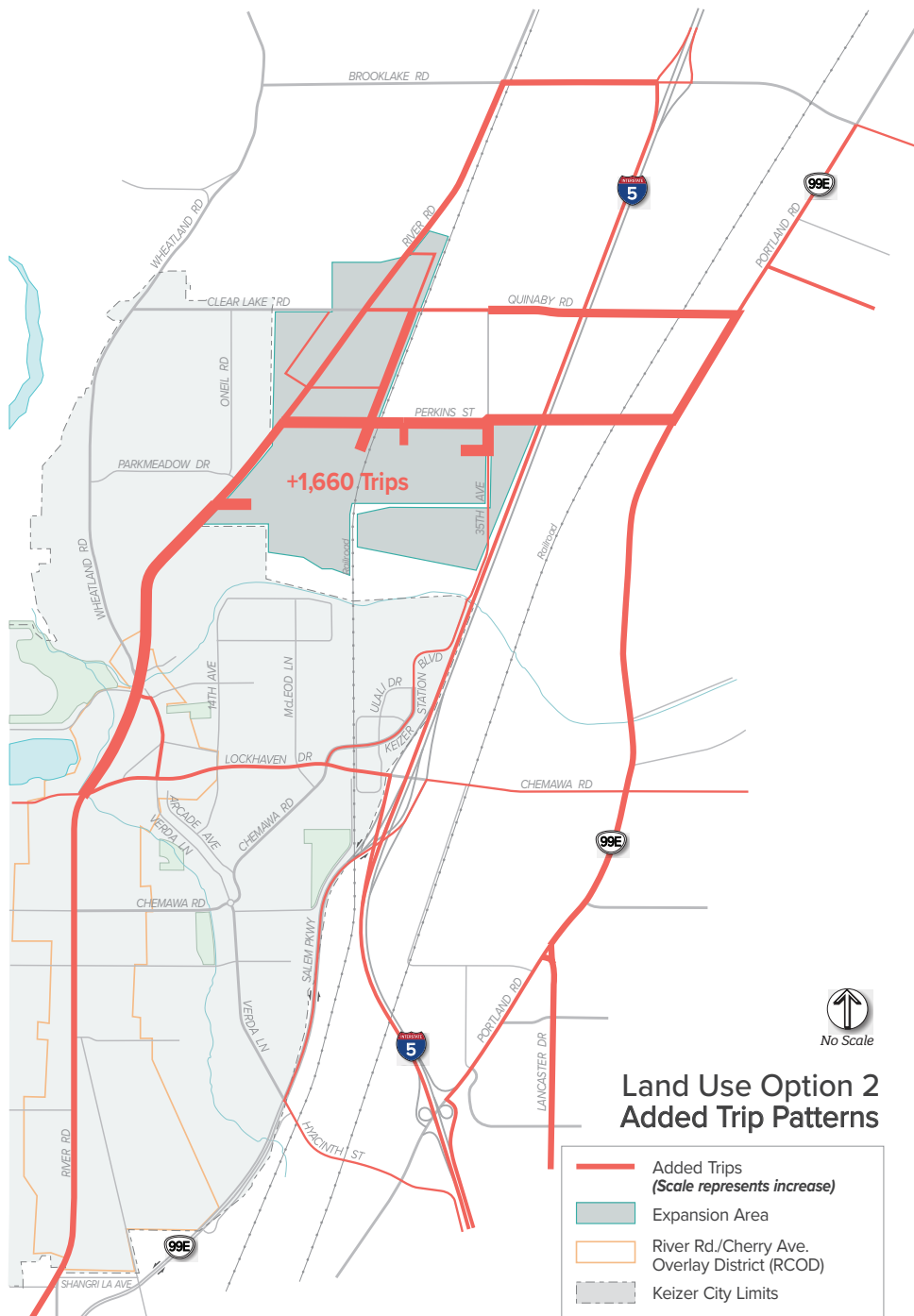
GROWTH IMPACTS

Based on the land use assumptions outlined in the previous section, trip patterns were developed for both of the growth options. These options were compared to a baseline scenario in 2043 that assumed no UGB expansion growth to determine the growth impacts. This modified baseline includes the 517 multi-family units in the River Road/Cherry Avenue Overlay District (RCOD) that are also assumed in Option 1. In Option 2, about half these units are assumed to be in the RCOD and half are located in the expansion area.

The trip patterns and magnitude of volume growth in the PM peak hour for the expansion areas of two options are shown in **Figures 5 and 6**. Generally, Option 1 has a much smaller impact than Option 2. Under Option 1, trips access the expansion area via River Road or Perkins Street, with some volume growth on OR 99E (Portland Road). There is a minor growth in trips on River Road in the RCOD.

FIGURE 5. LAND USE OPTION 1: ADDED TRIP PATTERNS ►





Land Use Option 2 shows significant growth in the expansion area, with increases in volume along River Road, Quinaby Road, Perkins Street, and OR 99E (Portland Road). There are some volume increases at the Brooklake Road, OR 99E (Portland Road), and Chemawa Road I-5 interchanges.

◀ **FIGURE 6. LAND USE OPTION 2: ADDED TRIP PATTERNS**

GROWTH IMPACTS ON STUDY AREA ROADWAYS AND INTERSECTIONS

Several roadways adjacent to the location of the growth options will require upgrades to City of Keizer street design standards if and when growth occurs in the future year baseline conditions (meaning without land use options 1 and 2). The operations shown in Figure 7 were analyzed with the assumption that all RTSP projects identified on Page 8 are completed.¹ The roadways that would need improvement beyond the RTSP projects identified on Page 8 are shown in **Table 1**. The extent of the improvements would be limited to the Urban Growth Boundary.

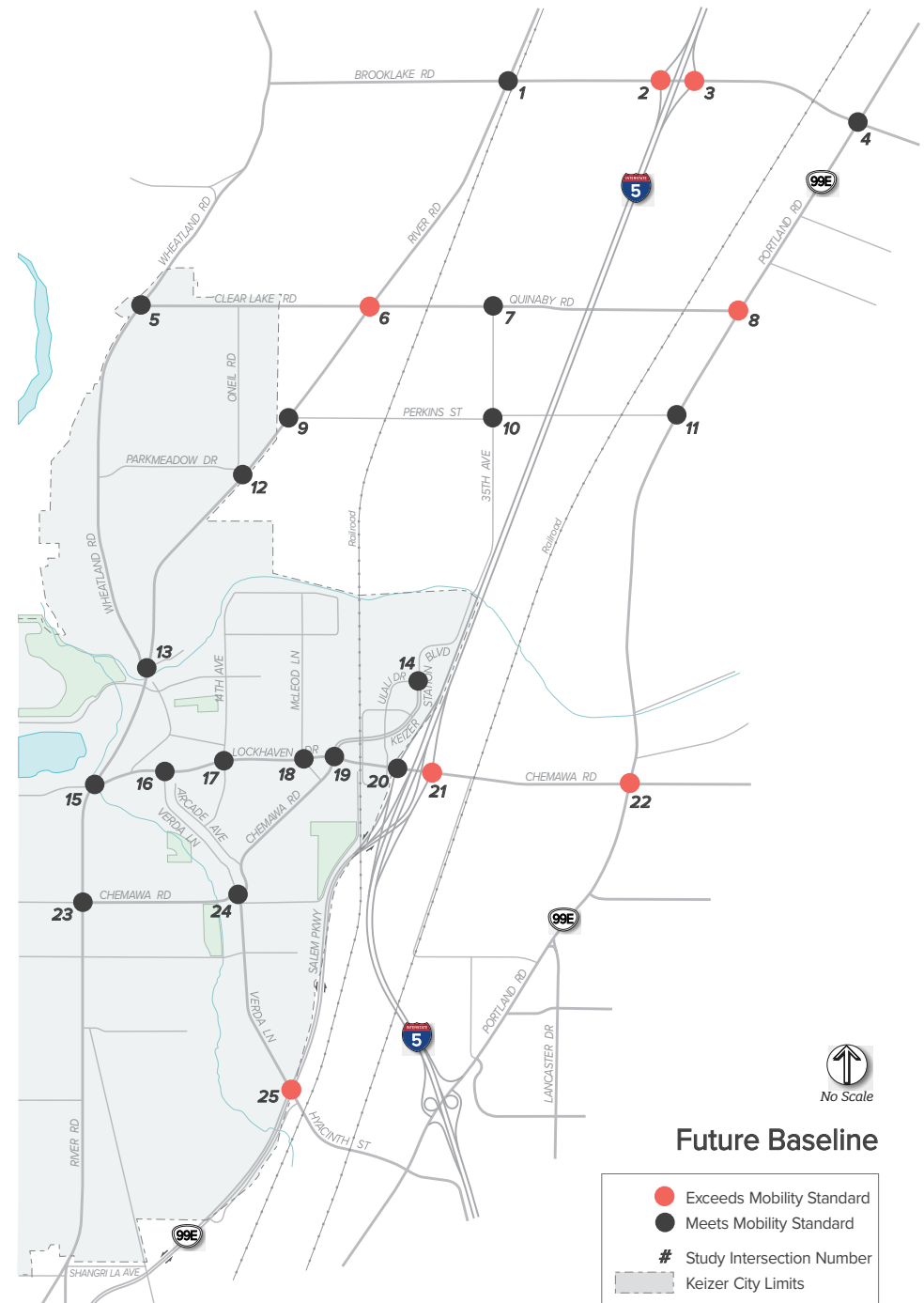
Several study intersections will require upgrades to traffic controls or expanded turn lanes to serve these growth options, as shown in **Figure 7**. These intersections will continue to be severely congested during peak hours with both growth options.

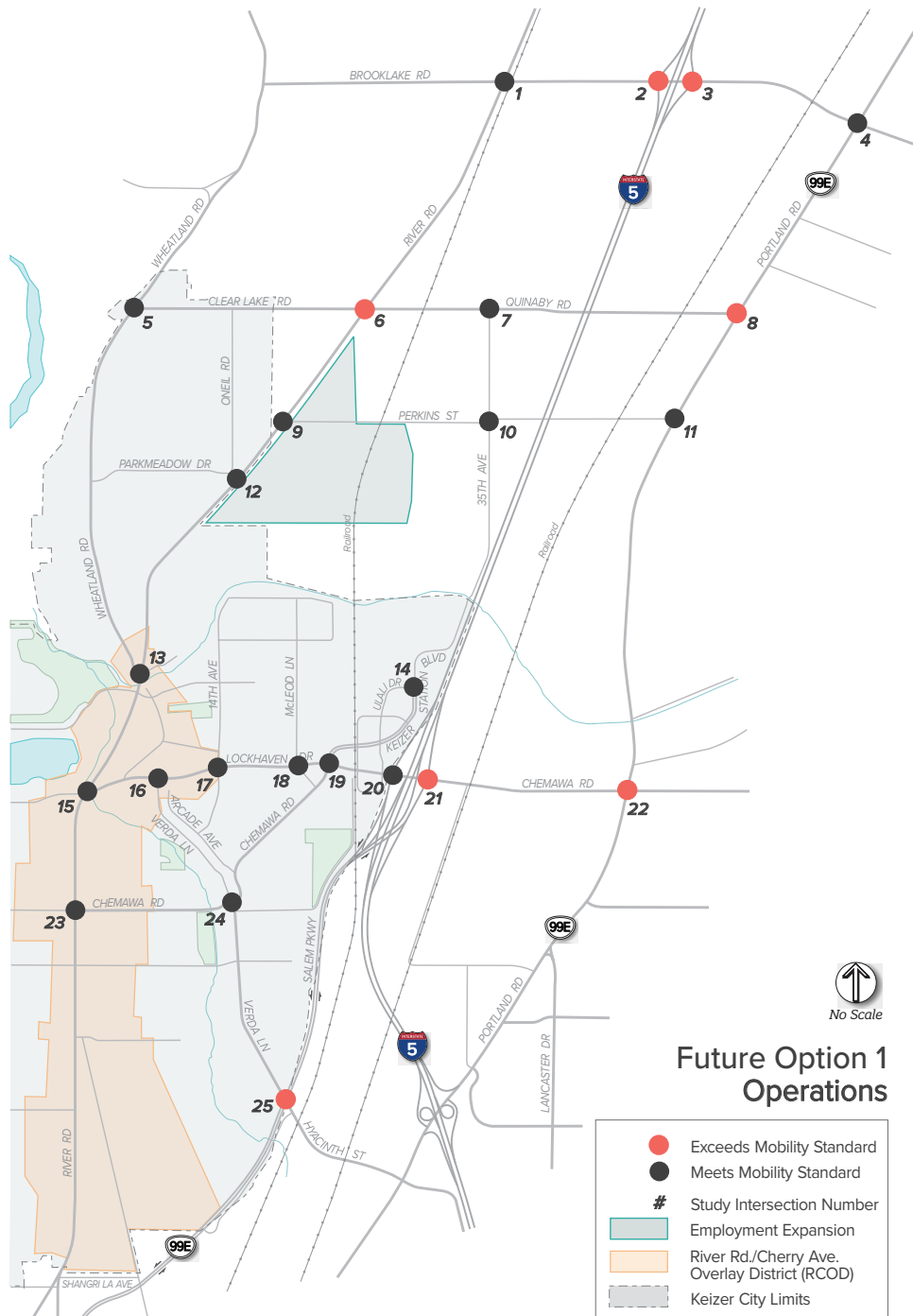
TABLE 1. ROADWAYS IN NEED OF IMPROVEMENT TO SERVE CONCEPTUAL GROWTH OPTIONS

LOCATION	FACILITY UPGRADE REQUIRED TO SERVE GROWTH
Perkins St	Upgrade to City of Keizer standards for minor arterials (3 lanes)
River Rd	Upgrade to City of Keizer standards for major arterials (5 lanes)
Quinaby Rd	Upgrade to City of Keizer standards for minor arterials (3 lanes)

FIGURE 7. FUTURE BASELINE ►

¹ City of Keizer design standards - Streets. See page 5
<https://evogov.s3.amazonaws.com/media/60/media/17105.pdf>

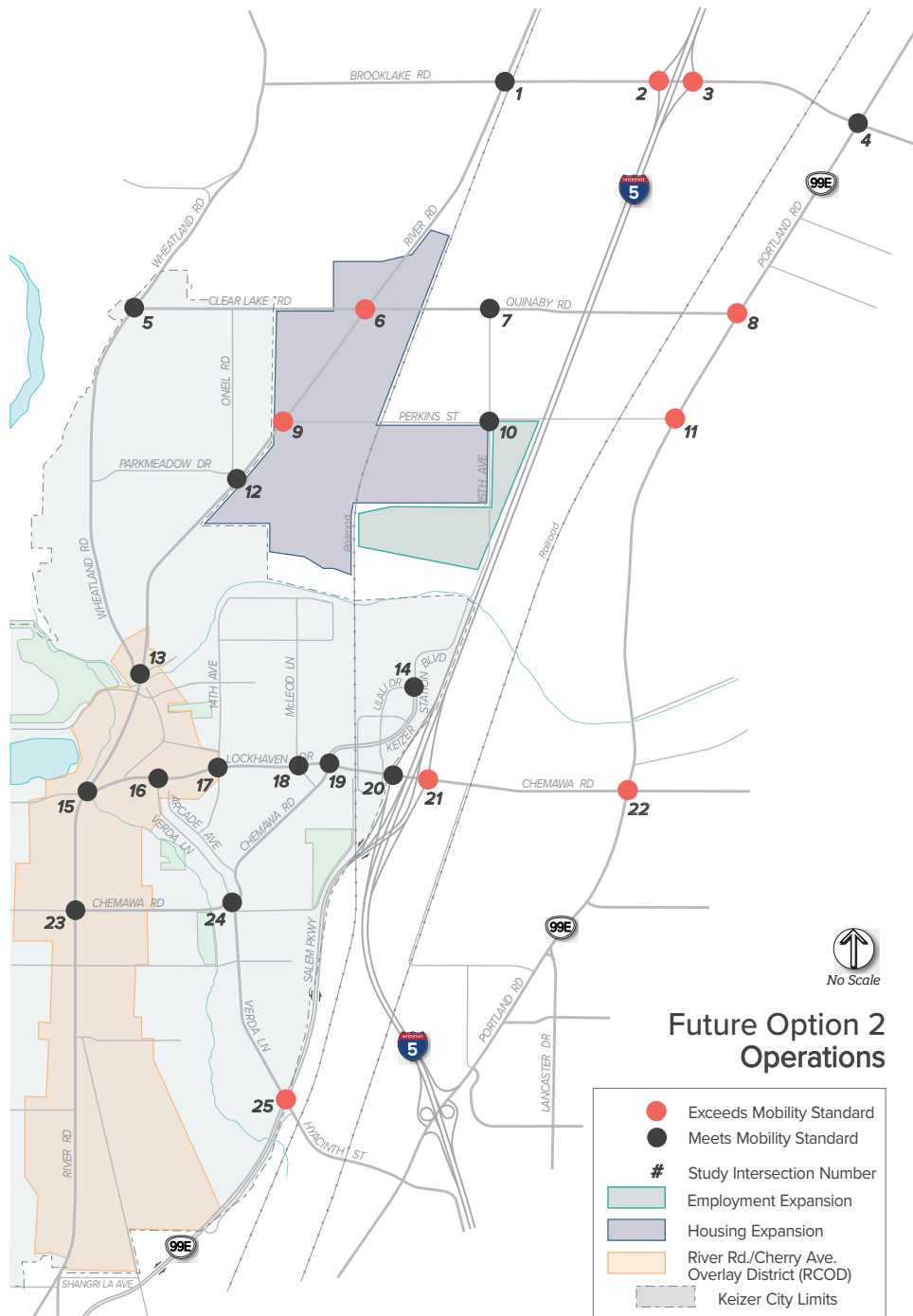




LAND USE OPTION 1

Apart from the study intersections already experiencing significant congestion in the 2043 Baseline scenario, no additional study intersections exceed mobility standards with Option 1, as shown in **Figure 8**. The following section will provide system improvements for the intersections shown to be experiencing significant congestion.

◀ **FIGURE 8. LAND USE OPTION 1**



LAND USE OPTION 2

Two study intersections experience significant congestion with the growth of Option 2, River Road/Perkins Street and OR 99 E (Portland Road)/Perkins Street, as shown in **Figure 9**. This is tied to the increased growth in trips along Perkins Street due to the adjacent expansion area.

◀ **FIGURE 9. LAND USE OPTION 2**

SYSTEM INVESTMENTS TO SERVE GROWTH

2043 BASELINE SYSTEM RECOMMENDATIONS

Several study intersections need improvement to serve planned growth even without further UGB expansion. **Table 2** identifies several projects that are recommended for the street network without expansion of the UGB. Each recommended improvement shows an associated cost estimate, and the jurisdiction that would be primarily responsible for the improvement. When traffic signals are installed at intersections #6 and #8, they will operate adequately during peak hours, as shown in the Appendix. Several of the projects in Table 2 were identified by studies conducted after the RTSP project list was adopted. These projects are expected to mitigate growth that occurs by 2043 without expansion of the UGB (baseline conditions).

¹ As part of a previous study done by DKS Associates in 2019, intersection mitigations for the I-5 and Brooklake Road interchange were identified. These improvements include signalization of the two intersections.

² Two RTSP projects are identified in the general areas of study intersections 21 and 22, however specific improvements were not specified (see K002 and S172). Further study is recommended to expand the scope of the existing RTSP projects to include improvements at these study intersections as well as the Chemawa Road, OR 99E (Portland Road), and I-5 corridors in this area.

³ Due to its location on a regionally significant route for motor vehicles and freight, Salem Parkway, additional study is recommended to mitigate intersection #25. Notably, the existing configuration and surrounding land use limits capacity expansion alternatives.

TABLE 2. BASELINE LIST OF INTERSECTION IMPROVEMENTS

INTERSECTION	RECOMMENDED IMPROVEMENT	COST ESTIMATE	JURISDICTION
2 Brooklake Rd & I-5 SB Ramps	Improvements from 2019 I-5/Brooklake Study (includes signalization) ¹	\$5,400,000	ODOT
3 Brooklake Rd & I-5 NB Ramps	Improvements from 2019 I-5/Brooklake Study (includes signalization) ¹		
6 River Rd & Clear Lake Rd/Quinaby Rd	Upgrade to signal control	\$1,000,000	County/City
8 OR 99E (Portland Rd) & Quinaby Rd	Upgrade to signal control	\$1,000,000	ODOT
21 Chemawa Rd & I-5 NB Ramp	Future study needed ²	TBD	ODOT
22 OR 99E (Portland Rd) & Chemawa Rd/Hazelgreen Rd	Future study needed ²	TBD	ODOT
25 Salem Pkwy & Verda Ln/Hyacinth	Future study needed ³	TBD	ODOT

OPTION 1 SYSTEM RECOMMENDATIONS

No additional study intersections need improvement with the growth with Option 1 from the baseline scenario. However, several roadways adjacent to the proposed developments in this growth option would require upgrades to City of Keizer standards. Due to the location of Option 1's proposed development, only Perkins Street and River Road would require upgrades to City of Keizer standards. **Table 3** shows the proposed roadway upgrades and planning-level estimated costs.

By widening River Road as described in Table 3, study intersection #6 (River Road & Clear Lake Rd/Quinaby Road) would be mitigated to meet jurisdictional standard with the additional turn lanes on River Road, and therefore would not require an intersection control upgrade to a signal. A comparison of the intersection operations with additional turn lanes versus intersection control upgrades is provided in the Appendix.

Option 1 has a total of \$17,000,000 for planning level transportation project costs associated with this expansion (not including future baseline needs identified above).

TABLE 3. OPTION 1 - LIST OF ROADWAY IMPROVEMENTS

ROADWAY	RECOMMENDED IMPROVEMENT ¹	COST ESTIMATE	JURISDICTION
Perkins St	Upgrade to 3 lanes	\$5,000,000	County/City
River Rd	Upgrade to 5 lanes	\$12,000,000	County/City

¹ Urban upgrades would be constructed to the new city limits (based on expansion area). Cost estimates reflect that distance.

OPTION 2 SYSTEM RECOMMENDATIONS

Two additional intersections need improvement with the growth of Option 2 as compared to the baseline scenario and Option 1. **Table 4** provides recommendations for improvements at these intersections, as well as the associated planning-level cost estimate and the jurisdiction responsible.

Several roadways adjacent to the proposed developments in this growth option would require upgrades to City of Keizer standards. **Table 5** shows the planning level cost estimates for these upgrades.

Study intersection #6 (River Road & Clear Lake Rd/Quinaby Road) would be mitigated to meet the jurisdictional standard with turn lanes constructed on both River Road and Quinaby Road. A comparison of this intersection from upgrading to signal control (recommended baseline improvements), to the construction of turn lanes on River Road only (recommended Option 1 improvements), to the construction of turn lanes on both River Road and Quinaby Road (recommended Option 2 improvements) is found in the Appendix.

Option 2 has a total of \$36,500,000 for planning level transportation project costs associated with this expansion (not including future baseline needs identified above).

TABLE 4. OPTION 2 - LIST OF INTERSECTION IMPROVEMENTS

ROADWAY	RECOMMENDED IMPROVEMENT	COST ESTIMATE	JURISDICTION
River Rd & Perkins St	Construct turn lanes	\$500,000 (for all three approaches)	Private developers, County, City
OR 99E (Portland Rd) & Perkins St	Upgrade to signal control	\$1,000,000	ODOT

TABLE 5. OPTION 2 - LIST OF ROADWAY IMPROVEMENTS

ROADWAY	RECOMMENDED IMPROVEMENT ¹	COST ESTIMATE	JURISDICTION
Perkins St	Upgrade to 3 lanes	\$10,000,000	County/City
River Rd	Upgrade to 5 lanes	\$19,000,000	County/City
Quinaby Rd	Upgrade to 3 lanes	\$6,000,000	County/City

¹ Urban upgrades would be constructed to the new city limits (based on expansion area). Cost estimates reflect that distance.

SUMMARY OF FINDINGS

In order to accommodate expected growth in 2043 regardless of the growth options proposed in this study, several study intersections will require upgrades. With the growth in Option 1, the City has the potential to work with developers to fund intersection and roadway improvements as identified in the Baseline scenario. The growth of Option 2 would cause two additional study intersections to experience significant congestion, one of which is likely to be funded by private development.

As shown in **Table 6**, planning level costs for the transportation projects identified total \$17,000,000 for Option 1 and \$36,500,000 for Option 2. These costs would be in addition to the City of Keizer's Included RTSP projects, which total \$16 million in today's dollars, plus the 2043 recommended baseline improvements due to future deficiencies (about \$1 million for City of Keizer).

TABLE 6. TOTAL ESTIMATED ROADWAY IMPROVEMENTS COSTS FOR GROWTH OPTIONS

GROWTH OPTION	RECOMMENDED IMPROVEMENTS	TOTAL ESTIMATED COST
Option 1	Widen Perkins Street Widen River Road	\$17,000,000
Option 2	Widen Perkins Street Widen River Road Widen Quinaby Road Upgrade River Road & Perkins Street Upgrade Portland Road & Perkins Street	\$36,500,000

HOUSEHOLD AND EMPLOYMENT GROWTH BY OPTION

If we continue our analysis to compare the scale of development that was supported by each growth option, we can derive a unit cost for each PM peak hour trip that would be served in the growth area. This provides a fair basis of comparison between these growth options.

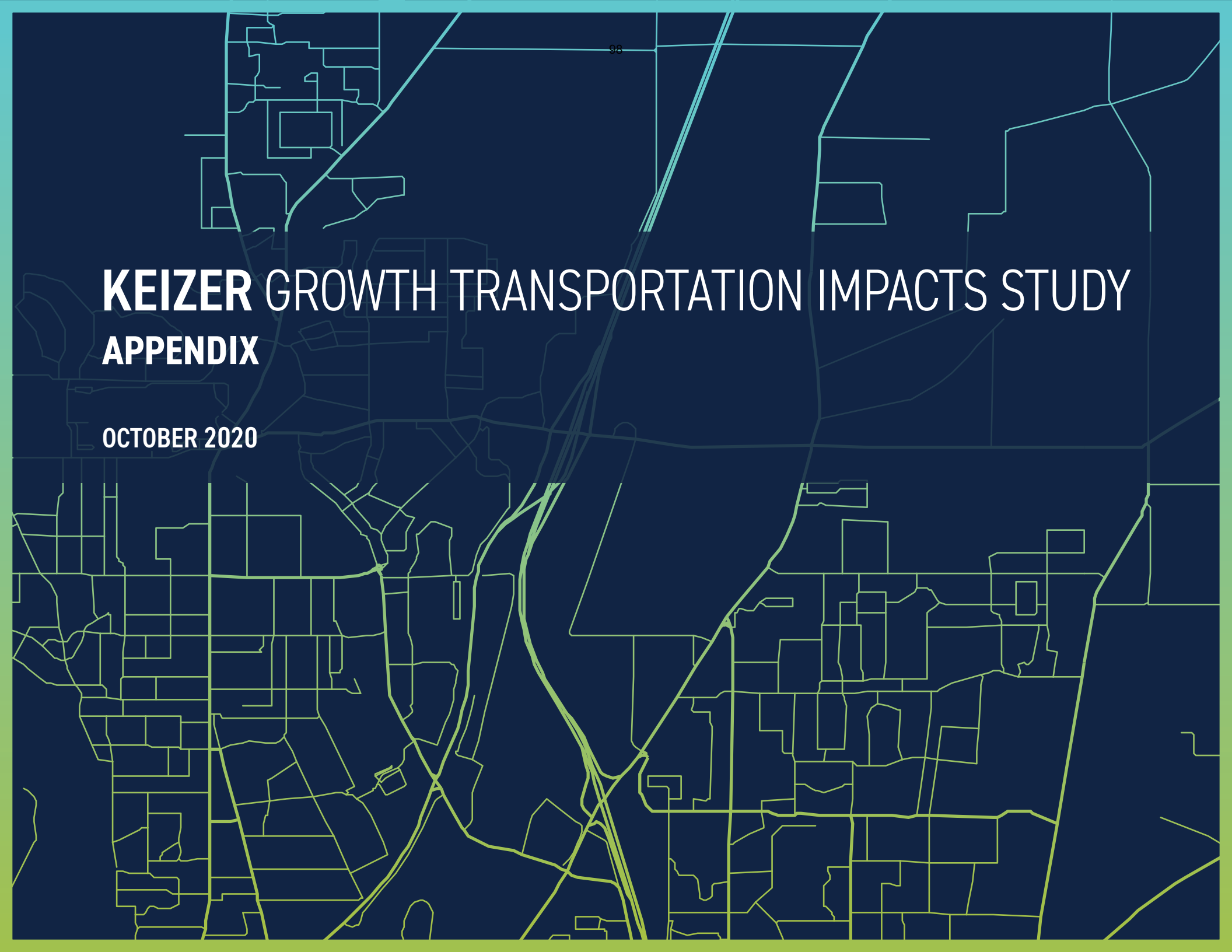
For this analysis, both Option 1 and Option 2 were compared to the modified future baseline (includes 517 multi-family households in the RCOD). The following table summarizes the trips added to the growth area, the total cost of improvements, and the cost per additional trip for each option. Note that the Option 1 expansion only contains employment growth, while Option 2 has both single family households and employment growth.

While Option 1 is about half the cost of Option 2, Option 2 supports about five times the amount of trips. Because of this, the cost per trip are lower for Option 2 compared to Option 1. In fact, the cost per additional PM peak hour trip in Option 1 (\$48,600) is approximately double the cost in Option 2 (\$22,000). This outcome is due to the efficiencies of building out the expansion area in Option 2 and making use of the capacity improvements at the adjacent roadways and intersections that would be needed with any scale of development. Note that both options would also require an active transportation study to identify any needed bicycle and pedestrian facilities.

OPTION 1		
350	\$17M	\$48,600
GROWTH AREA TRIPS	COST OF IMPROVEMENTS	COST PER TRIP
OPTION 2		
1,660	\$36.5M	\$22,000
GROWTH AREA TRIPS	COST OF IMPROVEMENTS	COST PER TRIP

These system improvements would likely be funded through a variety of sources, including System Development Charges, development exactions, and funds from local agencies (City of Keizer, Marion County, and ODOT). These trips were estimated from the travel demand model and are typically lower than the number of trips that would be produced from the ITE Trip Generation Manual in a Transportation Impact Analysis (TIA). Once specific developments are selected, a full TIA would need to be performed. Thus, the cost per trip reported here is for reference purposes, not the suggested development fee. For reference, the current Keizer System Development Charge (SDC) fee for a single family house is \$1,405, or more generally \$2,780 per trip¹. The costs are intended to provide a scale of investment and to indicate how increased development density in the expansion area can lower costs per trip.

¹ City of Keizer, Fees and Charges for Services, July 2019, <https://www.keizer.org/media/Departments/Finance/2019-20-%20Fee%20Schedule%207-1-19%20update.pdf>

A stylized map of a region, likely in the Pacific Northwest, showing a network of roads and highways. The map is rendered in white and light green lines on a dark blue background. A prominent highway, labeled '98', runs diagonally from the top center towards the bottom right. The map shows a dense grid of roads in some areas and more sparse, winding routes in others, representing a mix of urban and rural landscapes.

KEIZER GROWTH TRANSPORTATION IMPACTS STUDY

APPENDIX

OCTOBER 2020



CONTENTS

SECTION 1. TECHNICAL MODELING MEMORANDUM

SECTION 2. REGIONAL TRANSPORTATION PLAN PROJECTS

SECTION 3: INTERSECTION OPERATIONS SUMMARY

SECTION 4: SYNCHRO OPERATIONS REPORTS



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SECTION 1. TECHNICAL MODELING MEMORANDUM



TECHNICAL MEMORANDUM

DATE: September 1, 2020

TO: Shane Witham | City of Keizer

FROM: Carl Springer, PE and Amanda Deering, PE | DKS Associates

SUBJECT: Keizer UGB Growth Study – Technical Modeling Memorandum Project # 20018-000

INTRODUCTION

The purpose of this memorandum is to document the methods and assumptions used in the modeling process for the Keizer UGB Growth Study. Details will be provided on land use estimates, trip generation, modeling, and forecasting future volumes. Full analysis and results discussion are provided in the main report document.

LAND USE INPUTS

Two conceptual growth options were developed in coordination with the City of Keizer, the Mid-Willamette Valley Council of Governments (MWVCOG), and the consultant team. The intent was to develop two scenarios to address the housing needs and projected employment growth in Keizer beyond its current Urban Growth Boundary. For each growth scenario, the City provided an estimate of housing units and employment acreage, which was converted to land use inputs for the future 2043 Salem-Keizer travel demand model (SKATS). The existing year (2017) and future year (2043) models were used to forecast the transportation impacts of the two scenarios.

GROWTH OPTIONS

The following growth scenarios were modeled in this study to assess changes in travel demands:

- Modified baseline: 2043 SKATS base future model with the addition of multi-family housing units within the River Road/Cherry Road Overlay District (RCOD)
- Option 1: modified baseline plus a small employment expansion outside of the urban growth boundary (UGB)
- Option 2: housing expansion plus a large employment expansion and outside of the UGB

The expansion areas are depicted in Figure 1 and specific land use inputs from the City for these scenarios are presented in Table 1.

FIGURE 1: GROWTH EXPANSION AREAS

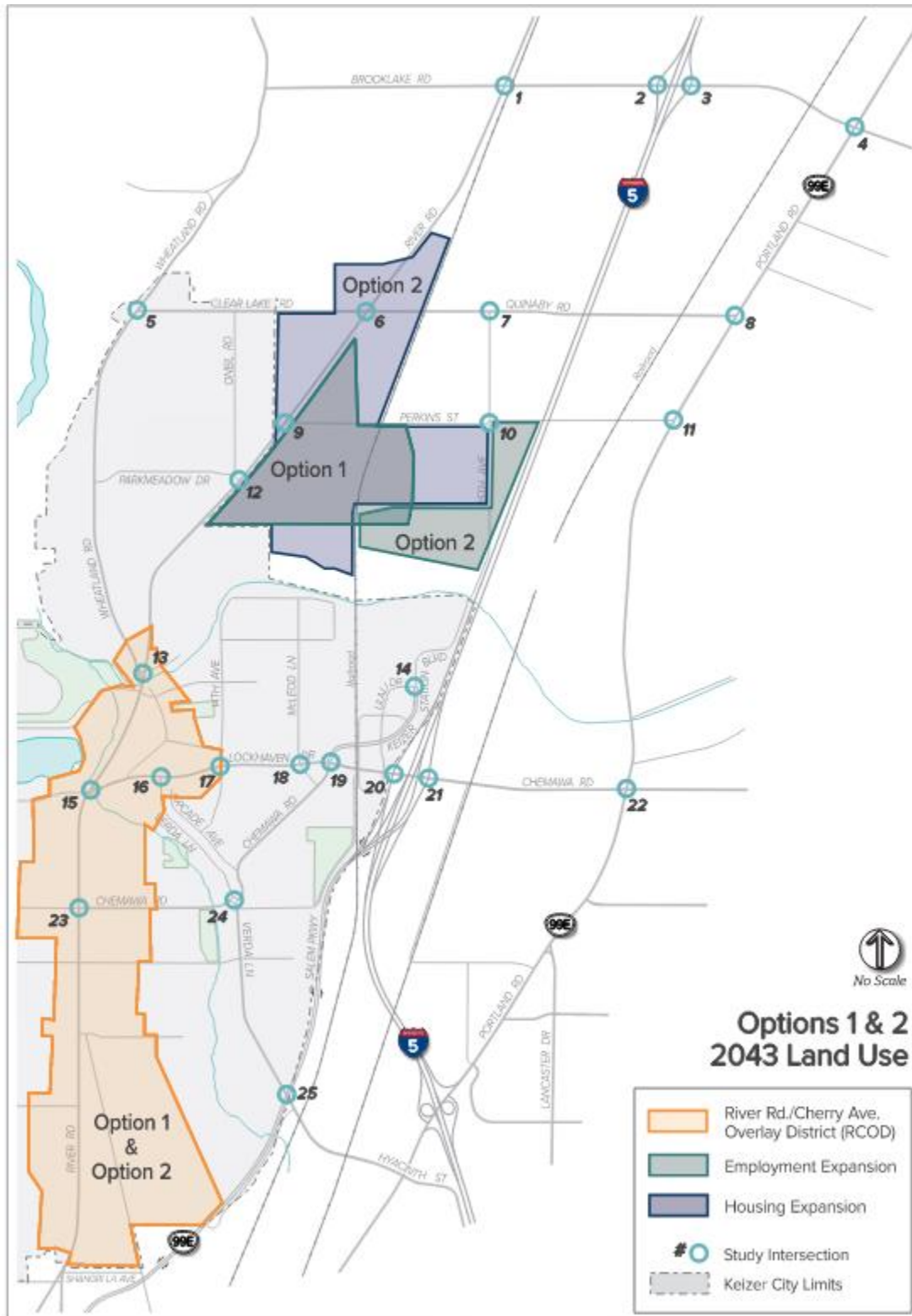


TABLE 1: LAND USE BY SCENARIO

SCENARIO	MULTI-FAMILY UNITS	SINGLE FAMILY UNITS	INDUSTRIAL EMPLOYMENT ACRES	COMMERCIAL EMPLOYMENT ACRES	TOTAL EMPLOYMENT ACRES
MODIFIED BASELINE	517	-	-	-	-
OPTION 1	517	-	42	21	63
OPTION 2	517 ^a	1731	80	40	120

^a 258 multi-family units in the RCOD, and 259 units in the expansion area

This land use was checked to verify it matches the appropriate housing density and vacancy in the growth areas. It was also reviewed to check that it provides the level of housing specified in the housing needs analysis and that the projected employment matches the anticipated job growth.

MODEL INPUTS

These growth scenario land use quantities were then converted to inputs to the regional travel demand model in the form of households and jobs. These inputs are applied as edits to the land use for each applicable transportation analysis zone (TAZ). Options 1 and 2 involve TAZs that are outside of the UGB and are mostly vacant. The multifamily units in the River Road/Cherry Road Overlay District RCOD are filling in the vacant lots remaining in the otherwise developed TAZs surrounding River Road, within the city limits.

The following assumptions were used to convert commercial and industrial employment acreage to jobs by employment type for input into the model. The rates are in units of jobs per built 1,000 square feet (ksf) and are based off floor area ratios (FARs) and previous land use modeling assumptions.

TABLE 2: EMPLOYEE RATES BASED ON BUILT SQUARE FOOTAGE (JOB/KSF)

LAND USE TYPE	RETAIL	SERVICE	MANUFACTURING	WHOLESALE	TOTAL
COMMERCIAL	0.55	0.85	0.0	1.1	2.5
INDUSTRIAL	0.0	0.0	1.0	0.5	1.5

Using Table 2, the employment acreage was converted to total new jobs and, with new households, were allocated across the appropriate TAZs and were provided as model inputs to the COG. Tables 3 and 4 summarize the detailed model input assumptions. The inputs shown are only the additional households or jobs to be added to the 2043 future baseline SKATS model, and don't reflect total land use numbers for the TAZs. Note that the modified baseline is included in Table 3 to show the multi-family housing growth in the RCOD that was assumed beyond the original SKATS 2043

baseline. The selected zones in TAZs 95-128 represent the RCOD, while TAZs 83-91 represent the expansion areas.

TABLE 3: HOUSING ASSUMPTIONS FOR THE MODIFIED BASELINE AND TWO GROWTH SCENARIOS

ADDED HOUSEHOLDS	MODIFIED BASELINE	OPTION 1		OPTION 2	
TAZ	MULTI-FAMILY UNITS	SINGLE- FAMILY UNITS	MULTI- FAMILY UNITS	SINGLE- FAMILY UNITS	MULTI- FAMILY UNITS
EXPANSION AREA					
83	0	0	0	29	0
84	0	0	0	25	0
85	0	0	0	387	0
86	0	0	0	1174	259
87	0	0	0	45	0
89	0	0	0	1	0
91	0	0	0	70	0
RCOD AREA					
95	200	0	200	0	100
108	56	0	56	0	28
117	14	0	14	0	7
119	76	0	76	0	38
124	24	0	24	0	12
125	66	0	66	0	33
127	36	0	36	0	18
128	45	0	45	0	22
TOTAL	517	0	517	1731	517

TABLE 4: EMPLOYMENT ASSUMPTIONS FOR TWO GROWTH OPTIONS

ADDED JOBS	MODIFIED BASELINE	OPTION 1				OPTION 2					
TAZ	TOTAL JOBS	RETAIL	SERVICE	MANUFAC-TURING	WHOLE-SALE	TOTAL	RETAIL	SERVICE	MANUFAC-TURING	WHOLE-SALE	TOTAL
86	0	67	104	253	260	684	192	296	697	732	1917
91	0	34	52	113	124	323	0	0	0	0	0
TOTAL	0	101	156	366	384	1007	192	296	697	732	1917

UPDATED TRAVEL DEMAND MODELS

The COG used the land use inputs provided by DKS to create three 2043 future year scenario models: the modified baseline, Option 1, and Option 2. These are based off the latest regional travel demand models, with a base year of 2017 and horizon year of 2043. These models include committed transportation improvements from the current Regional Transportation Plan (RTP), and projects from the Cities of Keizer and Salem Transportation System Plans (TSPs). The land use inputs were converted to vehicle trips and assigned to the street network in the transportation model following the trip patterns and methods used in the SKATS models. In addition to the land use, DKS also provided some network edits to the transportation models in the expansion areas where new connections would be needed to support the development.

MODEL STREET NETWORK EDITS

Figures 2 and 3 show the model street network edits that were implemented for Options 1 and 2. The edits included adding new street connections as collectors in the expansion areas, adding new connectors to distribute the development trips, and modifying connector locations so they are not loading directly into study intersections. These edits are high level, with the intention of improving the modeling assignment and properly distributing trips. They do not represent proposed new street alignments or infrastructure.

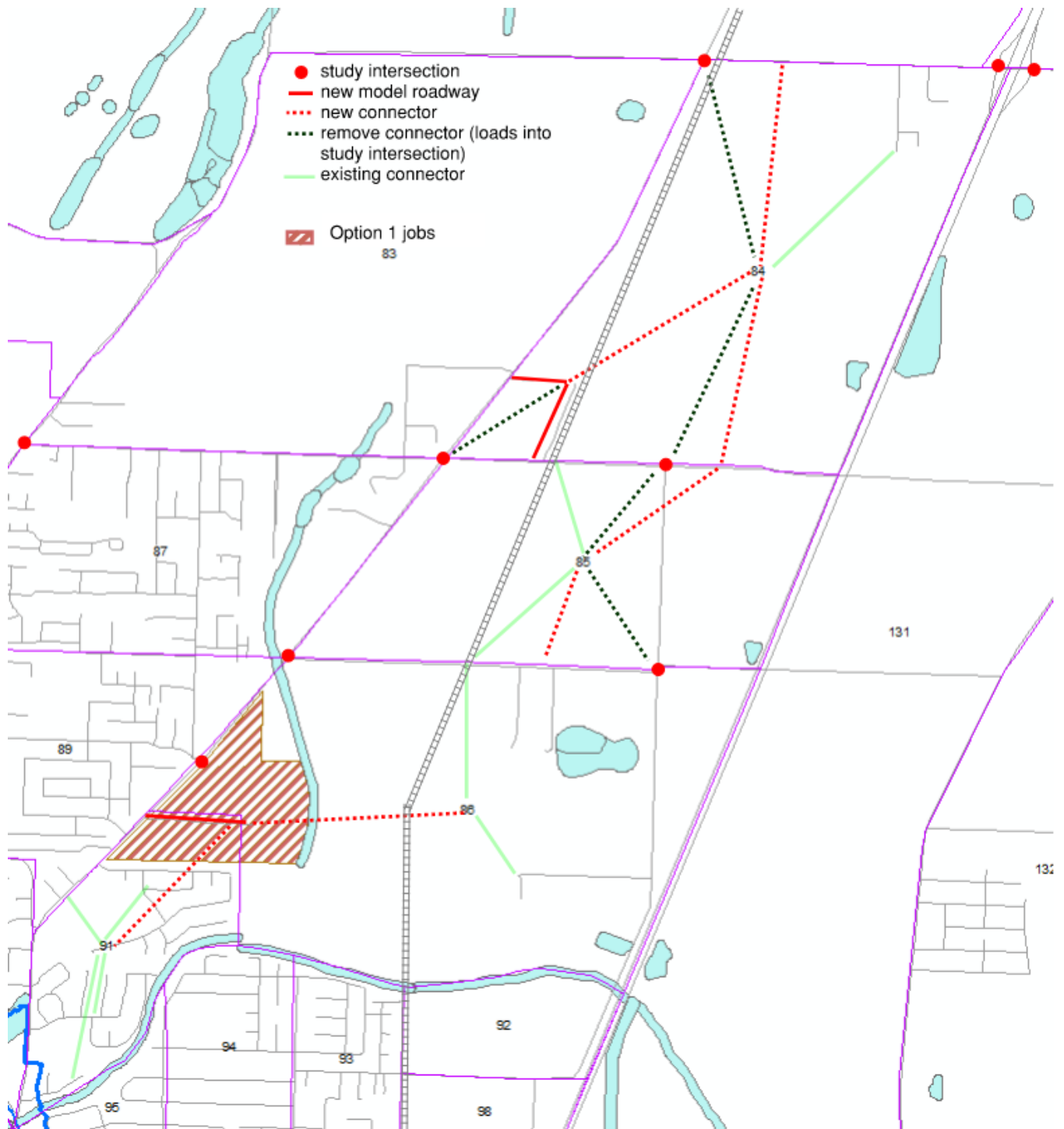
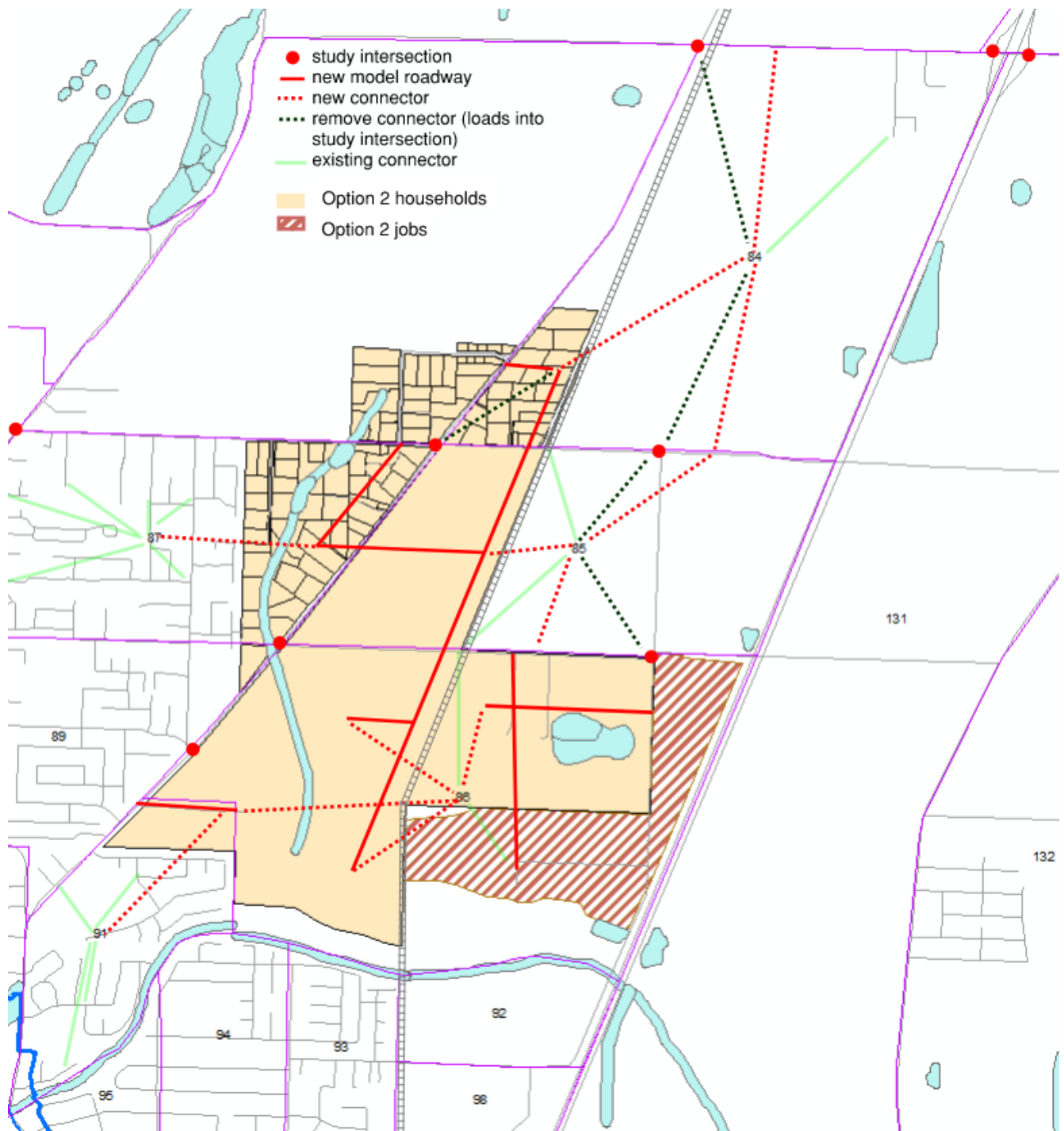
FIGURE 2: OPTION 1 MODEL NETWORK EDITS

FIGURE 3: OPTION 2 MODEL NETWORK EDITS

MODEL TRAVEL FORECASTS

The three future scenario 2043 SKATS models and the base 2017 SKATS model were used to pull various outputs to support the transportation analysis documented in the main report. These included post-processed 2043 traffic volumes, Highway Capacity Manual (HCM) intersection operations, and growth area travel patterns.

Volume difference plots from the travel demand models were used to develop travel pattern and trip growth distribution figures shown in Figures 4 and 5. These figures show high level distribution of new trips in the expansion areas for Options 1 and 2. The multifamily growth in the RCOD is spread across the corridor and doesn't show significant growth in trips in the area.

Future 2043 traffic volumes at the study intersections were forecasted using the SKATS base and future year models, existing year count data, and post-processed using NCHRP 765 methods¹. These volumes were used as inputs to the HCM intersection operation analysis performed in Synchro, which informed recommended transportation improvements.

¹ National Cooperative Highway Research Program (NCHRP) Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design, Transportation Research Board, 2014.

FIGURE 4: OPTION 1 GROWTH TRAVEL PATTERNS



FIGURE 5: OPTION 2 GROWTH TRAVEL PATTERNS



SECTION 2. REGIONAL TRANSPORTATION PLAN PROJECTS

SEE PAGE 8 FOR MAP

REGIONAL TRANSPORTATION PLAN PROJECTS

(SEE PAGE 8 FOR MAP)

RTSP ID	PROJECT NAME	PROJECT DESCRIPTION	JURISDICTION	PLANNING LEVEL COST (2009)
K002	Chemawa Interchange	- Add EB dual right-turn lanes to SB ramp - Add WB dual left-turn lanes to SB ramp - Add SB receiving lane to ramp	City of Keizer ODOT	\$550,000
K011	Verda Ln NE: Chemawa Rd NE to Dearborn Ave NE	Widen to 3 lanes, add bike lanes and sidewalks	City of Keizer	\$2,200,000
K015	Wheatland Rd N: River Rd N to north City Limits	Widen for continuous bike lanes, separated sidewalks, rain gardens and landscaping	City of Keizer	\$2,000,000
K019	Lockhaven Dr @ 14th Ave - Turn Lanes	- Construct a WB right-turn lane on Lockhaven Dr - Modify NB approach (Kafir Dr) and SB approach (14th Ave) to include separate left-turn lane and shared right turn/through lane	City of Keizer	\$383,373
K020	Wheatland Rd/River Rd Intersection	Add second NB left-turn lane and protected left-turn signal phase. Lengthen outside southbound lane	City of Keizer	\$1,100,000
K021	River Rd at Manzanita St Intersection Realignment	Move intersection approximately 250 feet to the south. Reconstruct McNary Estates Dr and Manzanita St approaches.	City of Keizer	\$2,700,000
K022	Verda Ln Extension	Extend Verda Ln from Lockhaven Dr to River Rd	City of Keizer	\$2,075,000
K023	Lockhaven Dr/Verda Ln Intersection	Signalize the intersection	City of Keizer	\$400,000

K024	River Rd at Lockhaven Dr Intersection Modifications	- Convert WB approach to dual left-turn lanes, a single through lane, and a separate right-turn lane - Convert east/west split phasing to a more conventional protected left-turn phasing	City of Keizer	\$500,000
K026	On-ramp to I-5 and Salem Parkway	Widen the existing on-ramp from Chemawa Road to I-5 (SB) from one lane to two lanes.	City of Keizer ODOT	\$360,000
S172	Chemawa Rd NE: I-5 to Portland Rd NE	Widen to 4 lanes plus center turn lanes, bike lanes, curbs, gutters, and sidewalks.	City of Salem	\$2,511,000
S184	Hyacinth St NE: Salem Parkway NE to Portland Rd NE	Widen to major arterial standards, including 4 travel lanes and a center turn lane with curbs, gutters, sidewalks, bike lanes and intersection modifications	City of Salem	\$3,448,000
M029	River Rd NE & Brooklake Rd NE	Signalize and realign intersection	Marion County	\$2,500,000
M039	Brooklake Rd N & Huff Ave	Add traffic signal and turn lanes	Marion County	\$2,500,000
M094	Brooklake Road: River Road to Huff Avenue	Widen to two lanes in each direction with turn lanes	Marion County	\$4,000,000

SECTION 3: INTERSECTION OPERATIONS SUMMARY

Existing

#	Intersection	Jurisdiction	Mobility Standard	Control Type	LOS	Delay	V/C Ratio
1	River Rd & Brooklake Rd	Marion Co	LOS D V/C <= 0.85	AWSC	D	28.1	0.76
2	Brooklake Rd & I-5 SB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	12/123	0.46/0.65
3	Brooklake Rd & I-5 NB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	A/F	10/148	0.31/1.13
4	Portland Rd & Brooklake Rd	ODOT (OHP)	V/C <= 0.95	Signal	B	13.2	0.68
5	Wheatland Rd & Clear Lake Rd	City of Keizer	LOS E V/C <= 0.95	TWSC	A/B	8/11	0.11/0.1
6	River Rd & Clear Lake Rd/Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/C	8/22	0.26/0.36
7	35th Ave & Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/B	7/10	0.07/0.13
8	Portland Rd & Quinaby Rd	ODOT (OHP)	V/C <= 0.95	TWSC	A/C	9/20	0.39/0.25
9	River Rd & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/C	8/19	0.27/0.39
10	35th Ave & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/B	7/11	0.06/0.16
11	Portland Rd & Perkins St	ODOT (OHP)	V/C <= 0.95	TWSC	A/C	9/18	0.38/0.19
12	River Rd & Parkmeadow Dr	City of Keizer	LOS E V/C <= 0.95	TWSC	A/C	10/17	0.32/0.31
13	River Rd & Wheatland Rd/Springwood Dr	City of Keizer	LOS D V/C <= 0.95	Signal	C	20.4	0.79
14	Keizer Station Blvd & Ulali Dr	City of Keizer	LOS D	Signal	A	6.1	0.28
15	River Rd & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	D	43.4	0.77
16	Verda Ln & Lockhaven Dr	City of Keizer	LOS E	TWSC	A/C	10/19	0.48/0.26
17	Kafir Dr/14th Ave & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	C	24.2	0.99
18	McLeod Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	C	22	0.59
19	Chemawa Rd & Lockhaven Dr & Keizer Station Blvd	City of Keizer	V/C < 1.00	Signal	D	45.8	0.68
20	Chemawa Rd & I-5 SB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	D	45.1	0.83
21	Chemawa Rd & I-5 NB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	D	35.7	0.89
22	Portland Rd & Chemawa Rd/Hazelgreen Rd	ODOT (OHP)	V/C <= 0.95	Signal	D	52.9	0.84
23	River Rd & Chemawa Rd	City of Keizer	LOS D V/C <= 0.95	Signal	D	44.4	0.82

Existing

24	Verda Ln & Chemawa Rd	City of Keizer	V/C < 1.00	RAB	A	9.2	0.54
25	Salem Pkwy & Verda Ln/Hyacinth St	ODOT (OHP)	V/C <= 0.95	Signal	D	54.5	0.78

Future Baseline (no RTP)

#	Intersection	Jurisdiction	Mobility Standard	Control Type	LOS	Delay	V/C Ratio
1	River Rd & Brooklake Rd	Marion Co	LOS D V/C <= 0.85	AWSC	F	62.7	0.97
2	Brooklake Rd & I-5 SB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	13/1517	0.49/4
3	Brooklake Rd & I-5 NB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	15/1452	0.51/3.82
4	Portland Rd & Brooklake Rd	ODOT (OHP)	V/C <= 0.95	Signal	B	12.1	0.72
5	Wheatland Rd & Clear Lake Rd	City of Keizer	LOS EV/C <= 0.95	TWSC	A/B	8/11	0.13/0.15
6	River Rd & Clear Lake Rd/Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/F	8/151	0.33/1.14
7	35th Ave & Quinaby Rd	Marion Co	LOS EV/C <= 0.85	TWSC	A/B	8/13	0.16/0.24
8	Portland Rd & Quinaby Rd	ODOT (OHP)	V/C <= 0.95	TWSC	B/F	10/140	0.46/1.09
9	River Rd & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/E	8/41	0.36/0.69
10	35th Ave & Perkins St	Marion Co	LOS EV/C <= 0.85	TWSC	A/C	8/18	0.18/0.36
11	Portland Rd & Perkins St	ODOT (OHP)	V/C <= 0.95	TWSC	A/D	10/31	0.49/0.48
12	River Rd & Parkmeadow Dr	City of Keizer	LOS EV/C <= 0.95	TWSC	B/C	11/24	0.43/0.44
13	River Rd & Wheatland Rd/Springwood Dr	City of Keizer	LOS DV/C <= 0.95	Signal	C	31.7	0.93
14	Keizer Station Blvd & Ulali Dr	City of Keizer	LOS D	Signal	A	6.4	0.30
15	River Rd & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	D	46.8	0.83
16	Verda Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	TWSC	A/C	9/17	0.46/0.25
17	Kafir Dr/14th Ave & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	13.6	0.81
18	McLeod Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	C	23.2	0.60
19	Chemawa Rd & Lockhaven Dr & Keizer Station Blvd	City of Keizer	V/C < 1.00	Signal	E	55.5	0.74
20	Chemawa Rd & I-5 SB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	F	91.3	0.95
21	Chemawa Rd & I-5 NB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	F	94.9	1.08
22	Portland Rd & Chemawa Rd/Hazelgreen Rd	ODOT (OHP)	V/C <= 0.95	Signal	F	130.9	1.08
23	River Rd & Chemawa Rd	City of Keizer	LOS DV/C <= 0.95	Signal	D	53.5	0.88
24	Verda Ln & Chemawa Rd	City of Keizer	V/C < 1.00	RAB	a	9.9	0.54
25	Salem Pkwy & Verda Ln/Hyacinth St	ODOT (OHP)	V/C <= 0.95	Signal	F	162	1.21

Future Baseline

#	Intersection	Jurisdiction	Mobility Standard	Control Type	LOS	Delay	V/C Ratio
1	River Rd & Brooklake Rd	Marion Co	LOS D V/C <= 0.85	Signal	B	14.5	0.67
2	Brooklake Rd & I-5 SB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	13/1443	0.49/3.85
3	Brooklake Rd & I-5 NB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	14/1476	0.5/3.89
4	Portland Rd & Brooklake Rd	ODOT (OHP)	V/C <= 0.95	Signal	B	18.2	0.78
5	Wheatland Rd & Clear Lake Rd	City of Keizer	LOS E V/C <= 0.95	TWSC	A/B	8/11	0.13/0.15
6	River Rd & Clear Lake Rd/Quinaby Rd	Marion Co	LOS EV/C <= 0.85	TWSC	A/F	8/151	0.33/1.14
7	35th Ave & Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/B	8/13	0.16/0.23
8	Portland Rd & Quinaby Rd	ODOT (OHP)	V/C <= 0.95	TWSC	B/F	10/140	0.46/1.09
9	River Rd & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/E	8/41	0.36/0.69
10	35th Ave & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/C	8/18	0.18/0.36
11	Portland Rd & Perkins St	ODOT (OHP)	V/C <= 0.95	TWSC	A/D	10/32	0.49/0.49
12	River Rd & Parkmeadow Dr	City of Keizer	LOS E V/C <= 0.95	TWSC	B/C	11/25	0.43/0.46
13	River Rd & Wheatland Rd/Springwood Dr	City of Keizer	LOS D V/C <= 0.95	Signal	C	21	0.56
14	Keizer Station Blvd & Ulali Dr	City of Keizer	LOS D	Signal	A	6	0.30
15	River Rd & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	D	43	0.67
16	Verda Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	12	0.78
17	Kafir Dr/14th Ave & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	12	0.64
18	McLeod Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	C	23	0.60
19	Chemawa Rd & Lockhaven Dr & Keizer Station Blvd	City of Keizer	V/C < 1.00	Signal	D	54	0.74
20	Chemawa Rd & I-5 SB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	B	20	0.63
21	Chemawa Rd & I-5 NB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	F	89	1.07
22	Portland Rd & Chemawa Rd/Hazelgreen Rd	ODOT (OHP)	V/C <= 0.95	Signal	F	131	1.08
23	River Rd & Chemawa Rd	City of Keizer	LOS D V/C <= 0.95	Signal	D	54	0.88
24	Verda Ln & Chemawa Rd	City of Keizer	V/C < 1.00	RAB	A	10	0.53
25	Salem Pkwy & Verda Ln/Hyacinth St	ODOT (OHP)	V/C <= 0.95	Signal	F	162	1.21

Land Use Option 1

#	Intersection	Jurisdiction	Mobility Standard	Control Type	LOS	Delay	V/C Ratio
1	River Rd & Brooklake Rd	Marion Co	LOS D V/C <= 0.85	Signal	B	14.4	0.66
2	Brooklake Rd & I-5 SB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	14/1591	0.51/4.14
3	Brooklake Rd & I-5 NB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	15/1439	0.51/3.79
4	Portland Rd & Brooklake Rd	ODOT (OHP)	V/C <= 0.95	Signal	B	13.0	0.84
5	Wheatland Rd & Clear Lake Rd	City of Keizer	LOS E V/C <= 0.95	TWSC	A/B	8/12	0.13/0.15
6	River Rd & Clear Lake Rd/Quinaby Rd	Marion Co	LOS EV/C <= 0.85	TWSC	A/F	8/92	0.35/0.92
7	35th Ave & Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/B	8/13	0.16/0.25
8	Portland Rd & Quinaby Rd	ODOT (OHP)	V/C <= 0.95	TWSC	A/F	10/129	0.44/1.06
9	River Rd & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/E	8/39	0.35/0.67
10	35th Ave & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/C	8/18	0.18/0.39
11	Portland Rd & Perkins St	ODOT (OHP)	V/C <= 0.95	TWSC	A/E	10/43	0.48/0.68
12	River Rd & Parkmeadow Dr	City of Keizer	LOS E V/C <= 0.95	TWSC	B/C	11/23	0.42/0.43
13	River Rd & Wheatland Rd/Springwood Dr	City of Keizer	LOS D V/C <= 0.95	Signal	C	21	0.58
14	Keizer Station Blvd & Ulali Dr	City of Keizer	LOS D	Signal	A	6	0.30
15	River Rd & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	D	42	0.66
16	Verda Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	11	0.77
17	Kafir Dr/14th Ave & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	12	0.65
18	McLeod Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	C	23	0.60
19	Chemawa Rd & Lockhaven Dr & Keizer Station Blvd	City of Keizer	V/C < 1.00	Signal	D	54	0.74
20	Chemawa Rd & I-5 SB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	C	21	0.65
21	Chemawa Rd & I-5 NB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	F	96	1.08
22	Portland Rd & Chemawa Rd/Hazelgreen Rd	ODOT (OHP)	V/C <= 0.95	Signal	F	130	1.08
23	River Rd & Chemawa Rd	City of Keizer	LOS D V/C <= 0.95	Signal	D	51	0.87
24	Verda Ln & Chemawa Rd	City of Keizer	V/C < 1.00	RAB	B	10	0.60
25	Salem Pkwy & Verda Ln/Hyacinth St	ODOT (OHP)	V/C <= 0.95	Signal	F	161	1.22

Land Use Option 2

#	Intersection	Jurisdiction	Mobility Standard	Control Type	LOS	Delay	V/C Ratio
1	River Rd & Brooklake Rd	Marion Co	LOS D V/C <= 0.85	Signal	B	16.3	0.75
2	Brooklake Rd & I-5 SB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	14/863	0.51/2.53
3	Brooklake Rd & I-5 NB Ramps	ODOT (OHP)	V/C <= 0.85	TWSC	B/F	13/1272	0.44/3.51
4	Portland Rd & Brooklake Rd	ODOT (OHP)	V/C <= 0.95	Signal	B	15.6	0.94
5	Wheatland Rd & Clear Lake Rd	City of Keizer	LOS E V/C <= 0.95	TWSC	A/B	8/12	0.14/0.19
6	River Rd & Clear Lake Rd/Quinaby Rd	Marion Co	LOS EV/C <= 0.85	TWSC	A/F	8/100	0.35/0.97
7	35th Ave & Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/C	8/16	0.25/0.3
8	Portland Rd & Quinaby Rd	ODOT (OHP)	V/C <= 0.95	TWSC	B/F	11/234	0.48/1.33
9	River Rd & Perkins St	Marion Co	LOS EV/C <= 0.85	TWSC	A/F	9/76	0.36/0.92
10	35th Ave & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/D	8/31	0.23/0.67
11	Portland Rd & Perkins St	ODOT (OHP)	V/C <= 0.95	TWSC	B/F	10/104	0.56/1.01
12	River Rd & Parkmeadow Dr	City of Keizer	LOS E V/C <= 0.95	TWSC	B/D	11/27	0.43/0.5
13	River Rd & Wheatland Rd/Springwood Dr	City of Keizer	LOS D V/C <= 0.95	Signal	C	21	0.61
14	Keizer Station Blvd & Ulali Dr	City of Keizer	LOS D	Signal	A	6	0.30
15	River Rd & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	D	42	0.66
16	Verda Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	12	0.79
17	Kafir Dr/14th Ave & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	B	12	0.65
18	McLeod Ln & Lockhaven Dr	City of Keizer	V/C < 1.00	Signal	C	20	0.59
19	Chemawa Rd & Lockhaven Dr & Keizer Station Blvd	City of Keizer	V/C < 1.00	Signal	E	55	0.75
20	Chemawa Rd & I-5 SB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	C	22	0.66
21	Chemawa Rd & I-5 NB Ramp	ODOT (OHP)	V/C <= 0.85	Signal	F	110	1.12
22	Portland Rd & Chemawa Rd/Hazegreen Rd	ODOT (OHP)	V/C <= 0.95	Signal	F	137	1.08
23	River Rd & Chemawa Rd	City of Keizer	LOS D V/C <= 0.95	Signal	D	54	0.90
24	Verda Ln & Chemawa Rd	City of Keizer	V/C < 1.00	RAB	B	11	0.61
25	Salem Pkwy & Verda Ln/Hyacinth St	ODOT (OHP)	V/C <= 0.95	Signal	F	167	1.23

Mitigations

#	Intersection	Jurisdiction	Mobility Standard	Control Type	LOS	Delay	V/C Ratio	
6	River Rd & Clear Lake Rd/Quinaby Rd	Marion Co	LOS E V/C <= 0.85	TWSC	A/E	8.4/39.7	0.06/0.48	Widened River Road to 3 lanes (added NB and SB Left Turn Lanes), Widened Quinaby Rd to 3 lanes (added WB and EB Left Turn Lanes)
8	Portland Rd & Quinaby Rd	ODOT (OHP)	V/C <= 0.95	TWSC	B/E	10.5/45.0	0.19/0.75	Restripe Portland Rd to allow for two-stage left turn lane
9	River Rd & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/D	8.5/26.2	0.04/0.56	Widened Perkins to 3 lanes (added WB Left Turn Lane), Widened River Rd to 3 lanes (added SB Left Turn Lane)
10	35th Ave & Perkins St	Marion Co	LOS E V/C <= 0.85	TWSC	A/C	7.9/24.2	0.05/0.47	Widened Perkins to 3 lanes (added WB and EB Left Turn Lanes) and realigned to T-intersection
11	Portland Rd & Perkins St	ODOT (OHP)	V/C <= 0.95	TWSC	C	26.0	0.85	Signalized intersection

SECTION 4: SYNCHRO OPERATIONS REPORTS

HCM 6th AWSC

1: River Rd & Brooklake Rd

Existing PM Peak Hour

09/08/2020

Intersection												
Intersection Delay, s/veh	21.9											
Intersection LOS	C											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	87	24	233	109	167	17	99	103	238	149	18
Future Vol, veh/h	5	87	24	233	109	167	17	99	103	238	149	18
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
Heavy Vehicles, %	20	2	0	2	4	4	0	3	3	3	2	0
Mvmt Flow	5	91	25	243	114	174	18	103	107	248	155	19
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	2			2			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			2			2		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			2			2		
HCM Control Delay	12.7			22.3			14.5			28.1		
HCM LOS	B			C			B			D		
Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1						
Vol Left, %	8%	5%	0%	68%	0%	59%						
Vol Thru, %	45%	95%	0%	32%	0%	37%						
Vol Right, %	47%	0%	100%	0%	100%	4%						
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop						
Traffic Vol by Lane	219	92	24	342	167	405						
LT Vol	17	5	0	233	0	238						
Through Vol	99	87	0	109	0	149						
RT Vol	103	0	24	0	167	18						
Lane Flow Rate	228	96	25	356	174	422						
Geometry Grp	2	7	7	7	7	2						
Degree of Util (X)	0.421	0.218	0.049	0.727	0.305	0.768						
Departure Headway (Hd)	6.648	8.197	7.128	7.346	6.313	6.55						
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes						
Cap	541	437	501	492	569	553						
Service Time	4.709	5.969	4.899	5.1	4.066	4.598						
HCM Lane V/C Ratio	0.421	0.22	0.05	0.724	0.306	0.763						
HCM Control Delay	14.5	13.3	10.3	27.4	11.8	28.1						
HCM Lane LOS	B	B	B	D	B	D						
HCM 95th-tile Q	2.1	0.8	0.2	5.9	1.3	6.9						

HCM 6th TWSC 2: SB Ramps & Brooklake Rd

Existing PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	7.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗		↖	↑						↖	↗
Traffic Vol, veh/h	0	288	453	321	360	0	0	0	0	43	0	293
Future Vol, veh/h	0	288	453	321	360	0	0	0	0	43	0	293
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	180	-	-	-	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	12	9	3	12	0	0	0	0	0	0	10
Mvmt Flow	0	303	477	338	379	0	0	0	0	45	0	308
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	780	0	0				1597	1835	379
Stage 1	-	-	-	-	-	-				1055	1055	-
Stage 2	-	-	-	-	-	-				542	780	-
Critical Hdwy	-	-	-	4.13	-	-				6.4	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.4	5.5	-
Follow-up Hdwy	-	-	-	2.227	-	-				3.5	4	3.39
Pot Cap-1 Maneuver	0	-	-	833	-	0				118	77	651
Stage 1	0	-	-	-	-	0				338	305	-
Stage 2	0	-	-	-	-	0				587	409	-
Platoon blocked, %	-	-	-	-	-	-				-	-	-
Mov Cap-1 Maneuver	-	-	-	833	-	-				70	0	651
Mov Cap-2 Maneuver	-	-	-	-	-	-				70	0	-
Stage 1	-	-	-	-	-	-				338	0	-
Stage 2	-	-	-	-	-	-				349	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			5.8			29.1					
HCM LOS							D					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2						
Capacity (veh/h)	-	-	833	-	70	651						
HCM Lane V/C Ratio	-	-	0.406	-	0.647	0.474						
HCM Control Delay (s)	-	-	12.2	-	122.8	15.4						
HCM Lane LOS	-	-	B	-	F	C						
HCM 95th %tile Q(veh)	-	-	2	-	2.9	2.5						

HCM 6th TWSC

3: Brooklake Rd & NB Ramps

Existing PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	27.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	140	188	0	0	435	51	214	0	276	0	0	0
Future Vol, veh/h	140	188	0	0	435	51	214	0	276	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	155	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	18	4	0	0	4	0	14	0	4	0	0	0
Mvmt Flow	154	207	0	0	478	56	235	0	303	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	534	0	-	-	-	0	1021	1049	207
Stage 1	-	-	-	-	-	-	515	515	-
Stage 2	-	-	-	-	-	-	506	534	-
Critical Hdwy	4.28	-	-	-	-	-	6.54	6.5	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	5.54	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.54	5.5	-
Follow-up Hdwy	2.362	-	-	-	-	-	3.626	4	3.336
Pot Cap-1 Maneuver	958	-	0	0	-	-	249	229	828
Stage 1	-	-	0	0	-	-	576	538	-
Stage 2	-	-	0	0	-	-	582	528	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	958	-	-	-	-	-	~ 209	0	828
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 209	0	-
Stage 1	-	-	-	-	-	-	483	0	-
Stage 2	-	-	-	-	-	-	582	0	-

Approach	EB	WB	NB
HCM Control Delay, s	4	0	71.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	209	828	958	-	-	-
HCM Lane V/C Ratio	1.125	0.366	0.161	-	-	-
HCM Control Delay (s)	147.9	11.8	9.5	-	-	-
HCM Lane LOS	F	B	A	-	-	-
HCM 95th %tile Q(veh)	11.2	1.7	0.6	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary

4: Portland Rd & Brooklake Rd

Existing PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	60	150	28	63	17	84	403	17	16	547	253
Future Volume (veh/h)	245	60	150	28	63	17	84	403	17	16	547	253
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1856	1870	1870	1870	1811	1856	1856	1900	1870	1826
Adj Flow Rate, veh/h	258	63	0	29	66	18	88	424	18	17	576	266
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
Percent Heavy Veh, %	7	7	3	2	2	2	6	3	3	0	2	5
Cap, veh/h	444	79		168	343	81	323	845	36	432	827	684
Arrive On Green	0.28	0.29	0.00	0.28	0.29	0.28	0.05	0.48	0.45	0.01	0.44	0.44
Sat Flow, veh/h	1127	275	1572	294	1190	281	1725	1767	75	1810	1870	1547
Grp Volume(v), veh/h	321	0	0	113	0	0	88	0	442	17	576	266
Grp Sat Flow(s),veh/h/ln	1402	0	1572	1766	0	0	1725	0	1842	1810	1870	1547
Q Serve(g_s), s	8.8	0.0	0.0	0.0	0.0	0.0	1.6	0.0	9.0	0.3	13.5	6.3
Cycle Q Clear(g_c), s	11.4	0.0	0.0	2.6	0.0	0.0	1.6	0.0	9.0	0.3	13.5	6.3
Prop In Lane	0.80		1.00	0.26		0.16	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	511	0		576	0	0	323	0	881	432	827	684
V/C Ratio(X)	0.63	0.00		0.20	0.00	0.00	0.27	0.00	0.50	0.04	0.70	0.39
Avail Cap(c_a), veh/h	1035	0		1224	0	0	493	0	1457	676	1479	1224
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	0.0	0.0	14.8	0.0	0.0	10.1	0.0	9.8	9.4	12.2	10.2
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.6	0.0	1.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	0.0	1.0	0.0	0.0	0.5	0.0	2.8	0.1	4.6	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.7	0.0	0.0	14.9	0.0	0.0	10.5	0.0	10.4	9.4	13.7	10.7
LnGrp LOS	B	A		B	A	A	B	A	B	A	B	B
Approach Vol, veh/h		321	A		113			530			859	
Approach Delay, s/veh		18.7			14.9			10.4			12.7	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	30.0		19.7	6.7	28.0		19.7				
Change Period (Y+Rc), s	4.0	* 5.4		4.5	4.0	* 5.4		4.5				
Max Green Setting (Gmax), s	8.0	* 42		36.5	8.0	* 42		36.5				
Max Q Clear Time (g_c+I1), s	2.3	11.0		13.4	3.6	15.5		4.6				
Green Ext Time (p_c), s	0.0	4.0		1.6	0.0	7.1		0.5				

Intersection Summary

HCM 6th Ctrl Delay	13.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
5: Wheatland Rd & Clear Lake Rd

Existing PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	1	1	48	1	15	1	65	45	13	146	2
Future Vol, veh/h	2	1	1	48	1	15	1	65	45	13	146	2
Conflicting Peds, #/hr	0	0	2	0	0	0	0	0	2	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	50	100	0	0	0	0	0	2	2	8	0	0
Mvmt Flow	2	1	1	54	1	17	1	73	51	15	164	2
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	307	325	169	301	301	101	168	0	0	126	0	0
Stage 1	197	197	-	103	103	-	-	-	-	-	-	-
Stage 2	110	128	-	198	198	-	-	-	-	-	-	-
Critical Hdwy	7.6	7.5	6.2	7.1	6.5	6.2	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.6	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.95	4.9	3.3	3.5	4	3.3	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	561	462	880	655	615	960	1422	-	-	1424	-	-
Stage 1	706	587	-	908	814	-	-	-	-	-	-	-
Stage 2	791	635	-	808	741	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	544	454	877	644	605	958	1419	-	-	1421	-	-
Mov Cap-2 Maneuver	544	454	-	644	605	-	-	-	-	-	-	-
Stage 1	704	579	-	905	812	-	-	-	-	-	-	-
Stage 2	775	633	-	794	731	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	11.4		10.8			0.1			0.6			
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1419	-	-	570	697	1421	-	-				
HCM Lane V/C Ratio	0.001	-	-	0.008	0.103	0.01	-	-				
HCM Control Delay (s)	7.5	0	-	11.4	10.8	7.6	0	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0	-	-				

HCM 6th TWSC
6: River Rd & Clear Lake Rd/Quinaby Rd

Existing PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	
Traffic Vol, veh/h	22	36	16	37	78	60	29	141	22	39	339	42
Future Vol, veh/h	22	36	16	37	78	60	29	141	22	39	339	42
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	30	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	6	6	0	0	7	0	2	0	8	1	0
Mvmt Flow	23	37	16	38	80	62	30	145	23	40	349	43

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	708	679	372	695	689	157	392	0	0	168	0	0
Stage 1	451	451	-	217	217	-	-	-	-	-	-	-
Stage 2	257	228	-	478	472	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.26	7.1	6.5	6.27	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.354	3.5	4	3.363	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	352	369	665	359	371	876	1178	-	-	1374	-	-
Stage 1	592	564	-	790	727	-	-	-	-	-	-	-
Stage 2	752	708	-	572	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	256	345	664	306	347	876	1178	-	-	1374	-	-
Mov Cap-2 Maneuver	256	345	-	306	347	-	-	-	-	-	-	-
Stage 1	575	543	-	768	707	-	-	-	-	-	-	-
Stage 2	602	688	-	500	541	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	17.7		17.5		1.2		0.7	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1178	-	-	305	664	333	876	1374	-	-
HCM Lane V/C Ratio	0.025	-	-	0.196	0.025	0.356	0.071	0.029	-	-
HCM Control Delay (s)	8.1	0	-	19.7	10.6	21.7	9.4	7.7	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.1	1.6	0.2	0.1	-	-

HCM 6th TWSC
7: 35th Ave & Quinaby Rd

Existing PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	3.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	55	40	11	91	71	16
Future Vol, veh/h	55	40	11	91	71	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	0	0	3	0	0
Mvmt Flow	67	49	13	111	87	20
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	116	0	229	92
Stage 1	-	-	-	-	92	-
Stage 2	-	-	-	-	137	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1485	-	764	971
Stage 1	-	-	-	-	937	-
Stage 2	-	-	-	-	895	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1485	-	757	971
Mov Cap-2 Maneuver	-	-	-	-	757	-
Stage 1	-	-	-	-	937	-
Stage 2	-	-	-	-	887	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.8		10.3	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	789	-	-	1485	-	
HCM Lane V/C Ratio	0.134	-	-	0.009	-	
HCM Control Delay (s)	10.3	-	-	7.4	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.5	-	-	0	-	

HCM 6th TWSC
8: Portland Rd & Quinaby Rd

Existing PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	47	50	370	581	43
Future Vol, veh/h	30	47	50	370	581	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	240	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	4	5	1	2
Mvmt Flow	32	49	53	389	612	45
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1130	635	657	0	-	0
Stage 1	635	-	-	-	-	-
Stage 2	495	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	227	475	921	-	-	-
Stage 1	532	-	-	-	-	-
Stage 2	617	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	214	475	921	-	-	-
Mov Cap-2 Maneuver	214	-	-	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	617	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	19.9	1.1		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	921	-	322	-	-	
HCM Lane V/C Ratio	0.057	-	0.252	-	-	
HCM Control Delay (s)	9.1	-	19.9	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0.2	-	1	-	-	

HCM 6th TWSC
9: River Rd & Perkins St

Existing PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	3.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	120	22	193	62	13	380
Future Vol, veh/h	120	22	193	62	13	380
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	1	0	2	2	0	1
Mvmt Flow	138	25	222	71	15	437
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	725	258	0	0	293	0
Stage 1	258	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	393	786	-	-	1280	-
Stage 1	787	-	-	-	-	-
Stage 2	633	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	387	786	-	-	1280	-
Mov Cap-2 Maneuver	387	-	-	-	-	-
Stage 1	787	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	18.9	0	0.3			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	420	1280	-	
HCM Lane V/C Ratio	-	-	0.389	0.012	-	
HCM Control Delay (s)	-	-	18.9	7.8	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	1.8	0	-	

HCM 6th TWSC
10: 35th Ave & Perkins St

Existing PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	22	0	25	74	6	0	77	18	6	39	1
Future Vol, veh/h	5	22	0	25	74	6	0	77	18	6	39	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	5	0
Mvmt Flow	6	25	0	28	84	7	0	88	20	7	44	1
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	203	167	-	169	157	98	-	0	0	108	0	0
Stage 1	59	59	-	98	98	-	-	-	-	-	-	-
Stage 2	144	108	-	71	59	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	-	7.1	6.51	6.2	-	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	-	3.5	4.009	3.3	-	-	-	2.2	-	-
Pot Cap-1 Maneuver	759	720	0	799	737	963	0	-	-	1495	-	-
Stage 1	958	840	0	913	816	-	0	-	-	-	-	-
Stage 2	864	800	0	944	848	-	0	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	685	716	-	775	733	963	-	-	-	1495	-	-
Mov Cap-2 Maneuver	685	716	-	775	733	-	-	-	-	-	-	-
Stage 1	958	836	-	913	816	-	-	-	-	-	-	-
Stage 2	769	800	-	911	844	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	10.3		10.7		0		1					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	-	-	710	753	1495	-	-					
HCM Lane V/C Ratio	-	-	0.043	0.158	0.005	-	-					
HCM Control Delay (s)	-	-	10.3	10.7	7.4	0	-					
HCM Lane LOS	-	-	B	B	A	A	-					
HCM 95th %tile Q(veh)	-	-	0.1	0.6	0	-	-					

HCM 6th TWSC
11: Portland Rd & Perkins St

Existing PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	50	67	432	581	24
Future Vol, veh/h	12	50	67	432	581	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	6	0	4	2	0
Mvmt Flow	13	54	72	465	625	26
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1247	638	651	0	-	0
Stage 1	638	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.2	-	-	-
Pot Cap-1 Maneuver	193	469	945	-	-	-
Stage 1	530	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	173	469	945	-	-	-
Mov Cap-2 Maneuver	173	-	-	-	-	-
Stage 1	475	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	17.6	1.2		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	945	-	352	-	-	
HCM Lane V/C Ratio	0.076	-	0.189	-	-	
HCM Control Delay (s)	9.1	0	17.6	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-	

HCM 6th TWSC
12: River Rd & Parkmeadow Dr

Existing PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	96	224	223	403	89
Future Vol, veh/h	32	96	224	223	403	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	1	1	1	1	0
Mvmt Flow	36	107	249	248	448	99
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1244	498	547	0	-	0
Stage 1	498	-	-	-	-	-
Stage 2	746	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	191	574	1027	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	145	574	1027	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	462	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	16.5	4.8		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1027	-	453	-	-	
HCM Lane V/C Ratio	0.242	-	0.314	-	-	
HCM Control Delay (s)	9.6	-	16.5	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0.9	-	1.3	-	-	

HCM 6th Signalized Intersection Summary

13: River Rd & Wheatland Rd/Springwood Dr

Existing PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	2	336	13	1	4	528	735	13	10	577	13
Future Volume (veh/h)	7	2	336	13	1	4	528	735	13	10	577	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1870	1900	1900	1900	1900	1885	1885	1900	1885	1885
Adj Flow Rate, veh/h	8	2	365	14	1	4	574	799	14	11	627	14
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
Percent Heavy Veh, %	0	0	2	0	0	0	0	1	1	0	1	1
Cap, veh/h	258	65	472	34	2	10	656	2201	39	353	1480	33
Arrive On Green	0.15	0.18	0.18	0.02	0.03	0.02	0.21	0.61	0.58	0.01	0.41	0.38
Sat Flow, veh/h	1462	365	2674	1291	92	369	1810	3601	63	1810	3581	80
Grp Volume(v), veh/h	10	0	365	19	0	0	574	397	416	11	313	328
Grp Sat Flow(s), veh/h/ln	1827	0	1337	1752	0	0	1810	1791	1873	1810	1791	1870
Q Serve(g_s), s	0.4	0.0	11.7	1.0	0.0	0.0	16.4	10.0	10.0	0.3	11.2	11.2
Cycle Q Clear(g_c), s	0.4	0.0	11.7	1.0	0.0	0.0	16.4	10.0	10.0	0.3	11.2	11.2
Prop In Lane	0.80		1.00	0.74		0.21	1.00		0.03	1.00		0.04
Lane Grp Cap(c), veh/h	323	0	472	47	0	0	656	1094	1145	353	740	773
V/C Ratio(X)	0.03	0.00	0.77	0.41	0.00	0.00	0.87	0.36	0.36	0.03	0.42	0.42
Avail Cap(c_a), veh/h	345	0	505	117	0	0	807	1094	1145	449	740	773
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.3	0.0	35.3	43.3	0.0	0.0	13.3	8.7	8.8	17.0	18.8	18.8
Incr Delay (d2), s/veh	0.0	0.0	6.0	2.1	0.0	0.0	7.9	0.9	0.9	0.0	1.8	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	4.2	0.4	0.0	0.0	6.8	3.5	3.7	0.1	4.8	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.4	0.0	41.3	45.5	0.0	0.0	21.2	9.7	9.7	17.0	20.5	20.5
LnGrp LOS	C	A	D	D	A	A	C	A	A	B	C	C
Approach Vol, veh/h		375			19			1387			652	
Approach Delay, s/veh		41.1			45.5			14.4			20.5	
Approach LOS		D			D			B			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	59.0		19.9	22.5	41.2		6.4				
Change Period (Y+Rc), s	4.0	7.0		6.0	4.0	7.0		4.5				
Max Green Setting (Gmax), s	5.5	42.5		15.0	26.0	22.0		5.5				
Max Q Clear Time (g_c+I1), s	2.3	12.0		13.7	18.4	13.2		3.0				
Green Ext Time (p_c), s	0.0	0.9		0.1	0.1	0.7		0.0				

Intersection Summary

HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Notes

User approved changes to right turn type.

HCM 6th Signalized Intersection Summary

14: Keizer Station Blvd & Ulali Dr

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	90	53	122	104	21	33	105	90	10	145	76
Future Volume (veh/h)	111	90	53	122	104	21	33	105	90	10	145	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1870	1870	1900	1885	1900
Adj Flow Rate, veh/h	126	102	60	139	118	24	38	119	102	11	165	86
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	2	2	0	1	0
Cap, veh/h	591	298	175	571	410	83	679	340	292	651	690	589
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1266	1112	654	1243	1532	312	1147	930	797	1178	1885	1610
Grp Volume(v), veh/h	126	0	162	139	0	142	38	0	221	11	165	86
Grp Sat Flow(s), veh/h/ln	1266	0	1765	1243	0	1844	1147	0	1727	1178	1885	1610
Q Serve(g_s), s	1.9	0.0	1.6	2.2	0.0	1.3	0.5	0.0	2.0	0.1	1.3	0.8
Cycle Q Clear(g_c), s	3.3	0.0	1.6	3.8	0.0	1.3	1.8	0.0	2.0	2.2	1.3	0.8
Prop In Lane	1.00		0.37	1.00		0.17	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	591	0	473	571	0	494	679	0	632	651	690	589
V/C Ratio(X)	0.21	0.00	0.34	0.24	0.00	0.29	0.06	0.00	0.35	0.02	0.24	0.15
Avail Cap(c_a), veh/h	1469	0	1697	1432	0	1772	1886	0	2450	1891	2674	2284
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.6	0.0	6.4	8.0	0.0	6.3	5.5	0.0	5.0	5.8	4.8	4.6
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.3	0.4	0.0	0.3	0.0	0.0	0.2	0.0	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.7	0.0	6.6	8.1	0.0	6.5	5.5	0.0	5.2	5.8	4.9	4.7
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	288			281			259			262		
Approach Delay, s/veh	7.1			7.3			5.2			4.9		
Approach LOS	A			A			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	12.0			9.9			12.0			9.9		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	31.0			21.0			31.0			21.0		
Max Q Clear Time (g_c+I1), s	4.2			5.8			4.0			5.3		
Green Ext Time (p_c), s	0.2			0.2			0.3			0.2		

Intersection Summary

HCM 6th Ctrl Delay	6.1
HCM 6th LOS	A

HCM Signalized Intersection Capacity Analysis

Existing PM Peak Hour

15: River Rd & Lockhaven Dr

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	222	100	243	243	204	119	831	257	196	634	151
Future Volume (vph)	147	222	100	243	243	204	119	831	257	196	634	151
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	4.0	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	1.00	0.95	1.00	1.00	0.95	0.95
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.97	1.00	0.99	0.99
Flpb, ped/bikes	1.00	1.00	1.00	0.99	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	1.00	0.85	1.00	1.00	0.85	1.00	0.97	0.97
Flt Protected	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	1863	1556	1648	1753	1577	1805	3574	1524	1787	3435	3435
Flt Permitted	0.95	1.00	1.00	0.62	0.93	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	1863	1556	1068	1638	1577	1805	3574	1524	1787	3435	3435
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)	152	229	103	251	251	210	123	857	265	202	654	156
RTOR Reduction (vph)	0	0	88	0	0	135	0	0	168	0	15	0
Lane Group Flow (vph)	152	229	15	213	289	75	123	857	97	202	795	0
Confl. Peds. (#/hr)	1		7	7		1	5		3	3		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	1%	3%	2%	1%	0%	1%	3%	1%	1%	3%
Turn Type	Split	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	7	7			8		5	2		1	6	
Permitted Phases			7	8		8			2			
Actuated Green, G (s)	18.5	18.5	18.5	28.0	28.0	28.0	11.5	45.5	45.5	17.5	51.5	
Effective Green, g (s)	19.5	19.5	19.5	29.0	29.0	29.0	12.0	47.5	47.5	18.0	53.5	
Actuated g/C Ratio	0.15	0.15	0.15	0.22	0.22	0.22	0.09	0.37	0.37	0.14	0.41	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.5	6.0	6.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	268	279	233	238	365	351	166	1305	556	247	1413	
v/s Ratio Prot	0.09	c0.12					0.07	c0.24		c0.11	0.23	
v/s Ratio Perm			0.01	c0.20	0.18	0.05			0.06			
v/c Ratio	0.57	0.82	0.07	0.89	0.79	0.21	0.74	0.66	0.17	0.82	0.56	
Uniform Delay, d1	51.3	53.6	47.4	49.0	47.7	41.2	57.5	34.4	28.0	54.4	29.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.82	0.51	1.00	1.00	
Incremental Delay, d2	1.6	16.6	0.0	31.2	10.5	0.1	14.3	2.6	0.7	17.7	1.6	
Delay (s)	53.0	70.1	47.5	80.2	58.1	41.3	69.1	30.8	14.9	72.1	30.9	
Level of Service	D	E	D	F	E	D	E	C	B	E	C	
Approach Delay (s)		59.9			59.8			31.2			39.1	
Approach LOS		E			E			C			D	
Intersection Summary												
HCM 2000 Control Delay			43.4									
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			130.0									
Intersection Capacity Utilization			73.2%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC
16: Verda Ln & Lockhaven Dr

Existing PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	1.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	649	81	20	768	61	22
Future Vol, veh/h	649	81	20	768	61	22
Conflicting Peds, #/hr	0	4	4	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	2	5	2	0	5
Mvmt Flow	683	85	21	808	64	23
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	772	0	1580	732
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	850	-
Critical Hdwy	-	-	4.15	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.245	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	830	-	121	416
Stage 1	-	-	-	-	481	-
Stage 2	-	-	-	-	422	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	827	-	117	414
Mov Cap-2 Maneuver	-	-	-	-	316	-
Stage 1	-	-	-	-	479	-
Stage 2	-	-	-	-	411	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	0.2		19.4		
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	337	-	-	827	-	
HCM Lane V/C Ratio	0.259	-	-	0.025	-	
HCM Control Delay (s)	19.4	-	-	9.5	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	1	-	-	0.1	-	

HCM 6th Signalized Intersection Summary

17: Kafir Dr/14th Ave & Lockhaven Dr

Existing PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	610	4	7	767	203	5	24	8	115	20	36
Future Volume (veh/h)	27	610	4	7	767	203	5	24	8	115	20	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1870	1870	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	28	629	4	7	791	209	5	25	8	119	21	37
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
Percent Heavy Veh, %	0	4	4	0	2	2	0	0	0	0	0	0
Cap, veh/h	181	1160	7	431	885	234	41	166	44	159	23	364
Arrive On Green	0.02	0.63	0.62	0.01	0.62	0.61	0.23	0.25	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1810	1827	12	1810	1418	375	0	663	177	403	100	1582
Grp Volume(v), veh/h	28	0	633	7	0	1000	38	0	0	140	0	37
Grp Sat Flow(s),veh/h/ln	1810	0	1839	1810	0	1793	840	0	0	503	0	1582
Q Serve(g_s), s	0.6	0.0	19.2	0.1	0.0	47.5	0.0	0.0	0.0	0.0	0.0	1.8
Cycle Q Clear(g_c), s	0.6	0.0	19.2	0.1	0.0	47.5	23.0	0.0	0.0	23.0	0.0	1.8
Prop In Lane	1.00		0.01	1.00		0.21	0.13		0.21	0.85		1.00
Lane Grp Cap(c), veh/h	181	0	1167	431	0	1118	234	0	0	182	0	364
V/C Ratio(X)	0.15	0.00	0.54	0.02	0.00	0.89	0.16	0.00	0.00	0.77	0.00	0.10
Avail Cap(c_a), veh/h	296	0	1167	566	0	1118	234	0	0	182	0	364
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.8	0.0	10.2	8.9	0.0	16.1	29.8	0.0	0.0	40.1	0.0	30.4
Incr Delay (d2), s/veh	0.1	0.0	1.8	0.0	0.0	11.0	0.1	0.0	0.0	16.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	7.4	0.1	0.0	20.1	0.7	0.0	0.0	4.3	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	0.0	12.0	8.9	0.0	27.1	29.9	0.0	0.0	56.3	0.0	30.4
LnGrp LOS	B	A	B	A	A	C	C	A	A	E	A	C
Approach Vol, veh/h	661			1007			38			177		
Approach Delay, s/veh	12.3			27.0			29.9			50.9		
Approach LOS	B			C			C			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.5	67.5		28.0	5.6	66.4		28.0				
Change Period (Y+Rc), s	4.0	5.0		* 5	4.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	56.0		* 23	8.0	56.0		22.0				
Max Q Clear Time (g_c+I1), s	2.1	21.2		25.0	2.6	49.5		25.0				
Green Ext Time (p_c), s	0.0	0.9		0.0	0.0	1.3		0.0				

Intersection Summary

HCM 6th Ctrl Delay	24.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

18: McLeod Ln & Lockhaven Dr

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	662	14	30	930	297	10	50	3	131	28	25
Future Volume (veh/h)	45	662	14	30	930	297	10	50	3	131	28	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1885	1885	1900	1870	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	720	15	33	1011	323	11	54	3	142	30	27
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
Percent Heavy Veh, %	0	4	4	0	1	1	0	2	0	0	0	0
Cap, veh/h	63	2599	54	42	1943	615	14	94	80	111	96	86
Arrive On Green	0.04	0.74	0.73	0.05	1.00	1.00	0.01	0.05	0.05	0.06	0.10	0.10
Sat Flow, veh/h	1810	3503	73	1810	2660	843	1810	1870	1601	1810	920	828
Grp Volume(v), veh/h	49	359	376	33	678	656	11	54	3	142	0	57
Grp Sat Flow(s),veh/h/ln	1810	1749	1828	1810	1791	1712	1810	1870	1601	1810	0	1748
Q Serve(g_s), s	3.5	8.7	8.7	2.3	0.0	0.0	0.8	3.7	0.2	8.0	0.0	3.9
Cycle Q Clear(g_c), s	3.5	8.7	8.7	2.3	0.0	0.0	0.8	3.7	0.2	8.0	0.0	3.9
Prop In Lane	1.00		0.04	1.00		0.49	1.00		1.00	1.00		0.47
Lane Grp Cap(c), veh/h	63	1297	1356	42	1308	1250	14	94	80	111	0	182
V/C Ratio(X)	0.77	0.28	0.28	0.78	0.52	0.52	0.80	0.58	0.04	1.28	0.00	0.31
Avail Cap(c_a), veh/h	167	1297	1356	111	1308	1250	111	317	271	111	0	296
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.83	0.83	0.83	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.2	5.4	5.5	61.6	0.0	0.0	64.4	60.4	58.8	61.0	0.0	53.9
Incr Delay (d2), s/veh	7.2	0.5	0.5	9.4	1.2	1.3	31.7	2.1	0.1	176.4	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	3.0	3.1	1.2	0.4	0.5	0.5	1.8	0.1	9.2	0.0	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.4	6.0	6.0	71.0	1.2	1.3	96.1	62.5	58.8	237.4	0.0	54.3
LnGrp LOS	E	A	A	E	A	A	F	E	E	F	A	D
Approach Vol, veh/h	784		1367			68			199			
Approach Delay, s/veh	9.9		3.0			67.7			185.0			
Approach LOS	A		A			E			F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	100.5	5.0	17.5	8.6	98.9	12.0	10.5				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	8.0	75.0	8.0	22.0	12.0	71.0	8.0	22.0				
Max Q Clear Time (g_c+14), s	10.7	10.7	2.8	5.9	5.5	2.0	10.0	5.7				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.1	0.0	2.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	22.0
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

19: Chemawa Rd & Lockhaven Dr & Keizer Station Blvd

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	676	3	466	1154	35	6	104	339	152	73	89
Future Volume (veh/h)	121	676	3	466	1154	35	6	104	339	152	73	89
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1900	1885	1885	1900	1811	1811	1900	1826	1826
Adj Flow Rate, veh/h	126	704	3	485	1202	36	6	108	353	158	76	93
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
Percent Heavy Veh, %	3	3	3	0	1	1	0	6	6	0	5	5
Cap, veh/h	174	1824	8	432	2056	62	8	265	386	183	443	370
Arrive On Green	0.10	1.00	1.00	0.12	0.58	0.57	0.00	0.15	0.15	0.10	0.24	0.24
Sat Flow, veh/h	3428	3600	15	3510	3551	106	1810	1811	2640	1810	1826	1526
Grp Volume(v), veh/h	126	345	362	485	606	632	6	108	353	158	76	93
Grp Sat Flow(s),veh/h/ln	1714	1763	1853	1755	1791	1866	1810	1811	1320	1810	1826	1526
Q Serve(g_s), s	4.6	0.0	0.0	16.0	28.0	28.1	0.4	7.0	17.1	11.2	4.3	6.4
Cycle Q Clear(g_c), s	4.6	0.0	0.0	16.0	28.0	28.1	0.4	7.0	17.1	11.2	4.3	6.4
Prop In Lane	1.00		0.01	1.00		0.06	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	893	939	432	1037	1080	8	265	386	183	443	370
V/C Ratio(X)	0.72	0.39	0.39	1.12	0.58	0.58	0.74	0.41	0.91	0.86	0.17	0.25
Avail Cap(c_a), veh/h	527	893	939	432	1037	1080	139	265	386	223	443	370
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.5	0.0	0.0	57.0	17.4	17.4	64.6	50.4	54.7	57.5	38.9	39.7
Incr Delay (d2), s/veh	2.0	1.2	1.1	81.1	2.4	2.3	37.7	0.4	25.4	21.4	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.3	0.3	11.9	11.8	12.3	0.3	3.2	7.0	6.2	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.5	1.2	1.1	138.1	19.8	19.8	102.3	50.8	80.1	79.0	39.0	39.8
LnGrp LOS	E	A	A	F	B	B	F	D	F	E	D	D
Approach Vol, veh/h	833				1723				467		327	
Approach Delay, s/veh	10.0				53.1				73.6		58.5	
Approach LOS	A				D				E		E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	69.9	4.6	35.6	10.6	79.3	17.1	23.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	60.0	62.0	10.0	25.0	20.0	58.0	16.0	19.0				
Max Q Clear Time (g_c+I1), s	11.0	2.0	2.4	8.4	6.6	30.1	13.2	19.1				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.1	0.0	1.7	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	45.8
HCM 6th LOS	D

HCM 6th Signalized Intersection Summary

20: Chemawa Rd & SB Ramp

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑						↑	↑↑
Traffic Volume (veh/h)	0	685	923	275	1760	0	0	0	0	166	6	371
Future Volume (veh/h)	0	685	923	275	1760	0	0	0	0	166	6	371
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1856	1885	1885	1885	0				1870	1648	1870
Adj Flow Rate, veh/h	0	714	961	286	1833	0				173	6	386
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	1	1	1	0				2	17	2
Cap, veh/h	0	1689	765	357	2595	0				277	10	508
Arrive On Green	0.00	0.48	0.48	0.20	0.72	0.00				0.16	0.18	0.18
Sat Flow, veh/h	0	3618	1598	1795	3676	0				1519	53	2790
Grp Volume(v), veh/h	0	714	961	286	1833	0				179	0	386
Grp Sat Flow(s), veh/h/ln	0	1763	1598	1795	1791	0				1572	0	1395
Q Serve(g_s), s	0.0	11.3	41.0	13.0	24.7	0.0				9.1	0.0	11.2
Cycle Q Clear(g_c), s	0.0	11.3	41.0	13.0	24.7	0.0				9.1	0.0	11.2
Prop In Lane	0.00		1.00	1.00		0.00				0.97		1.00
Lane Grp Cap(c), veh/h	0	1689	765	357	2595	0				286	0	508
V/C Ratio(X)	0.00	0.42	1.26	0.80	0.71	0.00				0.63	0.00	0.76
Avail Cap(c_a), veh/h	0	1689	765	440	2595	0				753	0	1336
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	14.6	22.3	32.7	6.7	0.0				33.3	0.0	33.2
Incr Delay (d2), s/veh	0.0	0.1	125.7	6.7	0.8	0.0				0.8	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.2	40.3	6.2	7.1	0.0				3.4	0.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	14.6	148.0	39.4	7.4	0.0				34.1	0.0	34.1
LnGrp LOS	A	B	F	D	A	A				C	A	C
Approach Vol, veh/h		1675			2119						565	
Approach Delay, s/veh		91.1			11.7						34.1	
Approach LOS		F			B						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	1.0	45.0		19.6		66.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	39.0	39.0		39.0		39.0						
Max Q Clear Time (g_c+I1), s	43.0	43.0		13.2		26.7						
Green Ext Time (p_c), s	0.0	0.0		0.3		4.1						

Intersection Summary

HCM 6th Ctrl Delay	45.1
HCM 6th LOS	D

HCM Signalized Intersection Capacity Analysis

21: NB Ramp & Chemawa Rd

Existing PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	194	657	0	0	777	67	1258	0	238	0	0	0
Future Volume (vph)	194	657	0	0	777	67	1258	0	238	0	0	0
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	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			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	1.00			0.99		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1770	3505			3524		1698	1698	1568			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1770	3505			3524		1698	1698	1568			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	206	699	0	0	827	71	1338	0	253	0	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	102	0	0	0
Lane Group Flow (vph)	206	699	0	0	892	0	669	669	151	0	0	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	3%	0%	0%	1%	4%	1%	0%	3%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases							4		4			
Actuated Green, G (s)	14.3	47.1			26.8		41.3	41.3	41.3			
Effective Green, g (s)	16.3	49.1			28.8		43.3	43.3	43.3			
Actuated g/C Ratio	0.16	0.49			0.29		0.43	0.43	0.43			
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0	6.0			
Vehicle Extension (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lane Grp Cap (vph)	287	1714			1010		732	732	676			
v/s Ratio Prot	c0.12	0.20			c0.25							
v/s Ratio Perm							c0.39	0.39	0.10			
v/c Ratio	0.72	0.41			0.88		0.91	0.91	0.22			
Uniform Delay, d1	39.9	16.4			34.2		26.8	26.8	18.0			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	7.0	0.1			9.0		15.6	15.6	0.1			
Delay (s)	46.8	16.4			43.2		42.4	42.4	18.0			
Level of Service	D	B			D		D	D	B			
Approach Delay (s)		23.3			43.2			38.5			0.0	
Approach LOS		C			D			D			A	
Intersection Summary												
HCM 2000 Control Delay		35.7			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.89										
Actuated Cycle Length (s)		100.4			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		91.9%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

22: Portland Rd & Chemawa Rd/Hazegreen Rd

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	347	406	56	271	24	365	354	79	60	530	78
Future Volume (veh/h)	99	347	406	56	271	24	365	354	79	60	530	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1841	1841	1870	1841	1885	1885	1900	1826	1826	1781	1870	1856
Adj Flow Rate, veh/h	106	373	437	60	291	26	392	381	85	65	570	84
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
Percent Heavy Veh, %	4	4	2	4	1	1	0	5	5	8	2	3
Cap, veh/h	147	605	521	88	503	45	281	911	201	123	853	377
Arrive On Green	0.08	0.33	0.33	0.05	0.29	0.27	0.16	0.32	0.29	0.07	0.24	0.24
Sat Flow, veh/h	1753	1841	1585	1753	1705	152	1810	2825	624	1697	3554	1572
Grp Volume(v), veh/h	106	373	437	60	0	317	392	232	234	65	570	84
Grp Sat Flow(s),veh/h/ln	1753	1841	1585	1753	0	1858	1810	1735	1714	1697	1777	1572
Q Serve(g_s), s	4.2	12.1	18.1	2.4	0.0	10.3	11.0	7.4	7.7	2.6	10.3	3.0
Cycle Q Clear(g_c), s	4.2	12.1	18.1	2.4	0.0	10.3	11.0	7.4	7.7	2.6	10.3	3.0
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.36	1.00		1.00
Lane Grp Cap(c), veh/h	147	605	521	88	0	548	281	559	553	123	853	377
V/C Ratio(X)	0.72	0.62	0.84	0.68	0.00	0.58	1.40	0.42	0.42	0.53	0.67	0.22
Avail Cap(c_a), veh/h	272	675	581	272	0	681	281	636	629	263	1304	577
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	20.0	22.0	33.1	0.0	21.3	29.9	18.8	19.1	31.7	24.4	21.6
Incr Delay (d2), s/veh	4.8	1.2	9.3	6.7	0.0	0.7	198.4	0.4	0.4	2.6	0.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	4.7	7.2	1.1	0.0	4.0	19.8	2.7	2.8	1.1	4.2	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.5	21.2	31.3	39.8	0.0	22.0	228.4	19.2	19.5	34.3	25.1	21.8
LnGrp LOS	D	C	C	D	A	C	F	B	B	C	C	C
Approach Vol, veh/h	916					377	858			719		
Approach Delay, s/veh	27.8					24.9	114.8			25.5		
Approach LOS	C					C	F			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.0	21.0	10.0	24.9	9.2	26.9	7.6	27.3				
Change Period (Y+Rc), s	4.5	6.0	4.5	6.0	4.5	6.0	4.5	6.0				
Max Green Setting (Gmax), s	10.5	24.0	10.5	24.0	10.5	24.0	10.5	24.0				
Max Q Clear Time (g_c+I1), s	12.3	12.3	6.2	12.3	4.6	9.7	4.4	20.1				
Green Ext Time (p_c), s	0.0	2.7	0.1	1.0	0.0	1.7	0.0	1.2				

Intersection Summary

HCM 6th Ctrl Delay	52.9
HCM 6th LOS	D

HCM 6th Signalized Intersection Summary

23: River Rd & Chemawa Rd

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	217	180	162	268	121	202	1066	108	126	692	81
Future Volume (veh/h)	137	217	180	162	268	121	202	1066	108	126	692	81
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1710	1697	1683	1697	1710	1697	1697	1697	1697	1697	1683	1683
Adj Flow Rate, veh/h	144	228	189	171	282	127	213	1122	114	133	728	85
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
Percent Heavy Veh, %	0	1	2	1	0	1	1	1	1	1	2	2
Cap, veh/h	166	271	218	193	303	245	235	1474	150	153	1303	152
Arrive On Green	0.10	0.16	0.16	0.12	0.18	0.18	0.15	0.50	0.50	0.19	0.91	0.90
Sat Flow, veh/h	1629	1697	1370	1616	1710	1387	1616	2950	299	1616	2880	336
Grp Volume(v), veh/h	144	228	189	171	282	127	213	612	624	133	404	409
Grp Sat Flow(s),veh/h/ln	1629	1697	1370	1616	1710	1387	1616	1612	1638	1616	1599	1617
Q Serve(g_s), s	11.3	17.0	17.5	13.5	21.1	10.8	16.9	39.8	40.0	10.4	6.3	6.4
Cycle Q Clear(g_c), s	11.3	17.0	17.5	13.5	21.1	10.8	16.9	39.8	40.0	10.4	6.3	6.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		0.21
Lane Grp Cap(c), veh/h	166	271	218	193	303	245	235	805	818	153	724	732
V/C Ratio(X)	0.87	0.84	0.87	0.89	0.93	0.52	0.91	0.76	0.76	0.87	0.56	0.56
Avail Cap(c_a), veh/h	194	271	218	242	303	245	360	805	818	186	724	732
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89
Uniform Delay (d), s/veh	57.5	53.1	53.3	56.4	52.7	48.5	54.7	26.2	26.3	51.9	3.7	3.7
Incr Delay (d2), s/veh	22.6	17.2	23.9	22.9	33.9	0.9	13.8	6.7	6.6	23.7	2.8	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	8.5	7.5	6.8	11.9	3.8	7.7	16.3	16.6	4.8	1.8	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.1	70.2	77.2	79.3	86.6	49.4	68.5	32.9	32.9	75.6	6.4	6.5
LnGrp LOS	F	E	E	E	F	D	E	C	C	E	A	A
Approach Vol, veh/h	561					580		1449		946		
Approach Delay, s/veh	75.1					76.3		38.2		16.2		
Approach LOS	E					E		D		B		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	69.4	19.5	24.7	22.9	62.8	17.3	27.0					
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	60.0	19.5	19.0	29.0	46.0	15.5	23.0					
Max Q Clear Time (g_c+I1), s	42.0	15.5	19.5	18.9	8.4	13.3	23.1					
Green Ext Time (p_c), s	0.0	1.7	0.0	0.0	0.0	1.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	44.4
HCM 6th LOS	D

HCM 6th Roundabout
24: Verda Ln & Chemawa Rd

Existing PM Peak Hour
09/08/2020

Intersection				
Intersection Delay, s/veh	9.2			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	482	542	460	133
Demand Flow Rate, veh/h	488	548	465	134
Vehicles Circulating, veh/h	242	299	327	685
Vehicles Exiting, veh/h	577	493	403	162
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.4	10.4	9.3	7.5
Approach LOS	A	B	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	488	548	465	134
Cap Entry Lane, veh/h	1078	1017	989	686
Entry HV Adj Factor	0.988	0.989	0.989	0.994
Flow Entry, veh/h	482	542	460	133
Cap Entry, veh/h	1065	1006	977	682
V/C Ratio	0.453	0.539	0.471	0.195
Control Delay, s/veh	8.4	10.4	9.3	7.5
LOS	A	B	A	A
95th %tile Queue, veh	2	3	3	1

HCM 6th Signalized Intersection Summary

25: Salem Pkwy & Verda Ln/Hyacinth St

Existing PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	38	318	93	253	473	78	184	1090	321	41	898	114
Future Volume (veh/h)	38	318	93	253	473	78	184	1090	321	41	898	114
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1885	1885	1870	1826	1885	1856	1885	1870	1856	1900
Adj Flow Rate, veh/h	39	324	95	258	483	80	188	1112	0	42	916	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
Percent Heavy Veh, %	0	3	1	1	2	5	1	3	1	2	3	0
Cap, veh/h	127	343	289	294	520	423	227	1191		326	1417	
Arrive On Green	0.07	0.18	0.18	0.16	0.28	0.28	0.13	0.34	0.00	0.18	0.40	0.00
Sat Flow, veh/h	1810	1856	1566	1795	1870	1521	1795	3526	1598	1781	3526	1610
Grp Volume(v), veh/h	39	324	95	258	483	80	188	1112	0	42	916	0
Grp Sat Flow(s), veh/h/ln	1810	1856	1566	1795	1870	1521	1795	1763	1598	1781	1763	1610
Q Serve(g_s), s	2.7	22.4	5.1	18.2	32.7	5.2	13.3	39.7	0.0	2.6	27.3	0.0
Cycle Q Clear(g_c), s	2.7	22.4	5.1	18.2	32.7	5.2	13.3	39.7	0.0	2.6	27.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	127	343	289	294	520	423	227	1191		326	1417	
V/C Ratio(X)	0.31	0.95	0.33	0.88	0.93	0.19	0.83	0.93		0.13	0.65	
Avail Cap(c_a), veh/h	127	343	289	359	604	491	290	1193		326	1417	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.4	52.4	25.9	53.1	45.7	35.8	55.4	41.6	0.0	44.4	31.4	0.0
Incr Delay (d2), s/veh	1.3	34.7	0.7	16.4	18.2	0.1	14.4	14.4	0.0	0.2	2.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	13.6	2.7	9.5	17.6	1.9	6.7	18.5	0.0	1.1	11.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.8	87.0	26.6	69.5	63.9	35.9	69.8	56.0	0.0	44.6	33.7	0.0
LnGrp LOS	E	F	C	E	E	D	E	E		D	C	
Approach Vol, veh/h	458			821			1300			A	958	A
Approach Delay, s/veh	72.1			62.9			58.0				34.2	
Approach LOS	E			E			E				C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.5	56.3	13.2	40.1	28.8	47.9	25.3	28.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	6.0	* 6	5.0	5.0				
Max Green Setting (Gmax), s	20.0	41.0	7.0	41.0	19.0	* 42	25.0	23.0				
Max Q Clear Time (g_c+I1), s	11.3	29.3	4.7	34.7	4.6	41.7	20.2	24.4				
Green Ext Time (p_c), s	0.2	5.0	0.0	0.4	0.0	0.2	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 54.5

HCM 6th LOS D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th AWSC
1: River Rd & Brooklake Rd

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection

Intersection Delay, s/veh 41.8
Intersection LOS E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰↱			↰↱	
Traffic Vol, veh/h	10	90	30	265	125	180	25	135	115	240	200	25
Future Vol, veh/h	10	90	30	265	125	180	25	135	115	240	200	25
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
Heavy Vehicles, %	20	2	0	2	4	4	0	3	3	3	2	0
Mvmt Flow	10	94	31	276	130	188	26	141	120	250	208	26
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	14.6	41	21.2	62.7
HCM LOS	B	E	C	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	9%	10%	0%	68%	0%	52%
Vol Thru, %	49%	90%	0%	32%	0%	43%
Vol Right, %	42%	0%	100%	0%	100%	5%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	275	100	30	390	180	465
LT Vol	25	10	0	265	0	240
Through Vol	135	90	0	125	0	200
RT Vol	115	0	30	0	180	25
Lane Flow Rate	286	104	31	406	188	484
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.598	0.269	0.071	0.918	0.369	0.98
Departure Headway (Hd)	7.512	9.302	8.197	8.134	7.093	7.287
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	478	385	436	447	506	499
Service Time	5.574	7.078	5.972	5.891	4.85	5.287
HCM Lane V/C Ratio	0.598	0.27	0.071	0.908	0.372	0.97
HCM Control Delay	21.2	15.5	11.6	53.5	14	62.7
HCM Lane LOS	C	C	B	F	B	F
HCM 95th-tile Q	3.8	1.1	0.2	10.3	1.7	12.9

HCM 6th TWSC

2: SB Ramps & Brooklake Rd

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection												
Int Delay, s/veh	148											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	390	330	395	295	0	0	0	0	190	0	440
Future Vol, veh/h	0	390	330	395	295	0	0	0	0	190	0	440
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	180	-	-	-	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	12	9	3	12	0	0	0	0	0	0	10
Mvmt Flow	0	411	347	416	311	0	0	0	0	200	0	463
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	758	0	0				1728	1901	311
Stage 1	-	-	-	-	-	-				1143	1143	-
Stage 2	-	-	-	-	-	-				585	758	-
Critical Hdwy	-	-	-	4.13	-	-				6.4	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.4	5.5	-
Follow-up Hdwy	-	-	-	2.227	-	-				3.5	4	3.39
Pot Cap-1 Maneuver	0	-	-	849	-	0				~ 98	70	711
Stage 1	0	-	-	-	-	0				307	277	-
Stage 2	0	-	-	-	-	0				561	418	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	849	-	-				~ 50	0	711
Mov Cap-2 Maneuver	-	-	-	-	-	-				~ 50	0	-
Stage 1	-	-	-	-	-	-				307	0	-
Stage 2	-	-	-	-	-	-				286	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			7.6			\$ 470.8					
HCM LOS							F					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2						
Capacity (veh/h)	-	-	849	-	50	711						
HCM Lane V/C Ratio	-	-	0.49	-	4	0.651						
HCM Control Delay (s)	-	-	13.2	-	\$ 1517	19						
HCM Lane LOS	-	-	B	-	F	C						
HCM 95th %tile Q(veh)	-	-	2.7	-	22.1	4.8						
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

HCM 6th TWSC

3: Brooklake Rd & NB Ramps

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection												
Int Delay, s/veh	137											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			↰	↱			
Traffic Vol, veh/h	350	230	0	0	530	200	160	0	290	0	0	0
Future Vol, veh/h	350	230	0	0	530	200	160	0	290	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	155	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	18	4	0	0	4	0	14	0	4	0	0	0
Mvmt Flow	385	253	0	0	582	220	176	0	319	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	802	0	- - - 0 1715 1825 253
Stage 1	-	-	- - - 1023 1023 -
Stage 2	-	-	- - - 692 802 -
Critical Hdwy	4.28	-	- - - 6.54 6.5 6.24
Critical Hdwy Stg 1	-	-	- - - 5.54 5.5 -
Critical Hdwy Stg 2	-	-	- - - 5.54 5.5 -
Follow-up Hdwy	2.362	-	- - - 3.626 4 3.336
Pot Cap-1 Maneuver	755	-	0 0 - - ~ 93 78 781
Stage 1	-	-	0 0 - - 330 316 -
Stage 2	-	-	0 0 - - 475 399 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	755	-	- - - ~ 46 0 781
Mov Cap-2 Maneuver	-	-	- - - ~ 46 0 -
Stage 1	-	-	- - - ~ 162 0 -
Stage 2	-	-	- - - 475 0 -

Approach	EB	WB	NB
HCM Control Delay, s	8.8	0	\$ 524.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	46	781	755	-	-	-
HCM Lane V/C Ratio	3.822	0.408	0.509	-	-	-
HCM Control Delay (s)	\$ 1451.7	12.8	14.6	-	-	-
HCM Lane LOS	F	B	B	-	-	-
HCM 95th %tile Q(veh)	19.6	2	2.9	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection SummaFuture Baseline PM Peak Hour (without RTP projects)

4: Portland Rd & Brooklake Rd

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	60	295	40	150	55	95	595	40	50	480	390
Future Volume (veh/h)	140	60	295	40	150	55	95	595	40	50	480	390
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1856	1870	1870	1870	1811	1856	1856	1900	1870	1826
Adj Flow Rate, veh/h	147	63	0	42	158	58	100	626	42	53	505	411
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
Percent Heavy Veh, %	7	7	3	2	2	2	6	3	3	0	2	5
Cap, veh/h	320	102		128	270	91	389	852	57	344	885	732
Arrive On Green	0.22	0.23	0.00	0.22	0.23	0.22	0.05	0.50	0.47	0.03	0.47	0.47
Sat Flow, veh/h	860	451	1572	185	1195	400	1725	1719	115	1810	1870	1547
Grp Volume(v), veh/h	210	0	0	258	0	0	100	0	668	53	505	411
Grp Sat Flow(s),veh/h/ln	1311	0	1572	1780	0	0	1725	0	1835	1810	1870	1547
Q Serve(g_s), s	0.8	0.0	0.0	0.0	0.0	0.0	1.5	0.0	14.1	0.8	9.5	9.3
Cycle Q Clear(g_c), s	7.1	0.0	0.0	6.3	0.0	0.0	1.5	0.0	14.1	0.8	9.5	9.3
Prop In Lane	0.70		1.00	0.16		0.22	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	409	0		471	0	0	389	0	910	344	885	732
V/C Ratio(X)	0.51	0.00		0.55	0.00	0.00	0.26	0.00	0.73	0.15	0.57	0.56
Avail Cap(c_a), veh/h	1081	0		1372	0	0	579	0	1620	584	1652	1366
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	0.0	0.0	17.1	0.0	0.0	7.6	0.0	9.8	8.7	9.3	9.2
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.7	0.0	0.0	0.3	0.0	1.7	0.2	0.8	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.0	2.4	0.0	0.0	0.4	0.0	4.1	0.2	2.8	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.1	0.0	0.0	17.9	0.0	0.0	7.9	0.0	11.4	8.9	10.1	10.2
LnGrp LOS	B	A		B	A	A	A	A	B	A	B	B
Approach Vol, veh/h		210	A		258			768			969	
Approach Delay, s/veh		18.1			17.9			11.0			10.1	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	28.1		15.0	6.6	27.0		15.0				
Change Period (Y+Rc), s	4.0	* 5.4		4.5	4.0	* 5.4		4.5				
Max Green Setting (Gmax), s	8.0	* 42		36.5	8.0	* 42		36.5				
Max Q Clear Time (g_c+I1), s	2.8	16.1		9.1	3.5	11.5		8.3				
Green Ext Time (p_c), s	0.0	6.7		1.1	0.1	7.7		1.2				

Intersection Summary

HCM 6th Ctrl Delay 12.1

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
5: Wheatland Rd & Clear Lake Rd

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	65	0	20	0	70	55	15	180	0
Future Vol, veh/h	0	0	0	65	0	20	0	70	55	15	180	0
Conflicting Peds, #/hr	0	0	2	0	0	0	0	0	2	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	50	100	0	0	0	0	0	2	2	8	0	0
Mvmt Flow	0	0	0	73	0	22	0	79	62	17	202	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	359	381	206	350	350	112	204	0	0	143	0	0
Stage 1	238	238	-	112	112	-	-	-	-	-	-	-
Stage 2	121	143	-	238	238	-	-	-	-	-	-	-
Critical Hdwy	7.6	7.5	6.2	7.1	6.5	6.2	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.6	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.6	6.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.95	4.9	3.3	3.5	4	3.3	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	517	426	840	608	577	947	1380	-	-	1404	-	-
Stage 1	669	560	-	898	807	-	-	-	-	-	-	-
Stage 2	780	625	-	770	712	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	498	418	837	599	567	945	1377	-	-	1401	-	-
Mov Cap-2 Maneuver	498	418	-	599	567	-	-	-	-	-	-	-
Stage 1	668	551	-	896	805	-	-	-	-	-	-	-
Stage 2	761	624	-	758	701	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		11.4			0			0.6			
HCM LOS	A		B									
Minor Lane/Major Mvmt	NBL		NBT	NBR		EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	1377		-	-	-	655	1401	-	-			
HCM Lane V/C Ratio	-		-	-	-	0.146	0.012	-	-			
HCM Control Delay (s)	0		-	-	0	11.4	7.6	0	-			
HCM Lane LOS	A		-	-	A	B	A	A	-			
HCM 95th %tile Q(veh)	0		-	-	-	0.5	0	-	-			

Intersection												
Int Delay, s/veh	32.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	
Traffic Vol, veh/h	25	55	20	110	120	100	35	170	80	80	405	30
Future Vol, veh/h	25	55	20	110	120	100	35	170	80	80	405	30
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	30	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	6	6	0	0	7	0	2	0	8	1	0
Mvmt Flow	26	57	21	113	124	103	36	175	82	82	418	31
Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	948	927	435	926	901	216	449	0	0	257	0	0
Stage 1	598	598	-	288	288	-	-	-	-	-	-	-
Stage 2	350	329	-	638	613	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.26	7.1	6.5	6.27	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.354	3.5	4	3.363	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	243	264	613	251	280	811	1122	-	-	1274	-	-
Stage 1	492	485	-	724	677	-	-	-	-	-	-	-
Stage 2	671	639	-	468	486	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	117	232	612	179	246	811	1122	-	-	1274	-	-
Mov Cap-2 Maneuver	117	232	-	179	246	-	-	-	-	-	-	-
Stage 1	473	443	-	696	651	-	-	-	-	-	-	-
Stage 2	456	615	-	360	444	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB		SB		SB	
HCM Control Delay, s	35.7		108.3		1		1.2					
HCM LOS	E		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1122	-	-	177	612	209	811	1274	-	-		
HCM Lane V/C Ratio	0.032	-	-	0.466	0.034	1.135	0.127	0.065	-	-		
HCM Control Delay (s)	8.3	0	-	41.9	11.1	151	10.1	8	0	-		
HCM Lane LOS	A	A	-	E	B	F	B	A	A	-		
HCM 95th %tile Q(veh)	0.1	-	-	2.2	0.1	11.3	0.4	0.2	-	-		

HCM 6th TWSC
7: 35th Ave & Quinaby Rd

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	155	60	15	210	85	25
Future Vol, veh/h	155	60	15	210	85	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	0	0	3	0	0
Mvmt Flow	189	73	18	256	104	30
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	262	0	518	226
Stage 1	-	-	-	-	226	-
Stage 2	-	-	-	-	292	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1314	-	521	818
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	762	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1314	-	513	818
Mov Cap-2 Maneuver	-	-	-	-	513	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	750	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		13.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	560	-	-	1314	-	
HCM Lane V/C Ratio	0.24	-	-	0.014	-	
HCM Control Delay (s)	13.4	-	-	7.8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.9	-	-	0	-	

HCM 6th TWSC
8: Portland Rd & Quinaby Rd

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection						
Int Delay, s/veh	19.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	95	115	105	485	645	95
Future Vol, veh/h	95	115	105	485	645	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	240	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	4	5	1	2
Mvmt Flow	100	121	111	511	679	100
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1462	729	779	0	-	0
Stage 1	729	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	143	420	829	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	124	420	829	-	-	-
Mov Cap-2 Maneuver	124	-	-	-	-	-
Stage 1	417	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	140.1	1.8		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	829	-	202	-	-	
HCM Lane V/C Ratio	0.133	-	1.094	-	-	
HCM Control Delay (s)	10	-	140.1	-	-	
HCM Lane LOS	B	-	F	-	-	
HCM 95th %tile Q(veh)	0.5	-	10.4	-	-	

HCM 6th TWSC
9: River Rd & Perkins St

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection						
Int Delay, s/veh	6.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	150	25	285	75	15	515
Future Vol, veh/h	150	25	285	75	15	515
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	1	0	2	2	0	1
Mvmt Flow	172	29	328	86	17	592
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	997	371	0	0	414	0
Stage 1	371	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	272	679	-	-	1156	-
Stage 1	700	-	-	-	-	-
Stage 2	535	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	266	679	-	-	1156	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	700	-	-	-	-	-
Stage 2	523	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	41	0	0.2			
HCM LOS	E					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	291	1156	-	
HCM Lane V/C Ratio	-	-	0.691	0.015	-	
HCM Control Delay (s)	-	-	41	8.2	0	
HCM Lane LOS	-	-	E	A	A	
HCM 95th %tile Q(veh)	-	-	4.7	0	-	

HCM 6th TWSC
10: 35th Ave & Perkins St

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection												
Int Delay, s/veh	7.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	25	60	50	75	10	100	95	65	25	45	5
Future Vol, veh/h	5	25	60	50	75	10	100	95	65	25	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	5	0
Mvmt Flow	6	28	68	57	85	11	114	108	74	28	51	6
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	531	520	54	531	486	145	57	0	0	182	0	0
Stage 1	110	110	-	373	373	-	-	-	-	-	-	-
Stage 2	421	410	-	158	113	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.51	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.009	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	462	456	1019	462	483	908	1560	-	-	1405	-	-
Stage 1	900	799	-	652	620	-	-	-	-	-	-	-
Stage 2	614	590	-	849	804	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	358	410	1019	377	434	908	1560	-	-	1405	-	-
Mov Cap-2 Maneuver	358	410	-	377	434	-	-	-	-	-	-	-
Stage 1	826	782	-	599	569	-	-	-	-	-	-	-
Stage 2	473	542	-	747	787	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	11.3		18.1			2.9			2.5			
HCM LOS	B		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1560	-	-	673	427	1405	-	-				
HCM Lane V/C Ratio	0.073	-	-	0.152	0.359	0.02	-	-				
HCM Control Delay (s)	7.5	-	-	11.3	18.1	7.6	0	-				
HCM Lane LOS	A	-	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	0.5	1.6	0.1	-	-				

HCM 6th TWSC
11: Portland Rd & Perkins St

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	95	90	585	705	25
Future Vol, veh/h	20	95	90	585	705	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	6	0	4	2	0
Mvmt Flow	22	102	97	629	758	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1595	772	785	0	-	0
Stage 1	772	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.2	-	-	-
Pot Cap-1 Maneuver	119	393	843	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	435	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	98	393	843	-	-	-
Mov Cap-2 Maneuver	98	-	-	-	-	-
Stage 1	378	-	-	-	-	-
Stage 2	435	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	31.2	1.3		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	843	-	258	-	-	
HCM Lane V/C Ratio	0.115	-	0.479	-	-	
HCM Control Delay (s)	9.8	0	31.2	-	-	
HCM Lane LOS	A	A	D	-	-	
HCM 95th %tile Q(veh)	0.4	-	2.4	-	-	

HCM 6th TWSC
12: River Rd & Parkmeadow Dr

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	100	250	325	570	95
Future Vol, veh/h	35	100	250	325	570	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	1	1	1	1	0
Mvmt Flow	39	111	278	361	633	106
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1603	686	739	0	-	0
Stage 1	686	-	-	-	-	-
Stage 2	917	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	116	449	872	-	-	-
Stage 1	498	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	79	449	872	-	-	-
Mov Cap-2 Maneuver	201	-	-	-	-	-
Stage 1	339	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	23.7	4.8		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	872	-	340	-	-	
HCM Lane V/C Ratio	0.319	-	0.441	-	-	
HCM Control Delay (s)	11	-	23.7	-	-	
HCM Lane LOS	B	-	C	-	-	
HCM 95th %tile Q(veh)	1.4	-	2.2	-	-	

HCM 6th Signalized Intersection Summary Future Baseline PM Peak Hour (without RTP projects) 13: River Rd & Wheatland Rd/Springwood Dr

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	5	405	15	5	5	565	900	15	15	775	15
Future Volume (veh/h)	10	5	405	15	5	5	565	900	15	15	775	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1870	1900	1900	1900	1900	1885	1885	1900	1885	1885
Adj Flow Rate, veh/h	11	5	440	16	5	5	614	978	16	16	842	16
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
Percent Heavy Veh, %	0	0	2	0	0	0	0	1	1	0	1	1
Cap, veh/h	239	108	506	35	11	11	641	2128	35	264	1148	22
Arrive On Green	0.17	0.19	0.19	0.03	0.03	0.03	0.28	0.59	0.56	0.01	0.32	0.29
Sat Flow, veh/h	1263	574	2678	1088	340	340	1810	3606	59	1810	3595	68
Grp Volume(v), veh/h	16	0	440	26	0	0	614	486	508	16	419	439
Grp Sat Flow(s),veh/h/ln	1837	0	1339	1769	0	0	1810	1791	1874	1810	1791	1872
Q Serve(g_s), s	0.7	0.0	14.4	1.3	0.0	0.0	23.3	13.7	13.7	0.6	18.7	18.8
Cycle Q Clear(g_c), s	0.7	0.0	14.4	1.3	0.0	0.0	23.3	13.7	13.7	0.6	18.7	18.8
Prop In Lane	0.69		1.00	0.62		0.19	1.00		0.03	1.00		0.04
Lane Grp Cap(c), veh/h	347	0	506	57	0	0	641	1057	1106	264	572	598
V/C Ratio(X)	0.05	0.00	0.87	0.46	0.00	0.00	0.96	0.46	0.46	0.06	0.73	0.73
Avail Cap(c_a), veh/h	347	0	506	118	0	0	653	1057	1106	355	572	598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	0.0	35.4	43.0	0.0	0.0	21.0	10.4	10.4	22.4	27.2	27.3
Incr Delay (d2), s/veh	0.0	0.0	14.5	2.1	0.0	0.0	24.7	1.4	1.4	0.0	8.1	7.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	5.7	0.6	0.0	0.0	13.0	5.0	5.2	0.2	9.0	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	0.0	49.9	45.1	0.0	0.0	45.6	11.8	11.8	22.5	35.3	35.1
LnGrp LOS	C	A	D	D	A	A	D	B	B	C	D	D
Approach Vol, veh/h		456			26			1608			874	
Approach Delay, s/veh		49.2			45.1			24.7			35.0	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.0	57.1		21.0	29.4	32.7		6.9				
Change Period (Y+Rc), s	4.0	7.0		6.0	4.0	7.0		4.5				
Max Green Setting (Gmax), s	5.5	42.5		15.0	26.0	22.0		5.5				
Max Q Clear Time (g_c+I1), s	2.6	15.7		16.4	25.3	20.8		3.3				
Green Ext Time (p_c), s	0.0	1.2		0.0	0.0	0.3		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			31.7									
HCM 6th LOS			C									
Notes												
User approved changes to right turn type.												

HCM 6th Signalized Intersection SummaFuture Baseline PM Peak Hour (without RTP projects)

14: Keizer Station Blvd & Ulali Dr

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	90	105	125	105	25	45	105	90	10	155	80
Future Volume (veh/h)	125	90	105	125	105	25	45	105	90	10	155	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1870	1870	1900	1885	1900
Adj Flow Rate, veh/h	142	102	119	142	119	28	51	119	102	11	176	91
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	2	2	0	1	0
Cap, veh/h	621	241	281	550	453	107	630	323	277	610	655	560
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	1260	790	921	1178	1487	350	1130	930	797	1178	1885	1610
Grp Volume(v), veh/h	142	0	221	142	0	147	51	0	221	11	176	91
Grp Sat Flow(s), veh/h/ln	1260	0	1711	1178	0	1837	1130	0	1727	1178	1885	1610
Q Serve(g_s), s	2.2	0.0	2.4	2.5	0.0	1.4	0.8	0.0	2.2	0.2	1.5	0.9
Cycle Q Clear(g_c), s	3.6	0.0	2.4	4.9	0.0	1.4	2.3	0.0	2.2	2.4	1.5	0.9
Prop In Lane	1.00		0.54	1.00		0.19	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	621	0	521	550	0	560	630	0	600	610	655	560
V/C Ratio(X)	0.23	0.00	0.42	0.26	0.00	0.26	0.08	0.00	0.37	0.02	0.27	0.16
Avail Cap(c_a), veh/h	1387	0	1561	1266	0	1676	1759	0	2326	1787	2539	2169
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.4	0.0	6.4	8.3	0.0	6.0	6.2	0.0	5.6	6.5	5.4	5.2
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.5	0.4	0.0	0.3	0.1	0.0	0.3	0.0	0.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.5	0.0	6.6	8.4	0.0	6.1	6.3	0.0	5.8	6.5	5.5	5.2
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	363			289			272			278		
Approach Delay, s/veh	6.9			7.3			5.9			5.4		
Approach LOS	A			A			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	12.0			11.0			12.0			11.0		
Change Period (Y+Rc), s	4.0			4.0			4.0			4.0		
Max Green Setting (Gmax), s	31.0			21.0			31.0			21.0		
Max Q Clear Time (g_c+I1), s	4.4			6.9			4.3			5.6		
Green Ext Time (p_c), s	0.2			0.2			0.3			0.4		

Intersection Summary

HCM 6th Ctrl Delay	6.4
HCM 6th LOS	A

HCM Signalized Intersection Capacity Analysis - Baseline PM Peak Hour (without RTP projects)

15: River Rd & Lockhaven Dr

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	260	165	315	225	205	130	835	275	165	725	125
Future Volume (vph)	160	260	165	315	225	205	130	835	275	165	725	125
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	4.0	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	1.00	0.95	1.00	1.00	0.95	0.95
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.97	1.00	0.99	0.99
Flpb, ped/bikes	1.00	1.00	1.00	0.99	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	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	1863	1556	1649	1737	1577	1805	3574	1524	1787	3467	3467
Flt Permitted	0.95	1.00	1.00	0.59	0.83	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	1863	1556	1031	1461	1577	1805	3574	1524	1787	3467	3467
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)	165	268	170	325	232	211	134	861	284	170	747	129
RTOR Reduction (vph)	0	0	141	0	0	117	0	0	198	0	11	0
Lane Group Flow (vph)	165	268	29	240	317	94	134	861	86	170	865	0
Confl. Peds. (#/hr)	1		7	7		1	5		3	3		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	1%	3%	2%	1%	0%	1%	3%	1%	1%	3%
Turn Type	Split	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	7	7			8		5	2		1	6	
Permitted Phases			7	8		8			2			
Actuated Green, G (s)	21.5	21.5	21.5	34.2	34.2	34.2	12.1	37.2	37.2	16.6	41.7	
Effective Green, g (s)	22.5	22.5	22.5	35.2	35.2	35.2	12.6	39.2	39.2	17.1	43.7	
Actuated g/C Ratio	0.17	0.17	0.17	0.27	0.27	0.27	0.10	0.30	0.30	0.13	0.34	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.5	6.0	6.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	309	322	269	279	395	427	174	1077	459	235	1165	
v/s Ratio Prot	0.09	c0.14					0.07	c0.24		0.10	c0.25	
v/s Ratio Perm			0.02	c0.23	0.22	0.06			0.06			
v/c Ratio	0.53	0.83	0.11	0.86	0.80	0.22	0.77	0.80	0.19	0.72	0.74	
Uniform Delay, d1	49.0	51.9	45.3	45.1	44.2	36.8	57.3	41.8	33.6	54.2	38.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.82	0.51	1.00	1.00	
Incremental Delay, d2	0.9	15.9	0.1	22.0	10.6	0.1	17.2	6.2	0.9	9.0	4.3	
Delay (s)	49.9	67.8	45.4	67.1	54.8	36.9	71.7	40.5	17.9	63.1	42.5	
Level of Service	D	E	D	E	D	D	E	D	B	E	D	
Approach Delay (s)		56.6			53.7			38.7			45.8	
Approach LOS		E			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			46.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			74.6%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th TWSC
16: Verda Ln & Lockhaven Dr

Future Baseline PM Peak Hour (without RTP projects)

09/08/2020

Intersection						
Int Delay, s/veh	1.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	595	30	60	735	25	70
Future Vol, veh/h	595	30	60	735	25	70
Conflicting Peds, #/hr	0	4	4	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	2	5	2	0	5
Mvmt Flow	626	32	63	774	26	74
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	662	0	1546	648
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	900	-
Critical Hdwy	-	-	4.15	-	6.4	6.25
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.245	-	3.5	3.345
Pot Cap-1 Maneuver	-	-	912	-	127	465
Stage 1	-	-	-	-	526	-
Stage 2	-	-	-	-	400	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	909	-	118	462
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	372	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	0.7		16.7		
HCM LOS	C					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	407	-	-	909	-	
HCM Lane V/C Ratio	0.246	-	-	0.069	-	
HCM Control Delay (s)	16.7	-	-	9.3	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	1	-	-	0.2	-	

HCM 6th Signalized Intersection Summary Future Baseline PM Peak Hour (without RTP projects)

17: Kafir Dr/14th Ave & Lockhaven Dr

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	795	10	10	905	145	20	55	15	50	20	40
Future Volume (veh/h)	50	795	10	10	905	145	20	55	15	50	20	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.97		0.96	0.97		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1870	1870	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	52	820	10	10	933	149	21	57	15	52	21	41
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
Percent Heavy Veh, %	0	4	4	0	2	2	0	0	0	0	0	0
Cap, veh/h	301	1377	17	454	1165	186	72	144	33	165	57	161
Arrive On Green	0.02	0.76	0.75	0.01	0.74	0.73	0.10	0.12	0.10	0.10	0.10	0.10
Sat Flow, veh/h	1810	1815	22	1810	1568	250	228	1157	266	997	550	1548
Grp Volume(v), veh/h	52	0	830	10	0	1082	93	0	0	73	0	41
Grp Sat Flow(s), veh/h/ln	1810	0	1837	1810	0	1819	1652	0	0	1548	0	1548
Q Serve(g_s), s	0.7	0.0	19.9	0.1	0.0	37.8	1.3	0.0	0.0	0.0	0.0	2.4
Cycle Q Clear(g_c), s	0.7	0.0	19.9	0.1	0.0	37.8	5.4	0.0	0.0	4.1	0.0	2.4
Prop In Lane	1.00		0.01	1.00		0.14	0.23		0.16	0.71		1.00
Lane Grp Cap(c), veh/h	301	0	1393	454	0	1351	216	0	0	223	0	161
V/C Ratio(X)	0.17	0.00	0.60	0.02	0.00	0.80	0.43	0.00	0.00	0.33	0.00	0.25
Avail Cap(c_a), veh/h	405	0	1393	586	0	1351	410	0	0	404	0	356
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	5.3	5.1	0.0	8.2	40.9	0.0	0.0	41.9	0.0	41.2
Incr Delay (d2), s/veh	0.1	0.0	1.9	0.0	0.0	5.1	0.5	0.0	0.0	0.3	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	6.2	0.0	0.0	12.7	2.2	0.0	0.0	1.7	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.1	0.0	7.2	5.1	0.0	13.3	41.4	0.0	0.0	42.2	0.0	41.5
LnGrp LOS	B	A	A	A	A	B	D	A	A	D	A	D
Approach Vol, veh/h	882			1092			93			114		
Approach Delay, s/veh	7.4			13.2			41.4			42.0		
Approach LOS	A			B			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	79.9		15.4	6.3	78.3		15.4				
Change Period (Y+Rc), s	4.0	5.0		* 5	4.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	56.0		* 23	8.0	56.0		22.0				
Max Q Clear Time (g_c+I1), s	2.1	21.9		6.1	2.7	39.8		7.4				
Green Ext Time (p_c), s	0.0	1.2		0.1	0.0	1.9		0.1				

Intersection Summary

HCM 6th Ctrl Delay 13.6

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection SummaFuture Baseline PM Peak Hour (without RTP projects)

18: McLeod Ln & Lockhaven Dr

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	760	15	30	940	290	15	60	10	135	30	25
Future Volume (veh/h)	45	760	15	30	940	290	15	60	10	135	30	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1885	1885	1900	1870	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	826	16	33	1022	315	16	65	11	147	33	27
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
Percent Heavy Veh, %	0	4	4	0	1	1	0	2	0	0	0	0
Cap, veh/h	63	2590	50	42	1951	596	19	101	86	111	101	83
Arrive On Green	0.04	0.74	0.73	0.05	1.00	1.00	0.01	0.05	0.05	0.06	0.10	0.10
Sat Flow, veh/h	1810	3509	68	1810	2686	821	1810	1870	1601	1810	965	790
Grp Volume(v), veh/h	49	412	430	33	678	659	16	65	11	147	0	60
Grp Sat Flow(s),veh/h/ln	1810	1749	1828	1810	1791	1716	1810	1870	1601	1810	0	1755
Q Serve(g_s), s	3.5	10.5	10.5	2.3	0.0	0.0	1.1	4.4	0.9	8.0	0.0	4.1
Cycle Q Clear(g_c), s	3.5	10.5	10.5	2.3	0.0	0.0	1.1	4.4	0.9	8.0	0.0	4.1
Prop In Lane	1.00		0.04	1.00		0.48	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	63	1291	1350	42	1301	1247	19	101	86	111	0	184
V/C Ratio(X)	0.77	0.32	0.32	0.78	0.52	0.53	0.83	0.64	0.13	1.32	0.00	0.33
Avail Cap(c_a), veh/h	167	1291	1350	111	1301	1247	111	317	271	111	0	297
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.66	0.66	0.66	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.2	5.8	5.8	61.6	0.0	0.0	64.2	60.3	58.6	61.0	0.0	53.9
Incr Delay (d2), s/veh	7.2	0.7	0.6	7.6	1.0	1.1	27.3	2.5	0.2	193.6	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	3.7	3.8	1.1	0.4	0.4	0.7	2.2	0.3	9.7	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.4	6.5	6.5	69.2	1.0	1.1	91.5	62.8	58.8	254.6	0.0	54.3
LnGrp LOS	E	A	A	E	A	A	F	E	E	F	A	D
Approach Vol, veh/h	891		1370			92			207			
Approach Delay, s/veh	9.9		2.7			67.3			196.6			
Approach LOS	A		A			E			F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	100.0	5.4	17.6	8.6	98.4	12.0	11.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	8.0	75.0	8.0	22.0	12.0	71.0	8.0	22.0				
Max Q Clear Time (g_c+14), s	12.5	12.5	3.1	6.1	5.5	2.0	10.0	6.4				
Green Ext Time (p_c), s	0.0	1.1	0.0	0.1	0.0	2.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	23.2
HCM 6th LOS	C

HCM 6th Signalized Intersection SummaFuture Baseline PM Peak Hour (without RTP projects) 19: Chemawa Rd & Lockhaven Dr & Keizer Station Blvd

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	730	10	455	1130	65	10	105	245	280	90	120
Future Volume (veh/h)	165	730	10	455	1130	65	10	105	245	280	90	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1900	1885	1885	1900	1811	1811	1900	1826	1826
Adj Flow Rate, veh/h	172	760	10	474	1177	68	10	109	255	292	94	125
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
Percent Heavy Veh, %	3	3	3	0	1	1	0	6	6	0	5	5
Cap, veh/h	220	1850	24	432	1990	115	13	202	294	223	416	347
Arrive On Green	0.13	1.00	1.00	0.12	0.58	0.57	0.01	0.11	0.11	0.12	0.23	0.23
Sat Flow, veh/h	3428	3563	47	3510	3442	199	1810	1811	2638	1810	1826	1526
Grp Volume(v), veh/h	172	376	394	474	612	633	10	109	255	292	94	125
Grp Sat Flow(s),veh/h/ln	1714	1763	1847	1755	1791	1849	1810	1811	1319	1810	1826	1526
Q Serve(g_s), s	6.3	0.0	0.0	16.0	28.5	28.6	0.7	7.4	12.4	16.0	5.4	9.0
Cycle Q Clear(g_c), s	6.3	0.0	0.0	16.0	28.5	28.6	0.7	7.4	12.4	16.0	5.4	9.0
Prop In Lane	1.00		0.03	1.00		0.11	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	220	915	959	432	1035	1069	13	202	294	223	416	347
V/C Ratio(X)	0.78	0.41	0.41	1.10	0.59	0.59	0.79	0.54	0.87	1.31	0.23	0.36
Avail Cap(c_a), veh/h	527	915	959	432	1035	1069	139	265	386	223	416	347
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.8	0.0	0.0	57.0	17.6	17.6	64.5	54.6	56.8	57.0	40.9	42.2
Incr Delay (d2), s/veh	2.1	1.3	1.2	72.2	2.5	2.4	32.0	0.8	12.4	168.3	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.3	0.3	11.4	12.0	12.4	0.4	3.4	4.6	17.7	2.5	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.9	1.3	1.2	129.2	20.1	20.0	96.4	55.4	69.2	225.3	41.0	42.5
LnGrp LOS	E	A	A	F	C	C	F	E	E	F	D	D
Approach Vol, veh/h	942					1719		374		511		
Approach Delay, s/veh	11.6					50.1		65.9		146.7		
Approach LOS	B					D		E		F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	71.5	4.9	33.6	12.3	79.2	20.0	18.5				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	60.0	62.0	10.0	25.0	20.0	58.0	16.0	19.0				
Max Q Clear Time (g_c+I1), s	11.0	2.0	2.7	11.0	8.3	30.6	18.0	14.4				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.8	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	55.5
HCM 6th LOS	E

HCM 6th Signalized Intersection Summary Future Baseline PM Peak Hour (without RTP projects) 20: Chemawa Rd & SB Ramp

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑						↑	↑↑
Traffic Volume (veh/h)	0	695	1015	480	1820	0	0	0	0	270	15	385
Future Volume (veh/h)	0	695	1015	480	1820	0	0	0	0	270	15	385
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1856	1885	1885	1885	0				1870	1648	1870
Adj Flow Rate, veh/h	0	724	1057	500	1896	0				281	16	401
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	1	1	1	0				2	17	2
Cap, veh/h	0	1509	684	394	2468	0				339	19	634
Arrive On Green	0.00	0.43	0.43	0.22	0.69	0.00				0.21	0.23	0.23
Sat Flow, veh/h	0	3618	1598	1795	3676	0				1489	85	2790
Grp Volume(v), veh/h	0	724	1057	500	1896	0				297	0	401
Grp Sat Flow(s), veh/h/ln	0	1763	1598	1795	1791	0				1574	0	1395
Q Serve(g_s), s	0.0	14.2	41.0	21.0	33.5	0.0				17.3	0.0	12.4
Cycle Q Clear(g_c), s	0.0	14.2	41.0	21.0	33.5	0.0				17.3	0.0	12.4
Prop In Lane	0.00		1.00	1.00		0.00				0.95		1.00
Lane Grp Cap(c), veh/h	0	1509	684	394	2468	0				358	0	634
V/C Ratio(X)	0.00	0.48	1.55	1.27	0.77	0.00				0.83	0.00	0.63
Avail Cap(c_a), veh/h	0	1509	684	394	2468	0				674	0	1194
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	19.7	27.4	37.4	9.8	0.0				36.2	0.0	33.4
Incr Delay (d2), s/veh	0.0	0.1	252.7	140.2	1.4	0.0				1.9	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	5.5	62.5	24.3	11.3	0.0				6.6	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	19.8	280.1	177.6	11.2	0.0				38.1	0.0	33.8
LnGrp LOS	A	B	F	F	B	A				D	A	C
Approach Vol, veh/h		1781			2396						698	
Approach Delay, s/veh		174.3			45.9						35.6	
Approach LOS		F			D						D	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	25.0	45.0		25.8		70.0						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	39.0	39.0		39.0		39.0						
Max Q Clear Time (g_c+Q), s	43.0	43.0		19.3		35.5						
Green Ext Time (p_c), s	0.0	0.0		0.5		2.0						

Intersection Summary

HCM 6th Ctrl Delay	91.3
HCM 6th LOS	F

HCM Signalized Intersection Capacity Analysis - Baseline PM Peak Hour (without RTP projects)

21: NB Ramp & Chemawa Rd

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Traffic Volume (vph)	245	720	0	0	1110	250	1190	0	505	0	0	0
Future Volume (vph)	245	720	0	0	1110	250	1190	0	505	0	0	0
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	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			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	1.00			0.97		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1770	3505			3457		1698	1698	1568			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1770	3505			3457		1698	1698	1568			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	261	766	0	0	1181	266	1266	0	537	0	0	0
RTOR Reduction (vph)	0	0	0	0	17	0	0	0	89	0	0	0
Lane Group Flow (vph)	261	766	0	0	1430	0	633	633	448	0	0	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	3%	0%	0%	1%	4%	1%	0%	3%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases							4		4			
Actuated Green, G (s)	16.6	51.9			29.3		39.9	39.9	39.9			
Effective Green, g (s)	18.6	53.9			31.3		41.9	41.9	41.9			
Actuated g/C Ratio	0.18	0.52			0.30		0.40	0.40	0.40			
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0	6.0			
Vehicle Extension (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lane Grp Cap (vph)	317	1820			1042		685	685	632			
v/s Ratio Prot	c0.15	0.22			c0.41							
v/s Ratio Perm							c0.37	0.37	0.29			
v/c Ratio	0.82	0.42			1.37		0.92	0.92	0.71			
Uniform Delay, d1	41.0	15.3			36.2		29.4	29.4	25.8			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	15.0	0.1			173.8		17.9	17.9	3.0			
Delay (s)	56.1	15.4			210.1		47.4	47.4	28.8			
Level of Service	E	B			F		D	D	C			
Approach Delay (s)		25.7			210.1			41.9			0.0	
Approach LOS		C			F			D			A	
Intersection Summary												
HCM 2000 Control Delay			94.9				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			1.08									
Actuated Cycle Length (s)			103.8				Sum of lost time (s)		14.0			
Intersection Capacity Utilization			115.2%				ICU Level of Service		H			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection SummaFuture Baseline PM Peak Hour (without RTP projects) 22: Portland Rd & Chemawa Rd/Hazegreen Rd

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	555	415	65	410	35	555	500	140	115	630	125
Future Volume (veh/h)	125	555	415	65	410	35	555	500	140	115	630	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1841	1841	1870	1841	1885	1885	1900	1826	1826	1781	1870	1856
Adj Flow Rate, veh/h	134	597	446	70	441	38	597	538	151	124	677	134
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
Percent Heavy Veh, %	4	4	2	4	1	1	0	5	5	8	2	3
Cap, veh/h	178	634	546	100	514	44	250	788	220	174	920	407
Arrive On Green	0.10	0.34	0.34	0.06	0.30	0.28	0.14	0.29	0.27	0.10	0.26	0.26
Sat Flow, veh/h	1753	1841	1585	1753	1711	147	1810	2677	748	1697	3554	1572
Grp Volume(v), veh/h	134	597	446	70	0	479	597	348	341	124	677	134
Grp Sat Flow(s),veh/h/ln	1753	1841	1585	1753	0	1859	1810	1735	1691	1697	1777	1572
Q Serve(g_s), s	5.9	25.0	20.4	3.1	0.0	19.3	11.0	14.1	14.3	5.6	13.9	5.5
Cycle Q Clear(g_c), s	5.9	25.0	20.4	3.1	0.0	19.3	11.0	14.1	14.3	5.6	13.9	5.5
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.44	1.00		1.00
Lane Grp Cap(c), veh/h	178	634	546	100	0	559	250	510	498	174	920	407
V/C Ratio(X)	0.75	0.94	0.82	0.70	0.00	0.86	2.39	0.68	0.69	0.71	0.74	0.33
Avail Cap(c_a), veh/h	242	634	546	242	0	607	250	566	552	234	1161	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.8	25.3	23.8	36.8	0.0	26.3	34.3	24.8	25.3	34.6	27.0	23.9
Incr Delay (d2), s/veh	7.3	22.2	9.1	6.3	0.0	10.7	636.7	2.6	2.8	5.1	1.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	13.6	8.2	1.4	0.0	9.2	48.7	5.6	5.6	2.5	5.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.1	47.5	32.9	43.2	0.0	37.0	671.0	27.4	28.0	39.7	28.6	24.2
LnGrp LOS	D	D	C	D	A	D	F	C	C	D	C	C
Approach Vol, veh/h	1177				549		1286				935	
Approach Delay, s/veh	41.4				37.8		326.4				29.5	
Approach LOS	D				D		F				C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.0	24.6	12.1	27.9	12.2	27.4	8.6	31.4				
Change Period (Y+Rc), s	4.5	6.0	4.5	6.0	4.5	6.0	4.5	6.0				
Max Green Setting (Gmax), s	10.5	24.0	10.5	24.0	10.5	24.0	10.5	24.0				
Max Q Clear Time (g_c+I1), s	13.0	15.9	7.9	21.3	7.6	16.3	5.1	27.0				
Green Ext Time (p_c), s	0.0	2.7	0.1	0.6	0.1	2.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	130.9
HCM 6th LOS	F

HCM 6th Signalized Intersection SummaFuture Baseline PM Peak Hour (without RTP projects)

23: River Rd & Chemawa Rd

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	220	205	190	300	130	215	1085	110	145	880	100
Future Volume (veh/h)	145	220	205	190	300	130	215	1085	110	145	880	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1710	1697	1683	1697	1710	1697	1697	1697	1697	1697	1683	1683
Adj Flow Rate, veh/h	153	232	216	200	316	137	226	1142	116	153	926	105
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
Percent Heavy Veh, %	0	1	2	1	0	1	1	1	1	1	2	2
Cap, veh/h	175	250	201	222	303	245	248	1421	144	173	1269	144
Arrive On Green	0.11	0.15	0.15	0.14	0.18	0.18	0.15	0.48	0.48	0.21	0.88	0.87
Sat Flow, veh/h	1629	1697	1365	1616	1710	1387	1616	2950	299	1616	2890	328
Grp Volume(v), veh/h	153	232	216	200	316	137	226	623	635	153	512	519
Grp Sat Flow(s),veh/h/ln	1629	1697	1365	1616	1710	1387	1616	1612	1638	1616	1599	1618
Q Serve(g_s), s	12.0	17.6	19.1	15.8	23.0	11.7	17.9	42.5	42.7	11.9	14.1	14.3
Cycle Q Clear(g_c), s	12.0	17.6	19.1	15.8	23.0	11.7	17.9	42.5	42.7	11.9	14.1	14.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		0.20
Lane Grp Cap(c), veh/h	175	250	201	222	303	245	248	777	789	173	702	711
V/C Ratio(X)	0.87	0.93	1.07	0.90	1.04	0.56	0.91	0.80	0.80	0.89	0.73	0.73
Avail Cap(c_a), veh/h	194	250	201	242	303	245	360	777	789	186	702	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89
Uniform Delay (d), s/veh	57.1	54.8	55.4	55.2	53.5	48.9	54.2	28.5	28.5	50.3	5.3	5.4
Incr Delay (d2), s/veh	25.2	33.5	79.3	30.1	63.8	1.7	16.6	8.6	8.6	30.4	5.9	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	9.8	11.0	8.3	15.2	4.2	8.4	17.7	18.1	5.7	3.2	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.4	88.3	134.8	85.3	117.3	50.6	70.8	37.0	37.1	80.7	11.2	11.2
LnGrp LOS	F	F	F	F	F	D	E	D	D	F	B	B
Approach Vol, veh/h	601			653			1484			1184		
Approach Delay, s/veh	103.5			93.5			42.2			20.2		
Approach LOS	F			F			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	67.1	21.8	23.1	23.9	61.1	18.0	27.0				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	5.0	60.0	19.5	19.0	29.0	46.0	15.5	23.0				
Max Q Clear Time (g_c+I1), s	13.9	44.7	17.8	21.1	19.9	16.3	14.0	25.0				
Green Ext Time (p_c), s	0.0	1.8	0.0	0.0	0.0	1.4	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	53.5
HCM 6th LOS	D

Intersection				
Intersection Delay, s/veh	9.9			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	489	505	525	206
Demand Flow Rate, veh/h	494	511	530	207
Vehicles Circulating, veh/h	306	367	286	681
Vehicles Exiting, veh/h	582	449	514	197
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.4	10.9	9.8	9.0
Approach LOS	A	B	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	494	511	530	207
Cap Entry Lane, veh/h	1010	949	1031	689
Entry HV Adj Factor	0.989	0.988	0.990	0.994
Flow Entry, veh/h	489	505	525	206
Cap Entry, veh/h	999	938	1020	685
V/C Ratio	0.489	0.538	0.514	0.300
Control Delay, s/veh	9.4	10.9	9.8	9.0
LOS	A	B	A	A
95th %tile Queue, veh	3	3	3	1

HCM 6th Signalized Intersection Summary Future Baseline PM Peak Hour (without RTP projects) 25: Salem Pkwy & Verda Ln/Hyacinth St

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	635	40	450	870	310	95	1195	630	195	905	175
Future Volume (veh/h)	40	635	40	450	870	310	95	1195	630	195	905	175
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1885	1885	1870	1826	1885	1856	1885	1870	1856	1900
Adj Flow Rate, veh/h	41	648	41	459	888	316	97	1219	0	199	923	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
Percent Heavy Veh, %	0	3	1	1	2	5	1	3	1	2	3	0
Cap, veh/h	111	343	289	359	604	492	134	1193		260	1472	
Arrive On Green	0.06	0.18	0.18	0.20	0.32	0.32	0.07	0.34	0.00	0.15	0.42	0.00
Sat Flow, veh/h	1810	1856	1566	1795	1870	1522	1795	3526	1598	1781	3526	1610
Grp Volume(v), veh/h	41	648	41	459	888	316	97	1219	0	199	923	0
Grp Sat Flow(s), veh/h/ln	1810	1856	1566	1795	1870	1522	1795	1763	1598	1781	1763	1610
Q Serve(g_s), s	2.8	24.0	2.3	26.0	42.0	23.1	6.9	44.0	0.0	14.0	26.9	0.0
Cycle Q Clear(g_c), s	2.8	24.0	2.3	26.0	42.0	23.1	6.9	44.0	0.0	14.0	26.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	111	343	289	359	604	492	134	1193		260	1472	
V/C Ratio(X)	0.37	1.89	0.14	1.28	1.47	0.64	0.72	1.02		0.76	0.63	
Avail Cap(c_a), veh/h	111	343	289	359	604	492	290	1193		274	1472	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	58.6	53.0	29.4	52.0	44.0	37.6	58.8	43.0	0.0	53.3	29.9	0.0
Incr Delay (d2), s/veh	2.0	412.1	0.2	145.1	220.2	2.2	7.1	31.6	0.0	11.5	2.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	50.3	1.1	26.0	56.0	8.8	3.3	23.2	0.0	6.8	11.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.6	465.1	29.6	197.1	264.2	39.8	65.9	74.6	0.0	64.9	31.9	0.0
LnGrp LOS	E	F	C	F	F	D	E	F		E	C	
Approach Vol, veh/h	730			1663			1316			A	1122	A
Approach Delay, s/veh	417.9			203.1			74.0				37.8	
Approach LOS	F			F			E				D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	3.7	58.3	12.0	46.0	24.0	48.0	30.0	28.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	6.0	* 6	5.0	5.0				
Max Green Setting (Gmax), s	20.0	41.0	7.0	41.0	19.0	* 42	25.0	23.0				
Max Q Clear Time (g_c+10), s	10.0	28.9	4.8	44.0	16.0	46.0	28.0	26.0				
Green Ext Time (p_c), s	0.1	5.1	0.0	0.0	0.1	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 162.0

HCM 6th LOS F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

1: River Rd & Brooklake Rd

2043 Future Baseline PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	90	30	265	125	180	25	135	115	240	200	25
Future Volume (veh/h)	10	90	30	265	125	180	25	135	115	240	200	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1604	1870	1870	1870	1841	1841	1856	1856	1856	1870	1870	1870
Adj Flow Rate, veh/h	10	94	31	276	130	188	26	141	120	250	208	26
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
Percent Heavy Veh, %	20	2	2	2	4	4	3	3	3	2	2	2
Cap, veh/h	258	422	139	455	210	304	109	496	386	475	375	43
Arrive On Green	0.31	0.31	0.30	0.31	0.31	0.30	0.54	0.55	0.54	0.54	0.55	0.54
Sat Flow, veh/h	910	1346	444	1266	671	970	75	903	703	695	682	78
Grp Volume(v), veh/h	10	0	125	276	0	318	287	0	0	484	0	0
Grp Sat Flow(s),veh/h/ln	910	0	1790	1266	0	1641	1682	0	0	1455	0	0
Q Serve(g_s), s	0.6	0.0	3.0	12.0	0.0	9.6	0.0	0.0	0.0	6.4	0.0	0.0
Cycle Q Clear(g_c), s	10.2	0.0	3.0	15.0	0.0	9.6	5.3	0.0	0.0	11.7	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.59	0.09		0.42	0.52		0.05
Lane Grp Cap(c), veh/h	258	0	561	455	0	514	977	0	0	881	0	0
V/C Ratio(X)	0.04	0.00	0.22	0.61	0.00	0.62	0.29	0.00	0.00	0.55	0.00	0.00
Avail Cap(c_a), veh/h	285	0	615	493	0	564	977	0	0	881	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.4	0.0	14.8	20.3	0.0	17.2	7.2	0.0	0.0	8.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.2	1.9	0.0	1.8	0.8	0.0	0.0	2.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.0	3.2	0.0	3.2	1.4	0.0	0.0	2.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.5	0.0	15.0	22.2	0.0	19.0	7.9	0.0	0.0	10.8	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	A	A	A	B	A	A
Approach Vol, veh/h	135		594				287		484			
Approach Delay, s/veh	15.5		20.5				7.9		10.8			
Approach LOS	B		C				A		B			
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	36.0		22.2		36.0		22.2					
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5					
Max Green Setting (Gmax), s	31.5		19.5		31.5		19.5					
Max Q Clear Time (g_c+I1), s	7.3		12.2		13.7		17.0					
Green Ext Time (p_c), s	1.5		0.3		2.7		0.7					
Intersection Summary												
HCM 6th Ctrl Delay	14.5											
HCM 6th LOS	B											

HCM 6th TWSC

2: SB Ramps & Brooklake Rd

2043 Future Baseline PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	141.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗		↖	↑						↖	↗
Traffic Vol, veh/h	0	390	330	395	280	0	0	0	0	190	0	440
Future Vol, veh/h	0	390	330	395	280	0	0	0	0	190	0	440
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	180	-	-	-	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	12	9	3	12	0	0	0	0	0	0	10
Mvmt Flow	0	411	347	416	295	0	0	0	0	200	0	463
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	758	0	0				1712	1885	295
Stage 1	-	-	-	-	-	-				1127	1127	-
Stage 2	-	-	-	-	-	-				585	758	-
Critical Hdwy	-	-	-	4.13	-	-				6.4	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.4	5.5	-
Follow-up Hdwy	-	-	-	2.227	-	-				3.5	4	3.39
Pot Cap-1 Maneuver	0	-	-	849	-	0				~ 101	71	726
Stage 1	0	-	-	-	-	0				312	282	-
Stage 2	0	-	-	-	-	0				561	418	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	849	-	-				~ 52	0	726
Mov Cap-2 Maneuver	-	-	-	-	-	-				~ 52	0	-
Stage 1	-	-	-	-	-	-				312	0	-
Stage 2	-	-	-	-	-	-				286	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			7.7			\$ 447.9					
HCM LOS							F					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2						
Capacity (veh/h)	-	-	849	-	52	726						
HCM Lane V/C Ratio	-	-	0.49	-	3.846	0.638						
HCM Control Delay (s)	-	-	13.2		\$ 1442.6	18.3						
HCM Lane LOS	-	-	B	-	F	C						
HCM 95th %tile Q(veh)	-	-	2.7	-	21.9	4.6						
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

HCM 6th TWSC 3: Brooklake Rd & NB Ramps

2043 Future Baseline PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	148.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			↰	↱			
Traffic Vol, veh/h	350	230	0	0	505	200	170	0	290	0	0	0
Future Vol, veh/h	350	230	0	0	505	200	170	0	290	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	155	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	18	4	0	0	4	0	14	0	4	0	0	0
Mvmt Flow	385	253	0	0	555	220	187	0	319	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	775	0	- - - 0 1688 1798 253
Stage 1	-	-	- - - 1023 1023 -
Stage 2	-	-	- - - 665 775 -
Critical Hdwy	4.28	-	- - - 6.54 6.5 6.24
Critical Hdwy Stg 1	-	-	- - - 5.54 5.5 -
Critical Hdwy Stg 2	-	-	- - - 5.54 5.5 -
Follow-up Hdwy	2.362	-	- - - 3.626 4 3.336
Pot Cap-1 Maneuver	774	-	0 0 - - ~ 96 81 781
Stage 1	-	-	0 0 - - 330 316 -
Stage 2	-	-	0 0 - - 490 411 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	774	-	- - - ~ 48 0 781
Mov Cap-2 Maneuver	-	-	- - - ~ 48 0 -
Stage 1	-	-	- - - ~ 166 0 -
Stage 2	-	-	- - - 490 0 -

Approach	EB	WB	NB
HCM Control Delay, s	8.5	0	\$ 553.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	48	781	774	-	-	-
HCM Lane V/C Ratio	3.892	0.408	0.497	-	-	-
HCM Control Delay (s)	\$ 1475.5	12.8	14.2	-	-	-
HCM Lane LOS	F	B	B	-	-	-
HCM 95th %tile Q(veh)	20.7	2	2.8	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary

4: Portland Rd & Brooklake Rd

2043 Future Baseline PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	90	295	40	150	55	95	595	40	50	480	390
Future Volume (veh/h)	255	90	295	40	150	55	95	595	40	50	480	390
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1856	1870	1870	1870	1811	1856	1856	1900	1870	1826
Adj Flow Rate, veh/h	268	95	0	42	158	58	100	626	42	53	505	411
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
Percent Heavy Veh, %	7	7	3	2	2	2	6	3	3	0	2	5
Cap, veh/h	397	110		122	427	143	313	758	51	248	780	646
Arrive On Green	0.35	0.36	0.00	0.35	0.36	0.35	0.06	0.44	0.42	0.04	0.42	0.42
Sat Flow, veh/h	867	307	1572	181	1189	397	1725	1719	115	1810	1870	1547
Grp Volume(v), veh/h	363	0	0	258	0	0	100	0	668	53	505	411
Grp Sat Flow(s),veh/h/ln	1175	0	1572	1768	0	0	1725	0	1835	1810	1870	1547
Q Serve(g_s), s	13.7	0.0	0.0	0.0	0.0	0.0	2.4	0.0	23.5	1.2	15.8	15.4
Cycle Q Clear(g_c), s	21.7	0.0	0.0	8.0	0.0	0.0	2.4	0.0	23.5	1.2	15.8	15.4
Prop In Lane	0.74		1.00	0.16		0.22	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	491	0		668	0	0	313	0	809	248	780	646
V/C Ratio(X)	0.74	0.00		0.39	0.00	0.00	0.32	0.00	0.83	0.21	0.65	0.64
Avail Cap(c_a), veh/h	672	0		914	0	0	399	0	1077	381	1098	909
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	0.0	0.0	17.7	0.0	0.0	13.2	0.0	18.0	15.2	17.0	16.9
Incr Delay (d2), s/veh	2.3	0.0	0.0	0.3	0.0	0.0	0.4	0.0	4.7	0.3	1.3	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	0.0	3.2	0.0	0.0	0.8	0.0	9.5	0.5	6.2	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.1	0.0	0.0	18.0	0.0	0.0	13.6	0.0	22.8	15.6	18.3	18.4
LnGrp LOS	C	A		B	A	A	B	A	C	B	B	B
Approach Vol, veh/h		363	A		258			768			969	
Approach Delay, s/veh		25.1			18.0			21.6			18.2	
Approach LOS		C			B			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	36.3		30.3	8.4	34.6		30.3				
Change Period (Y+Rc), s	4.5	* 5.4		5.0	4.5	* 5.4		5.0				
Max Green Setting (Gmax), s	7.5	* 42		36.0	7.5	* 42		36.0				
Max Q Clear Time (g_c+I1), s	3.2	25.5		23.7	4.4	17.8		10.0				
Green Ext Time (p_c), s	0.0	5.4		1.6	0.0	7.1		1.2				

Intersection Summary

HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
5: Wheatland Rd & Clear Lake Rd

2043 Future Baseline PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	65	0	20	0	70	55	15	180	0
Future Vol, veh/h	0	0	0	65	0	20	0	70	55	15	180	0
Conflicting Peds, #/hr	0	0	0	2	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	89	92	89	92	89	89	89	89	92
Heavy Vehicles, %	2	2	2	0	2	0	2	2	2	8	0	2
Mvmt Flow	0	0	0	73	0	22	0	79	62	17	202	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	357	379	204	350	348	112	202	0	0	143	0	0
Stage 1	236	236	-	112	112	-	-	-	-	-	-	-
Stage 2	121	143	-	238	236	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.1	6.52	6.2	4.12	-	-	4.18	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.5	4.018	3.3	2.218	-	-	2.272	-	-
Pot Cap-1 Maneuver	598	553	837	608	576	947	1370	-	-	1404	-	-
Stage 1	767	710	-	898	803	-	-	-	-	-	-	-
Stage 2	883	779	-	770	710	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	578	544	835	599	567	945	1370	-	-	1401	-	-
Mov Cap-2 Maneuver	578	544	-	599	567	-	-	-	-	-	-	-
Stage 1	767	700	-	896	801	-	-	-	-	-	-	-
Stage 2	862	777	-	758	700	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		11.4			0			0.6			
HCM LOS	A		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1370	-	-	-	655	1401	-	-				
HCM Lane V/C Ratio	-	-	-	-	0.146	0.012	-	-				
HCM Control Delay (s)	0	-	-	0	11.4	7.6	0	-				
HCM Lane LOS	A	-	-	A	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0	-	-				

HCM 6th TWSC
6: River Rd & Clear Lake Rd/Quinaby Rd

2043 Future Baseline PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	32.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	
Traffic Vol, veh/h	25	55	20	110	120	100	35	170	80	80	405	30
Future Vol, veh/h	25	55	20	110	120	100	35	170	80	80	405	30
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	30	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	6	6	0	0	7	0	2	0	8	1	0
Mvmt Flow	26	57	21	113	124	103	36	175	82	82	418	31

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	948	927	435	926	901	216	449	0	0	257	0	0
Stage 1	598	598	-	288	288	-	-	-	-	-	-	-
Stage 2	350	329	-	638	613	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.26	7.1	6.5	6.27	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.354	3.5	4	3.363	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	243	264	613	251	280	811	1122	-	-	1274	-	-
Stage 1	492	485	-	724	677	-	-	-	-	-	-	-
Stage 2	671	639	-	468	486	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	117	232	612	179	246	811	1122	-	-	1274	-	-
Mov Cap-2 Maneuver	117	232	-	179	246	-	-	-	-	-	-	-
Stage 1	473	443	-	696	651	-	-	-	-	-	-	-
Stage 2	456	615	-	360	444	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB				
HCM Control Delay, s	35.7		108.3		1			1.2				
HCM LOS	E		F									

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1122	-	-	177	612	209	811	1274	-	-
HCM Lane V/C Ratio	0.032	-	-	0.466	0.034	1.135	0.127	0.065	-	-
HCM Control Delay (s)	8.3	0	-	41.9	11.1	151	10.1	8	0	-
HCM Lane LOS	A	A	-	E	B	F	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	2.2	0.1	11.3	0.4	0.2	-	-

HCM 6th TWSC
7: 35th Ave & Quinaby Rd

2043 Future Baseline PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	2.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	155	50	15	210	80	25
Future Vol, veh/h	155	50	15	210	80	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	0	0	3	0	0
Mvmt Flow	189	61	18	256	98	30
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	250	0	512	220
Stage 1	-	-	-	-	220	-
Stage 2	-	-	-	-	292	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1327	-	525	825
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	762	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1327	-	517	825
Mov Cap-2 Maneuver	-	-	-	-	517	-
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	750	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		13.2	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	567	-	-	1327	-	
HCM Lane V/C Ratio	0.226	-	-	0.014	-	
HCM Control Delay (s)	13.2	-	-	7.8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.9	-	-	0	-	

HCM 6th TWSC
8: Portland Rd & Quinaby Rd

2043 Future Baseline PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	19.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	95	115	105	485	645	95
Future Vol, veh/h	95	115	105	485	645	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	240	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	4	5	1	2
Mvmt Flow	100	121	111	511	679	100
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1462	729	779	0	-	0
Stage 1	729	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	143	420	829	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	124	420	829	-	-	-
Mov Cap-2 Maneuver	124	-	-	-	-	-
Stage 1	417	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	140.1	1.8		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	829	-	202	-	-	
HCM Lane V/C Ratio	0.133	-	1.094	-	-	
HCM Control Delay (s)	10	-	140.1	-	-	
HCM Lane LOS	B	-	F	-	-	
HCM 95th %tile Q(veh)	0.5	-	10.4	-	-	

HCM 6th TWSC
9: River Rd & Perkins St

2043 Future Baseline PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	6.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	150	25	285	70	15	515
Future Vol, veh/h	150	25	285	70	15	515
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	1	0	2	2	0	1
Mvmt Flow	172	29	328	80	17	592
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	994	368	0	0	408	0
Stage 1	368	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	273	682	-	-	1162	-
Stage 1	702	-	-	-	-	-
Stage 2	535	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	267	682	-	-	1162	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	523	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	40.7	0		0.2		
HCM LOS	E					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 292		1162	-	
HCM Lane V/C Ratio	-	- 0.689		0.015	-	
HCM Control Delay (s)	-	- 40.7		8.1	0	
HCM Lane LOS	-	- E		A	A	
HCM 95th %tile Q(veh)	-	- 4.7		0	-	

HCM 6th TWSC
10: 35th Ave & Perkins St

2043 Future Baseline PM Peak Hour
09/08/2020

Intersection												
Int Delay, s/veh	7.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	25	60	50	75	10	100	95	70	20	45	5
Future Vol, veh/h	5	25	60	50	75	10	100	95	70	20	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	5	0
Mvmt Flow	6	28	68	57	85	11	114	108	80	23	51	6
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	524	516	54	524	479	148	57	0	0	188	0	0
Stage 1	100	100	-	376	376	-	-	-	-	-	-	-
Stage 2	424	416	-	148	103	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.51	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.009	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	467	459	1019	467	487	904	1560	-	-	1398	-	-
Stage 1	911	806	-	649	618	-	-	-	-	-	-	-
Stage 2	612	587	-	859	812	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	364	414	1019	382	439	904	1560	-	-	1398	-	-
Mov Cap-2 Maneuver	364	414	-	382	439	-	-	-	-	-	-	-
Stage 1	836	792	-	596	567	-	-	-	-	-	-	-
Stage 2	471	539	-	760	798	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	11.3		17.9		2.8		2.2					
HCM LOS	B		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1560	-	-	677	432	1398	-	-				
HCM Lane V/C Ratio	0.073	-	-	0.151	0.355	0.016	-	-				
HCM Control Delay (s)	7.5	-	-	11.3	17.9	7.6	0	-				
HCM Lane LOS	A	-	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	0.5	1.6	0.1	-	-				

HCM 6th TWSC
11: Portland Rd & Perkins St

2043 Future Baseline PM Peak Hour
09/08/2020

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	95	90	585	705	40
Future Vol, veh/h	20	95	90	585	705	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	6	0	4	2	0
Mvmt Flow	22	102	97	629	758	43
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1603	780	801	0	-	0
Stage 1	780	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.2	-	-	-
Pot Cap-1 Maneuver	117	389	831	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	435	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	96	389	831	-	-	-
Mov Cap-2 Maneuver	96	-	-	-	-	-
Stage 1	374	-	-	-	-	-
Stage 2	435	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	31.9	1.3		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	831	-	254	-	-	
HCM Lane V/C Ratio	0.116	-	0.487	-	-	
HCM Control Delay (s)	9.9	0	31.9	-	-	
HCM Lane LOS	A	A	D	-	-	
HCM 95th %tile Q(veh)	0.4	-	2.5	-	-	

HCM 6th TWSC
12: River Rd & Parkmeadow Dr

2043 Future Baseline PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	100	250	325	555	100
Future Vol, veh/h	40	100	250	325	555	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	1	1	1	1	0
Mvmt Flow	44	111	278	361	617	111
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1590	673	728	0	-	0
Stage 1	673	-	-	-	-	-
Stage 2	917	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	118	457	880	-	-	-
Stage 1	505	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	81	457	880	-	-	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	345	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	24.5	4.8		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	880	-	337	-	-	
HCM Lane V/C Ratio	0.316	-	0.462	-	-	
HCM Control Delay (s)	11	-	24.5	-	-	
HCM Lane LOS	B	-	C	-	-	
HCM 95th %tile Q(veh)	1.4	-	2.3	-	-	

HCM Signalized Intersection Capacity Analysis

13: River Rd & Wheatland Rd/Springwood Dr

2043 Future Baseline PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	405	15	5	5	565	905	10	15	775	15
Future Volume (vph)	10	5	405	15	5	5	565	905	10	15	775	15
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		3.0	4.0	
Lane Util. Factor		1.00	0.88		1.00		0.97	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.96		1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1837	2663		1711		3502	3564		1805	3564	
Flt Permitted		0.97	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1837	2663		1711		3502	3564		1805	3564	
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)	11	5	440	16	5	5	614	984	11	16	842	16
RTOR Reduction (vph)	0	0	399	0	5	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	16	41	0	21	0	614	995	0	16	857	0
Confl. Peds. (#/hr)			7	7			5		4	4		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	2%	8%	0%	0%	0%	1%	8%	0%	1%	0%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		6.3	6.3		2.2		20.6	58.1		1.9	39.4	
Effective Green, g (s)		8.3	8.3		2.7		20.6	61.1		2.9	42.4	
Actuated g/C Ratio		0.09	0.09		0.03		0.23	0.68		0.03	0.47	
Clearance Time (s)		6.0	6.0		4.5		4.0	7.0		4.0	7.0	
Vehicle Extension (s)		1.0	1.0		0.5		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		169	245		51		801	2419		58	1679	
v/s Ratio Prot		0.01			c0.01		c0.18	0.28		0.01	c0.24	
v/s Ratio Perm			c0.02									
v/c Ratio		0.09	0.17		0.41		0.77	0.41		0.28	0.51	
Uniform Delay, d1		37.4	37.7		42.9		32.5	6.4		42.5	16.6	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.1		2.0		4.0	0.5		0.9	1.1	
Delay (s)		37.5	37.8		44.9		36.4	7.0		43.5	17.7	
Level of Service		D	D		D		D	A		D	B	
Approach Delay (s)		37.8			44.9			18.2			18.2	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			21.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			18.5		
Intersection Capacity Utilization			56.1%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

14: Keizer Station Blvd & Ulali Dr

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	90	105	125	105	25	45	105	90	10	155	80
Future Volume (veh/h)	125	90	105	125	105	25	45	105	90	10	155	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1870	1870	1900	1885	1900
Adj Flow Rate, veh/h	142	102	119	142	119	28	51	119	102	11	176	91
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	2	2	0	1	0
Cap, veh/h	621	241	281	550	453	107	630	323	277	610	655	560
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	1260	790	921	1178	1487	350	1130	930	797	1178	1885	1610
Grp Volume(v), veh/h	142	0	221	142	0	147	51	0	221	11	176	91
Grp Sat Flow(s),veh/h/ln	1260	0	1711	1178	0	1837	1130	0	1727	1178	1885	1610
Q Serve(g_s), s	2.2	0.0	2.4	2.5	0.0	1.4	0.8	0.0	2.2	0.2	1.5	0.9
Cycle Q Clear(g_c), s	3.6	0.0	2.4	4.9	0.0	1.4	2.3	0.0	2.2	2.4	1.5	0.9
Prop In Lane	1.00		0.54	1.00		0.19	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	621	0	521	550	0	560	630	0	600	610	655	560
V/C Ratio(X)	0.23	0.00	0.42	0.26	0.00	0.26	0.08	0.00	0.37	0.02	0.27	0.16
Avail Cap(c_a), veh/h	1387	0	1561	1266	0	1676	1759	0	2326	1787	2539	2169
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.4	0.0	6.4	8.3	0.0	6.0	6.2	0.0	5.6	6.5	5.4	5.2
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.4	0.4	0.0	0.3	0.1	0.0	0.3	0.0	0.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.5	0.0	6.6	8.4	0.0	6.1	6.3	0.0	5.8	6.5	5.5	5.2
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	363					289		272		278		
Approach Delay, s/veh	6.9					7.3		5.9		5.4		
Approach LOS	A					A		A		A		
Timer - Assigned Phs	2		4			6		8				
Phs Duration (G+Y+Rc), s	12.0		11.0			12.0		11.0				
Change Period (Y+Rc), s	4.0		4.0			4.0		4.0				
Max Green Setting (Gmax), s	31.0		21.0			31.0		21.0				
Max Q Clear Time (g_c+I1), s	4.4		6.9			4.3		5.6				
Green Ext Time (p_c), s	0.2		0.2			0.3		0.3				
Intersection Summary												
HCM 6th Ctrl Delay	6.4											
HCM 6th LOS	A											

HCM Signalized Intersection Capacity Analysis

15: River Rd & Lockhaven Dr

2043 Future Baseline PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	260	165	315	225	205	130	835	275	165	725	125
Future Volume (vph)	160	260	165	315	225	205	130	835	275	165	725	125
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	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.97	1.00	0.99	1.00
Flpb, ped/bikes	1.00	1.00	1.00	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	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	1863	1557	3400	1863	1577	1805	3574	1523	1787	3467	125
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	1863	1557	3400	1863	1577	1805	3574	1523	1787	3467	125
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)	165	268	170	325	232	211	134	861	284	170	747	129
RTOR Reduction (vph)	0	0	140	0	0	172	0	0	158	0	8	0
Lane Group Flow (vph)	165	268	30	325	232	39	134	861	126	170	868	0
Confl. Peds. (#/hr)	1		7	7		1	5		3	3		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	1%	3%	2%	1%	0%	1%	3%	1%	1%	3%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8			4			2			
Actuated Green, G (s)	15.8	23.0	23.0	16.5	23.7	23.7	13.0	59.0	59.0	18.0	64.0	
Effective Green, g (s)	16.8	24.0	24.0	17.5	24.7	24.7	13.5	61.0	61.0	18.5	66.0	
Actuated g/C Ratio	0.12	0.18	0.18	0.13	0.18	0.18	0.10	0.45	0.45	0.14	0.48	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.5	6.0	6.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	219	326	272	434	335	284	177	1591	678	241	1670	
v/s Ratio Prot	0.09	c0.14		c0.10	0.12		c0.07	c0.24		c0.10	0.25	
v/s Ratio Perm			0.02			0.02			0.08			
v/c Ratio	0.75	0.82	0.11	0.75	0.69	0.14	0.76	0.54	0.19	0.71	0.52	
Uniform Delay, d1	58.1	54.4	47.5	57.6	52.6	47.2	60.2	27.8	23.0	56.6	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.2	14.6	0.1	6.1	4.9	0.1	15.0	1.3	0.6	7.4	1.2	
Delay (s)	70.3	69.0	47.6	63.7	57.5	47.3	75.2	29.1	23.6	64.1	25.7	
Level of Service	E	E	D	E	E	D	E	C	C	E	C	
Approach Delay (s)		63.3			57.3			32.7			31.9	
Approach LOS		E			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			42.6									
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			137.0									
Intersection Capacity Utilization			69.2%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

16: Verda Ln & Lockhaven Dr

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	595	30	60	745	145	25	60	70	165	65	25
Future Volume (veh/h)	20	595	30	60	745	145	25	60	70	165	65	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1870	1841	1841	1826	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	626	32	63	784	158	26	65	74	179	71	27
Peak Hour Factor	0.92	0.95	0.95	0.95	0.95	0.92	0.95	0.92	0.95	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	5	2	2	2	2	2	2	2	2
Cap, veh/h	252	1075	55	434	935	188	109	191	184	328	104	35
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.23	0.24	0.24	0.23	0.24	0.24
Sat Flow, veh/h	595	1736	89	757	1510	304	147	800	770	934	435	148
Grp Volume(v), veh/h	22	0	658	63	0	942	165	0	0	277	0	0
Grp Sat Flow(s),veh/h/ln	595	0	1824	757	0	1814	1717	0	0	1516	0	0
Q Serve(g_s), s	1.7	0.0	12.1	3.0	0.0	23.1	0.0	0.0	0.0	4.7	0.0	0.0
Cycle Q Clear(g_c), s	24.9	0.0	12.1	15.1	0.0	23.1	4.6	0.0	0.0	9.3	0.0	0.0
Prop In Lane	1.00		0.05	1.00		0.17	0.16		0.45	0.65		0.10
Lane Grp Cap(c), veh/h	252	0	1130	434	0	1124	468	0	0	454	0	0
V/C Ratio(X)	0.09	0.00	0.58	0.15	0.00	0.84	0.35	0.00	0.00	0.61	0.00	0.00
Avail Cap(c_a), veh/h	456	0	1756	694	0	1747	878	0	0	809	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.3	0.0	6.4	10.9	0.0	8.5	18.1	0.0	0.0	19.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.5	0.2	0.0	2.2	0.5	0.0	0.0	1.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	3.1	0.4	0.0	6.3	1.8	0.0	0.0	3.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.5	0.0	6.9	11.0	0.0	10.7	18.6	0.0	0.0	21.1	0.0	0.0
LnGrp LOS	B	A	A	B	A	B	B	A	A	C	A	A
Approach Vol, veh/h	680				1005				165		277	
Approach Delay, s/veh	7.2				10.7				18.6		21.1	
Approach LOS	A				B				B		C	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	17.4		38.9		17.4		38.9					
Change Period (Y+Rc), s	4.5		4.5		4.5		4.5					
Max Green Setting (Gmax), s	27.3		53.7		27.3		53.7					
Max Q Clear Time (g_c+I1), s	6.6		26.9		11.3		25.1					
Green Ext Time (p_c), s	0.9		5.0		1.5		9.2					
Intersection Summary												
HCM 6th Ctrl Delay	11.6											
HCM 6th LOS	B											

HCM 6th Signalized Intersection Summary

17: Kafir Dr/14th Ave & Lockhaven Dr

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	795	10	10	905	145	20	55	15	50	20	40
Future Volume (veh/h)	50	795	10	10	905	145	20	55	15	50	20	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.98		0.97	0.97		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1870	1900	1900	1900	1900	1885	1900	1900
Adj Flow Rate, veh/h	52	820	10	10	933	149	21	57	15	52	21	41
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
Percent Heavy Veh, %	0	4	4	0	2	0	0	0	0	1	0	0
Cap, veh/h	350	1348	16	435	1360	1145	199	187	49	182	67	131
Arrive On Green	0.02	0.74	0.74	0.01	0.73	0.73	0.13	0.13	0.13	0.12	0.12	0.12
Sat Flow, veh/h	1810	1815	22	1810	1870	1575	1328	1439	379	1304	562	1096
Grp Volume(v), veh/h	52	0	830	10	933	149	21	0	72	52	0	62
Grp Sat Flow(s), veh/h/ln	1810	0	1837	1810	1870	1575	1328	0	1818	1304	0	1658
Q Serve(g_s), s	0.8	0.0	21.2	0.2	27.2	2.9	1.5	0.0	3.6	3.8	0.0	3.4
Cycle Q Clear(g_c), s	0.8	0.0	21.2	0.2	27.2	2.9	4.9	0.0	3.6	7.4	0.0	3.4
Prop In Lane	1.00		0.01	1.00		1.00	1.00		0.21	1.00		0.66
Lane Grp Cap(c), veh/h	350	0	1364	435	1360	1145	199	0	236	182	0	199
V/C Ratio(X)	0.15	0.00	0.61	0.02	0.69	0.13	0.11	0.00	0.31	0.29	0.00	0.31
Avail Cap(c_a), veh/h	453	0	1364	566	1360	1145	332	0	418	325	0	381
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.6	0.0	6.0	5.8	7.4	4.1	41.5	0.0	39.4	43.7	0.0	40.2
Incr Delay (d2), s/veh	0.1	0.0	2.0	0.0	2.8	0.2	0.1	0.0	0.3	0.3	0.0	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.3	0.0	6.9	0.0	9.4	0.8	0.5	0.0	1.6	1.3	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.6	0.0	8.1	5.8	10.3	4.3	41.6	0.0	39.7	44.0	0.0	40.6
LnGrp LOS	A	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h	882			1092			93			114		
Approach Delay, s/veh	8.0			9.4			40.1			42.1		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	78.3		17.0	6.3	76.7		17.0				
Change Period (Y+Rc), s	4.0	5.0		* 5	4.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	56.0		* 23	8.0	56.0		22.0				
Max Q Clear Time (g_c+1/2, s)	23.2			9.4	2.8	29.2		6.9				
Green Ext Time (p_c), s	0.0	1.2		0.1	0.0	1.4		0.1				

Intersection Summary

HCM 6th Ctrl Delay 11.9

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

18: McLeod Ln & Lockhaven Dr

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	760	15	30	940	280	15	60	5	135	30	25
Future Volume (veh/h)	45	760	15	30	940	280	15	60	5	135	30	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1885	1885	1900	1870	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	826	16	33	1022	304	16	65	5	147	33	27
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
Percent Heavy Veh, %	0	4	4	0	1	1	0	2	0	0	0	0
Cap, veh/h	63	2591	50	42	1970	581	19	101	86	111	101	83
Arrive On Green	0.04	0.74	0.73	0.05	1.00	1.00	0.01	0.05	0.05	0.06	0.10	0.10
Sat Flow, veh/h	1810	3509	68	1810	2711	800	1810	1870	1601	1810	965	790
Grp Volume(v), veh/h	49	412	430	33	672	654	16	65	5	147	0	60
Grp Sat Flow(s),veh/h/ln	1810	1749	1828	1810	1791	1721	1810	1870	1601	1810	0	1755
Q Serve(g_s), s	3.5	10.5	10.5	2.3	0.0	0.0	1.1	4.4	0.4	8.0	0.0	4.1
Cycle Q Clear(g_c), s	3.5	10.5	10.5	2.3	0.0	0.0	1.1	4.4	0.4	8.0	0.0	4.1
Prop In Lane	1.00		0.04	1.00		0.47	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	63	1291	1350	42	1301	1250	19	101	86	111	0	184
V/C Ratio(X)	0.77	0.32	0.32	0.78	0.52	0.52	0.83	0.65	0.06	1.32	0.00	0.33
Avail Cap(c_a), veh/h	167	1291	1350	111	1301	1250	111	317	271	111	0	297
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.66	0.66	0.66	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.2	5.8	5.8	61.6	0.0	0.0	64.2	60.3	58.4	61.0	0.0	53.9
Incr Delay (d2), s/veh	7.2	0.7	0.6	7.6	1.0	1.0	27.3	2.6	0.1	193.6	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	3.7	3.8	1.1	0.4	0.4	0.7	2.2	0.2	9.7	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.4	6.5	6.5	69.2	1.0	1.0	91.5	62.8	58.5	254.6	0.0	54.3
LnGrp LOS	E	A	A	E	A	A	F	E	E	F	A	D
Approach Vol, veh/h	891		1359				86			207		
Approach Delay, s/veh	9.9		2.7				67.9			196.6		
Approach LOS	A		A				E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	100.0	5.4	17.6	8.6	98.4	12.0	11.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	8.0	75.0	8.0	22.0	12.0	71.0	8.0	22.0				
Max Q Clear Time (g_c+I4.3)	12.5	12.5	3.1	6.1	5.5	2.0	10.0	6.4				
Green Ext Time (p_c), s	0.0	1.1	0.0	0.1	0.0	2.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	23.2
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

19: Chemawa Rd & Lockhaven Dr & Keizer Station Blvd

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	730	5	455	1130	65	10	105	245	275	90	110
Future Volume (veh/h)	165	730	5	455	1130	65	10	105	245	275	90	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1900	1885	1885	1900	1811	1811	1900	1826	1826
Adj Flow Rate, veh/h	172	760	5	474	1177	68	10	109	255	286	94	115
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
Percent Heavy Veh, %	3	3	3	0	1	1	0	6	6	0	5	5
Cap, veh/h	220	1864	12	432	1990	115	13	202	294	223	416	347
Arrive On Green	0.13	1.00	1.00	0.12	0.58	0.57	0.01	0.11	0.11	0.12	0.23	0.23
Sat Flow, veh/h	3428	3590	24	3510	3442	199	1810	1811	2638	1810	1826	1526
Grp Volume(v), veh/h	172	373	392	474	612	633	10	109	255	286	94	115
Grp Sat Flow(s),veh/h/ln	1714	1763	1851	1755	1791	1849	1810	1811	1319	1810	1826	1526
Q Serve(g_s), s	6.3	0.0	0.0	16.0	28.5	28.6	0.7	7.4	12.4	16.0	5.4	8.2
Cycle Q Clear(g_c), s	6.3	0.0	0.0	16.0	28.5	28.6	0.7	7.4	12.4	16.0	5.4	8.2
Prop In Lane	1.00		0.01	1.00		0.11	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	220	915	961	432	1035	1069	13	202	294	223	416	347
V/C Ratio(X)	0.78	0.41	0.41	1.10	0.59	0.59	0.79	0.54	0.87	1.28	0.23	0.33
Avail Cap(c_a), veh/h	527	915	961	432	1035	1069	139	265	386	223	416	347
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.8	0.0	0.0	57.0	17.6	17.6	64.5	54.6	56.8	57.0	40.9	41.9
Incr Delay (d2), s/veh	2.1	1.3	1.2	72.2	2.5	2.4	32.0	0.8	12.4	157.5	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.3	0.3	11.4	12.0	12.4	0.4	3.4	4.6	17.0	2.5	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.9	1.3	1.2	129.2	20.1	20.0	96.4	55.4	69.2	214.5	41.0	42.1
LnGrp LOS	E	A	A	F	C	C	F	E	E	F	D	D
Approach Vol, veh/h	937					1719		374		495		
Approach Delay, s/veh	11.6					50.1		65.9		141.5		
Approach LOS	B					D		E		F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	71.5	4.9	33.6	12.3	79.2	20.0	18.5				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	60.0	62.0	10.0	25.0	20.0	58.0	16.0	19.0				
Max Q Clear Time (g_c+11g), s	11.0	2.0	2.7	10.2	8.3	30.6	18.0	14.4				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.8	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	54.4
HCM 6th LOS	D

HCM 6th Signalized Intersection Summary

20: Chemawa Rd & SB Ramp

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑	↑↑	↑↑						↑↑	↑↑
Traffic Volume (veh/h)	0	690	1015	480	1805	0	0	0	0	270	15	385
Future Volume (veh/h)	0	690	1015	480	1805	0	0	0	0	270	15	385
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1856	1885	1885	1885	0				1870	1648	1870
Adj Flow Rate, veh/h	0	719	1057	500	1880	0				281	16	401
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	1	1	1	0				2	17	2
Cap, veh/h	0	1483	1183	658	2368	0				352	20	659
Arrive On Green	0.00	0.42	0.42	0.19	0.66	0.00				0.21	0.24	0.24
Sat Flow, veh/h	0	3618	2812	3483	3676	0				1489	85	2790
Grp Volume(v), veh/h	0	719	1057	500	1880	0				297	0	401
Grp Sat Flow(s), veh/h/ln	0	1763	1406	1742	1791	0				1574	0	1395
Q Serve(g_s), s	0.0	11.6	27.2	10.6	29.2	0.0				14.0	0.0	10.0
Cycle Q Clear(g_c), s	0.0	11.6	27.2	10.6	29.2	0.0				14.0	0.0	10.0
Prop In Lane	0.00		1.00	1.00		0.00				0.95		1.00
Lane Grp Cap(c), veh/h	0	1483	1183	658	2368	0				372	0	659
V/C Ratio(X)	0.00	0.48	0.89	0.76	0.79	0.00				0.80	0.00	0.61
Avail Cap(c_a), veh/h	0	1854	1479	938	2368	0				827	0	1467
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	16.4	21.0	29.9	9.4	0.0				29.0	0.0	26.5
Incr Delay (d2), s/veh	0.0	0.1	5.4	1.2	1.8	0.0				1.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.3	8.9	4.4	9.4	0.0				5.1	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	16.5	26.4	31.1	11.2	0.0				30.5	0.0	26.9
LnGrp LOS	A	B	C	C	B	A				C	A	C
Approach Vol, veh/h		1776			2380						698	
Approach Delay, s/veh		22.4			15.4						28.4	
Approach LOS		C			B						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	8.7	36.8		22.4		55.5						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	39.0	39.0		39.0		39.0						
Max Q Clear Time (g_c+I1), s	29.2	29.2		16.0		31.2						
Green Ext Time (p_c), s	0.1	1.6		0.5		3.4						

Intersection Summary

HCM 6th Ctrl Delay	19.8
HCM 6th LOS	B

HCM Signalized Intersection Capacity Analysis

21: NB Ramp & Chemawa Rd

2043 Future Baseline PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	245	715	0	0	1060	250	1225	0	500	0	0	0
Future Volume (vph)	245	715	0	0	1060	250	1225	0	500	0	0	0
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	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			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	1.00			0.97		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1770	3505			3452		1698	1698	1568			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1770	3505			3452		1698	1698	1568			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	261	761	0	0	1128	266	1303	0	532	0	0	0
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	90	0	0	0
Lane Group Flow (vph)	261	761	0	0	1376	0	651	652	442	0	0	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	3%	0%	0%	1%	4%	1%	0%	3%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases							4		4			
Actuated Green, G (s)	16.7	52.0			29.3		41.1	41.1	41.1			
Effective Green, g (s)	18.7	54.0			31.3		43.1	43.1	43.1			
Actuated g/C Ratio	0.18	0.51			0.30		0.41	0.41	0.41			
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0	6.0			
Vehicle Extension (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lane Grp Cap (vph)	314	1800			1028		696	696	643			
v/s Ratio Prot	c0.15	0.22			c0.40							
v/s Ratio Perm							0.38	0.38	0.28			
v/c Ratio	0.83	0.42			1.34		0.94	0.94	0.69			
Uniform Delay, d1	41.7	15.9			36.9		29.7	29.7	25.5			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	16.2	0.1			158.9		19.6	19.8	2.5			
Delay (s)	57.8	15.9			195.8		49.2	49.5	27.9			
Level of Service	E	B			F		D	D	C			
Approach Delay (s)		26.6			195.8			43.1			0.0	
Approach LOS		C			F			D			A	
Intersection Summary												
HCM 2000 Control Delay			89.2				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			1.07									
Actuated Cycle Length (s)			105.1				Sum of lost time (s)		14.0			
Intersection Capacity Utilization			94.8%				ICU Level of Service		F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

22: Portland Rd & Chemawa Rd/Hazegreen Rd

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	555	415	65	410	35	555	500	140	115	630	125
Future Volume (veh/h)	125	555	415	65	410	35	555	500	140	115	630	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1841	1841	1870	1841	1885	1885	1900	1826	1826	1781	1870	1856
Adj Flow Rate, veh/h	134	597	446	70	441	38	597	538	151	124	677	134
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
Percent Heavy Veh, %	4	4	2	4	1	1	0	5	5	8	2	3
Cap, veh/h	178	634	546	100	514	44	250	788	220	174	920	407
Arrive On Green	0.10	0.34	0.34	0.06	0.30	0.28	0.14	0.29	0.27	0.10	0.26	0.26
Sat Flow, veh/h	1753	1841	1585	1753	1711	147	1810	2677	748	1697	3554	1572
Grp Volume(v), veh/h	134	597	446	70	0	479	597	348	341	124	677	134
Grp Sat Flow(s),veh/h/ln	1753	1841	1585	1753	0	1859	1810	1735	1691	1697	1777	1572
Q Serve(g_s), s	5.9	25.0	20.4	3.1	0.0	19.3	11.0	14.1	14.3	5.6	13.9	5.5
Cycle Q Clear(g_c), s	5.9	25.0	20.4	3.1	0.0	19.3	11.0	14.1	14.3	5.6	13.9	5.5
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.44	1.00		1.00
Lane Grp Cap(c), veh/h	178	634	546	100	0	559	250	510	498	174	920	407
V/C Ratio(X)	0.75	0.94	0.82	0.70	0.00	0.86	2.39	0.68	0.69	0.71	0.74	0.33
Avail Cap(c_a), veh/h	242	634	546	242	0	607	250	566	552	234	1161	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.8	25.3	23.8	36.8	0.0	26.3	34.3	24.8	25.3	34.6	27.0	23.9
Incr Delay (d2), s/veh	7.3	22.2	9.1	6.3	0.0	10.7	636.7	2.6	2.8	5.1	1.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	13.6	8.2	1.4	0.0	9.2	48.7	5.6	5.6	2.5	5.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.1	47.5	32.9	43.2	0.0	37.0	671.0	27.4	28.0	39.7	28.6	24.2
LnGrp LOS	D	D	C	D	A	D	F	C	C	D	C	C
Approach Vol, veh/h	1177			549			1286			935		
Approach Delay, s/veh	41.4			37.8			326.4			29.5		
Approach LOS	D			D			F			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.0	24.6	12.1	27.9	12.2	27.4	8.6	31.4				
Change Period (Y+Rc), s	4.5	6.0	4.5	6.0	4.5	6.0	4.5	6.0				
Max Green Setting (Gmax), s	10.5	24.0	10.5	24.0	10.5	24.0	10.5	24.0				
Max Q Clear Time (g_c+I13), s	15.9	7.9	21.3	7.6	16.3	5.1	27.0					
Green Ext Time (p_c), s	0.0	2.7	0.1	0.6	0.1	2.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	130.9
HCM 6th LOS	F

HCM 6th Signalized Intersection Summary

23: River Rd & Chemawa Rd

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	220	205	190	300	130	215	1085	110	145	880	100
Future Volume (veh/h)	145	220	205	190	300	130	215	1085	110	145	880	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1710	1697	1683	1697	1710	1697	1697	1697	1697	1697	1683	1683
Adj Flow Rate, veh/h	153	232	216	200	316	137	226	1142	116	153	926	105
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
Percent Heavy Veh, %	0	1	2	1	0	1	1	1	1	1	2	2
Cap, veh/h	175	250	201	222	303	245	248	1421	144	173	1269	144
Arrive On Green	0.11	0.15	0.15	0.14	0.18	0.18	0.15	0.48	0.48	0.21	0.88	0.87
Sat Flow, veh/h	1629	1697	1365	1616	1710	1387	1616	2950	299	1616	2890	328
Grp Volume(v), veh/h	153	232	216	200	316	137	226	623	635	153	512	519
Grp Sat Flow(s),veh/h/ln	1629	1697	1365	1616	1710	1387	1616	1612	1638	1616	1599	1618
Q Serve(g_s), s	12.0	17.6	19.1	15.8	23.0	11.7	17.9	42.5	42.7	11.9	14.1	14.3
Cycle Q Clear(g_c), s	12.0	17.6	19.1	15.8	23.0	11.7	17.9	42.5	42.7	11.9	14.1	14.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		0.20
Lane Grp Cap(c), veh/h	175	250	201	222	303	245	248	777	789	173	702	711
V/C Ratio(X)	0.87	0.93	1.07	0.90	1.04	0.56	0.91	0.80	0.80	0.89	0.73	0.73
Avail Cap(c_a), veh/h	194	250	201	242	303	245	360	777	789	186	702	711
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89
Uniform Delay (d), s/veh	57.1	54.8	55.4	55.2	53.5	48.9	54.2	28.5	28.5	50.3	5.3	5.4
Incr Delay (d2), s/veh	25.2	33.5	79.3	30.1	63.8	1.7	16.6	8.6	8.6	30.4	5.9	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	9.8	11.0	8.3	15.2	4.2	8.4	17.7	18.1	5.7	3.2	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.4	88.3	134.8	85.3	117.3	50.6	70.8	37.0	37.1	80.7	11.2	11.2
LnGrp LOS	F	F	F	F	F	D	E	D	D	F	B	B
Approach Vol, veh/h	601			653			1484			1184		
Approach Delay, s/veh	103.5			93.5			42.2			20.2		
Approach LOS	F			F			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	67.1	21.8	23.1	23.9	61.1	18.0	27.0				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	5.0	60.0	19.5	19.0	29.0	46.0	15.5	23.0				
Max Q Clear Time (g_c+I1), s	13.9	44.7	17.8	21.1	19.9	16.3	14.0	25.0				
Green Ext Time (p_c), s	0.0	1.8	0.0	0.0	0.0	1.4	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	53.5
HCM 6th LOS	D

HCM 6th Roundabout
24: Verda Ln & Chemawa Rd

2043 Future Baseline PM Peak Hour

09/08/2020

Intersection				
Intersection Delay, s/veh	9.7			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	474	500	525	206
Demand Flow Rate, veh/h	479	506	530	207
Vehicles Circulating, veh/h	306	367	271	676
Vehicles Exiting, veh/h	577	434	514	197
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.2	10.8	9.5	8.9
Approach LOS	A	B	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	479	506	530	207
Cap Entry Lane, veh/h	1010	949	1047	692
Entry HV Adj Factor	0.989	0.988	0.990	0.994
Flow Entry, veh/h	474	500	525	206
Cap Entry, veh/h	999	938	1036	688
V/C Ratio	0.474	0.533	0.507	0.299
Control Delay, s/veh	9.2	10.8	9.5	8.9
LOS	A	B	A	A
95th %tile Queue, veh	3	3	3	1

HCM 6th Signalized Intersection Summary

25: Salem Pkwy & Verda Ln/Hyacinth St

2043 Future Baseline PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	635	40	450	870	310	95	1195	630	195	905	175
Future Volume (veh/h)	40	635	40	450	870	310	95	1195	630	195	905	175
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1885	1885	1870	1826	1885	1856	1885	1870	1856	1900
Adj Flow Rate, veh/h	41	648	41	459	888	316	97	1219	0	199	923	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
Percent Heavy Veh, %	0	3	1	1	2	5	1	3	1	2	3	0
Cap, veh/h	111	343	289	359	604	492	134	1193		260	1472	
Arrive On Green	0.06	0.18	0.18	0.20	0.32	0.32	0.07	0.34	0.00	0.15	0.42	0.00
Sat Flow, veh/h	1810	1856	1566	1795	1870	1522	1795	3526	1598	1781	3526	1610
Grp Volume(v), veh/h	41	648	41	459	888	316	97	1219	0	199	923	0
Grp Sat Flow(s), veh/h/ln	1810	1856	1566	1795	1870	1522	1795	1763	1598	1781	1763	1610
Q Serve(g_s), s	2.8	24.0	2.3	26.0	42.0	23.1	6.9	44.0	0.0	14.0	26.9	0.0
Cycle Q Clear(g_c), s	2.8	24.0	2.3	26.0	42.0	23.1	6.9	44.0	0.0	14.0	26.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	111	343	289	359	604	492	134	1193		260	1472	
V/C Ratio(X)	0.37	1.89	0.14	1.28	1.47	0.64	0.72	1.02		0.76	0.63	
Avail Cap(c_a), veh/h	111	343	289	359	604	492	290	1193		274	1472	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	58.6	53.0	29.4	52.0	44.0	37.6	58.8	43.0	0.0	53.3	29.9	0.0
Incr Delay (d2), s/veh	2.0	412.1	0.2	145.1	220.2	2.2	7.1	31.6	0.0	11.5	2.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	50.3	1.1	26.0	56.0	8.8	3.3	23.2	0.0	6.8	11.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.6	465.1	29.6	197.1	264.2	39.8	65.9	74.6	0.0	64.9	31.9	0.0
LnGrp LOS	E	F	C	F	F	D	E	F		E	C	
Approach Vol, veh/h	730			1663			1316			A	1122	A
Approach Delay, s/veh	417.9			203.1			74.0				37.8	
Approach LOS	F			F			E				D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	3.7	58.3	12.0	46.0	24.0	48.0	30.0	28.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	6.0	* 6	5.0	5.0				
Max Green Setting (Gmax), s	20.0	41.0	7.0	41.0	19.0	* 42	25.0	23.0				
Max Q Clear Time (g_c+10), s	10.0	28.9	4.8	44.0	16.0	46.0	28.0	26.0				
Green Ext Time (p_c), s	0.1	5.1	0.0	0.0	0.1	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 162.0

HCM 6th LOS F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

1: River Rd & Brooklake Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	90	30	255	125	185	25	130	115	255	185	25
Future Volume (veh/h)	10	90	30	255	125	185	25	130	115	255	185	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1604	1870	1870	1870	1841	1841	1856	1856	1856	1870	1870	1870
Adj Flow Rate, veh/h	10	94	31	266	130	193	26	135	120	266	193	26
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
Percent Heavy Veh, %	20	2	2	2	4	4	3	3	3	2	2	2
Cap, veh/h	250	415	137	449	203	302	111	489	397	503	346	43
Arrive On Green	0.31	0.31	0.30	0.31	0.31	0.30	0.54	0.55	0.54	0.54	0.55	0.54
Sat Flow, veh/h	906	1346	444	1266	660	980	78	884	717	735	625	77
Grp Volume(v), veh/h	10	0	125	266	0	323	281	0	0	485	0	0
Grp Sat Flow(s),veh/h/ln	906	0	1790	1266	0	1639	1679	0	0	1438	0	0
Q Serve(g_s), s	0.6	0.0	3.0	11.4	0.0	9.8	0.0	0.0	0.0	6.7	0.0	0.0
Cycle Q Clear(g_c), s	10.4	0.0	3.0	14.5	0.0	9.8	5.1	0.0	0.0	11.8	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.60	0.09		0.43	0.55		0.05
Lane Grp Cap(c), veh/h	250	0	552	449	0	506	983	0	0	879	0	0
V/C Ratio(X)	0.04	0.00	0.23	0.59	0.00	0.64	0.29	0.00	0.00	0.55	0.00	0.00
Avail Cap(c_a), veh/h	284	0	619	496	0	567	983	0	0	879	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.7	0.0	14.9	20.2	0.0	17.4	7.0	0.0	0.0	8.2	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.2	1.6	0.0	2.0	0.7	0.0	0.0	2.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.0	3.0	0.0	3.3	1.3	0.0	0.0	2.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	0.0	15.1	21.8	0.0	19.4	7.7	0.0	0.0	10.7	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	A	A	A	B	A	A
Approach Vol, veh/h	135			589			281			485		
Approach Delay, s/veh	15.6			20.5			7.7			10.7		
Approach LOS	B			C			A			B		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	36.0			21.8			36.0			21.8		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	31.5			19.5			31.5			19.5		
Max Q Clear Time (g_c+I1), s	7.1			12.4			13.8			16.5		
Green Ext Time (p_c), s	1.5			0.3			2.8			0.9		
Intersection Summary												
HCM 6th Ctrl Delay	14.4											
HCM 6th LOS	B											

HCM 6th TWSC

2: SB Ramps & Brooklake Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	148.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗		↖	↑						↖	↗
Traffic Vol, veh/h	0	400	355	395	295	0	0	0	0	185	0	440
Future Vol, veh/h	0	400	355	395	295	0	0	0	0	185	0	440
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	180	-	-	-	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	12	9	3	12	0	0	0	0	0	0	10
Mvmt Flow	0	421	374	416	311	0	0	0	0	195	0	463
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	795	0	0				1751	1938	311
Stage 1	-	-	-	-	-	-				1143	1143	-
Stage 2	-	-	-	-	-	-				608	795	-
Critical Hdwy	-	-	-	4.13	-	-				6.4	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.4	5.5	-
Follow-up Hdwy	-	-	-	2.227	-	-				3.5	4	3.39
Pot Cap-1 Maneuver	0	-	-	822	-	0				~ 95	66	711
Stage 1	0	-	-	-	-	0				307	277	-
Stage 2	0	-	-	-	-	0				547	402	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	822	-	-				~ 47	0	711
Mov Cap-2 Maneuver	-	-	-	-	-	-				~ 47	0	-
Stage 1	-	-	-	-	-	-				307	0	-
Stage 2	-	-	-	-	-	-				270	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			7.9			\$ 484.2					
HCM LOS							F					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2						
Capacity (veh/h)	-	-	822	-	47	711						
HCM Lane V/C Ratio	-	-	0.506	-	4.143	0.651						
HCM Control Delay (s)	-	-	13.8		\$ 1590.7	19						
HCM Lane LOS	-	-	B	-	F	C						
HCM 95th %tile Q(veh)	-	-	2.9	-	21.8	4.8						
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			

HCM 6th TWSC

3: Brooklake Rd & NB Ramps

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	132											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	350	235	0	0	535	195	155	0	285	0	0	0
Future Vol, veh/h	350	235	0	0	535	195	155	0	285	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	155	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	18	4	0	0	4	0	14	0	4	0	0	0
Mvmt Flow	385	258	0	0	588	214	170	0	313	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	802	0	- - - 0 1723 1830 258
Stage 1	-	-	- - - 1028 1028 -
Stage 2	-	-	- - - 695 802 -
Critical Hdwy	4.28	-	- - - 6.54 6.5 6.24
Critical Hdwy Stg 1	-	-	- - - 5.54 5.5 -
Critical Hdwy Stg 2	-	-	- - - 5.54 5.5 -
Follow-up Hdwy	2.362	-	- - - 3.626 4 3.336
Pot Cap-1 Maneuver	755	-	0 0 - - ~ 91 77 776
Stage 1	-	-	0 0 - - 328 314 -
Stage 2	-	-	0 0 - - 474 399 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	755	-	- - - ~ 45 0 776
Mov Cap-2 Maneuver	-	-	- - - ~ 45 0 -
Stage 1	-	-	- - - ~ 161 0 -
Stage 2	-	-	- - - 474 0 -

Approach	EB	WB	NB
HCM Control Delay, s	8.7	0	\$ 515.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	45	776	755	-	-	-
HCM Lane V/C Ratio	3.785	0.404	0.509	-	-	-
HCM Control Delay (s)	\$ 1438.9	12.7	14.6	-	-	-
HCM Lane LOS	F	B	B	-	-	-
HCM 95th %tile Q(veh)	19	2	2.9	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary

4: Portland Rd & Brooklake Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	60	290	40	150	60	90	595	45	60	475	390
Future Volume (veh/h)	140	60	290	40	150	60	90	595	45	60	475	390
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1856	1870	1870	1870	1811	1856	1856	1900	1870	1826
Adj Flow Rate, veh/h	147	63	0	42	158	63	95	626	47	63	500	411
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
Percent Heavy Veh, %	7	7	3	2	2	2	6	3	3	0	2	5
Cap, veh/h	315	104		123	280	102	397	832	62	352	883	731
Arrive On Green	0.22	0.24	0.00	0.22	0.24	0.22	0.06	0.49	0.46	0.04	0.47	0.47
Sat Flow, veh/h	829	435	1572	182	1173	427	1725	1705	128	1810	1870	1547
Grp Volume(v), veh/h	210	0	0	263	0	0	95	0	673	63	500	411
Grp Sat Flow(s),veh/h/ln	1264	0	1572	1782	0	0	1725	0	1833	1810	1870	1547
Q Serve(g_s), s	1.2	0.0	0.0	0.0	0.0	0.0	1.5	0.0	15.6	0.9	10.1	10.0
Cycle Q Clear(g_c), s	8.1	0.0	0.0	6.9	0.0	0.0	1.5	0.0	15.6	0.9	10.1	10.0
Prop In Lane	0.70		1.00	0.16		0.24	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	394	0		471	0	0	397	0	895	352	883	731
V/C Ratio(X)	0.53	0.00		0.56	0.00	0.00	0.24	0.00	0.75	0.18	0.57	0.56
Avail Cap(c_a), veh/h	982	0		1261	0	0	557	0	1505	549	1536	1271
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.5	0.0	0.0	18.0	0.0	0.0	7.7	0.0	10.9	9.1	10.0	9.9
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.8	0.0	0.0	0.2	0.0	1.8	0.2	0.8	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	0.0	2.7	0.0	0.0	0.4	0.0	4.8	0.3	3.2	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.3	0.0	0.0	18.8	0.0	0.0	7.9	0.0	12.7	9.2	10.8	10.9
LnGrp LOS	B	A		B	A	A	A	A	B	A	B	B
Approach Vol, veh/h		210	A		263			768			974	
Approach Delay, s/veh		19.3			18.8			12.1			10.7	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.3	29.6		16.5	7.1	28.7		16.5				
Change Period (Y+Rc), s	4.5	* 5.4		5.0	4.5	* 5.4		5.0				
Max Green Setting (Gmax), s	7.5	* 42		36.0	7.5	* 42		36.0				
Max Q Clear Time (g_c+I1), s	2.9	17.6		10.1	3.5	12.1		8.9				
Green Ext Time (p_c), s	0.0	6.6		1.1	0.0	7.6		1.3				

Intersection Summary

HCM 6th Ctrl Delay 13.0

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
5: Wheatland Rd & Clear Lake Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	65	0	20	0	80	60	15	180	0
Future Vol, veh/h	0	0	0	65	0	20	0	80	60	15	180	0
Conflicting Peds, #/hr	0	0	0	2	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	89	92	89	92	89	89	89	89	92
Heavy Vehicles, %	2	2	2	0	2	0	2	2	2	8	0	2
Mvmt Flow	0	0	0	73	0	22	0	90	67	17	202	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	371	395	204	364	362	126	202	0	0	159	0	0
Stage 1	236	236	-	126	126	-	-	-	-	-	-	-
Stage 2	135	159	-	238	236	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.1	6.52	6.2	4.12	-	-	4.18	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.5	4.018	3.3	2.218	-	-	2.272	-	-
Pot Cap-1 Maneuver	586	542	837	596	565	930	1370	-	-	1385	-	-
Stage 1	767	710	-	883	792	-	-	-	-	-	-	-
Stage 2	868	766	-	770	710	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	565	533	835	588	556	928	1370	-	-	1382	-	-
Mov Cap-2 Maneuver	565	533	-	588	556	-	-	-	-	-	-	-
Stage 1	767	700	-	881	790	-	-	-	-	-	-	-
Stage 2	847	764	-	758	700	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		11.6			0			0.6			
HCM LOS	A		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1370	-	-	-	643	1382	-	-				
HCM Lane V/C Ratio	-	-	-	-	0.149	0.012	-	-				
HCM Control Delay (s)	0	-	-	0	11.6	7.6	0	-				
HCM Lane LOS	A	-	-	A	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0	-	-				

HCM 6th TWSC
6: River Rd & Clear Lake Rd/Quinaby Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	18.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	
Traffic Vol, veh/h	25	50	20	75	105	90	35	190	65	80	420	45
Future Vol, veh/h	25	50	20	75	105	90	35	190	65	80	420	45
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	30	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	6	6	0	0	7	0	2	0	8	1	0
Mvmt Flow	26	52	21	77	108	93	36	196	67	82	433	46
Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	976	955	457	960	945	230	479	0	0	263	0	0
Stage 1	620	620	-	302	302	-	-	-	-	-	-	-
Stage 2	356	335	-	658	643	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.26	7.1	6.5	6.27	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.354	3.5	4	3.363	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	232	254	595	238	264	797	1094	-	-	1267	-	-
Stage 1	479	474	-	712	668	-	-	-	-	-	-	-
Stage 2	666	635	-	457	472	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	118	222	594	171	231	797	1094	-	-	1267	-	-
Mov Cap-2 Maneuver	118	222	-	171	231	-	-	-	-	-	-	-
Stage 1	460	432	-	684	642	-	-	-	-	-	-	-
Stage 2	470	610	-	354	430	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB		SB		SB	
HCM Control Delay, s	35.5		64.9		1		1.2					
HCM LOS	E		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1094	-	-	172	594	202	797	1267	-	-		
HCM Lane V/C Ratio	0.033	-	-	0.45	0.035	0.919	0.116	0.065	-	-		
HCM Control Delay (s)	8.4	0	-	42	11.3	92.3	10.1	8	0	-		
HCM Lane LOS	A	A	-	E	B	F	B	A	A	-		
HCM 95th %tile Q(veh)	0.1	-	-	2.1	0.1	7.4	0.4	0.2	-	-		

HCM 6th TWSC
7: 35th Ave & Quinaby Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	160	50	15	210	85	30
Future Vol, veh/h	160	50	15	210	85	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	0	0	3	0	0
Mvmt Flow	195	61	18	256	104	37
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	256	0	518	226
Stage 1	-	-	-	-	226	-
Stage 2	-	-	-	-	292	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1321	-	521	818
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	762	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1321	-	513	818
Mov Cap-2 Maneuver	-	-	-	-	513	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	750	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		13.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	568	-	-	1321	-	
HCM Lane V/C Ratio	0.247	-	-	0.014	-	
HCM Control Delay (s)	13.4	-	-	7.8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	1	-	-	0	-	

HCM 6th TWSC
8: Portland Rd & Quinaby Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	18.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	110	105	480	610	100
Future Vol, veh/h	100	110	105	480	610	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	240	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	4	5	1	2
Mvmt Flow	105	116	111	505	642	105
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1422	695	747	0	-	0
Stage 1	695	-	-	-	-	-
Stage 2	727	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	152	439	852	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	482	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	132	439	852	-	-	-
Mov Cap-2 Maneuver	132	-	-	-	-	-
Stage 1	434	-	-	-	-	-
Stage 2	482	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	128.5	1.8		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	852	-	208	-	-	
HCM Lane V/C Ratio	0.13	-	1.063	-	-	
HCM Control Delay (s)	9.9	-	128.5	-	-	
HCM Lane LOS	A	-	F	-	-	
HCM 95th %tile Q(veh)	0.4	-	10	-	-	

HCM 6th TWSC
9: River Rd & Perkins St

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	6.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	145	30	290	75	20	490
Future Vol, veh/h	145	30	290	75	20	490
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	1	0	2	2	0	1
Mvmt Flow	167	34	333	86	23	563
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	985	376	0	0	419	0
Stage 1	376	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	276	675	-	-	1151	-
Stage 1	696	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	268	675	-	-	1151	-
Mov Cap-2 Maneuver	268	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	529	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	38.6	0	0.3			
HCM LOS	E					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	299	1151	-	
HCM Lane V/C Ratio	-	-	0.673	0.02	-	
HCM Control Delay (s)	-	-	38.6	8.2	0	
HCM Lane LOS	-	-	E	A	A	
HCM 95th %tile Q(veh)	-	-	4.5	0.1	-	

HCM 6th TWSC
10: 35th Ave & Perkins St

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	8.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	60	75	40	100	10	90	100	75	15	45	5
Future Vol, veh/h	5	60	75	40	100	10	90	100	75	15	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	5	0
Mvmt Flow	6	68	85	45	114	11	102	114	85	17	51	6
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	511	491	54	526	452	157	57	0	0	199	0	0
Stage 1	88	88	-	361	361	-	-	-	-	-	-	-
Stage 2	423	403	-	165	91	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.51	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.009	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	476	474	1019	466	505	894	1560	-	-	1385	-	-
Stage 1	925	816	-	662	628	-	-	-	-	-	-	-
Stage 2	613	595	-	842	821	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	357	433	1019	351	462	894	1560	-	-	1385	-	-
Mov Cap-2 Maneuver	357	433	-	351	462	-	-	-	-	-	-	-
Stage 1	857	805	-	613	582	-	-	-	-	-	-	-
Stage 2	451	551	-	697	810	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	12.8		18.3		2.5		1.8					
HCM LOS	B		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1560	-	-	619	439	1385	-	-				
HCM Lane V/C Ratio	0.066	-	-	0.257	0.388	0.012	-	-				
HCM Control Delay (s)	7.5	-	-	12.8	18.3	7.6	0	-				
HCM Lane LOS	A	-	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	1	1.8	0	-	-				

HCM 6th TWSC
11: Portland Rd & Perkins St

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	5.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	140	100	570	670	25
Future Vol, veh/h	30	140	100	570	670	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	6	0	4	2	0
Mvmt Flow	32	151	108	613	720	27
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1563	734	747	0	-	0
Stage 1	734	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.2	-	-	-
Pot Cap-1 Maneuver	124	414	870	-	-	-
Stage 1	478	-	-	-	-	-
Stage 2	432	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	101	414	870	-	-	-
Mov Cap-2 Maneuver	101	-	-	-	-	-
Stage 1	388	-	-	-	-	-
Stage 2	432	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	43	1.5		0		
HCM LOS	E					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	870	-	268	-	-	
HCM Lane V/C Ratio	0.124	-	0.682	-	-	
HCM Control Delay (s)	9.7	0	43	-	-	
HCM Lane LOS	A	A	E	-	-	
HCM 95th %tile Q(veh)	0.4	-	4.5	-	-	

HCM 6th TWSC
12: River Rd & Parkmeadow Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	100	250	330	545	90
Future Vol, veh/h	35	100	250	330	545	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	1	1	1	1	0
Mvmt Flow	39	111	278	367	606	100
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1579	656	706	0	-	0
Stage 1	656	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	120	467	897	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	83	467	897	-	-	-
Mov Cap-2 Maneuver	206	-	-	-	-	-
Stage 1	355	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	22.6	4.7		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	897	-	352	-	-	
HCM Lane V/C Ratio	0.31	-	0.426	-	-	
HCM Control Delay (s)	10.8	-	22.6	-	-	
HCM Lane LOS	B	-	C	-	-	
HCM 95th %tile Q(veh)	1.3	-	2.1	-	-	

HCM Signalized Intersection Capacity Analysis

13: River Rd & Wheatland Rd/Springwood Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	405	15	5	5	560	905	15	10	845	15
Future Volume (vph)	10	5	405	15	5	5	560	905	15	10	845	15
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		3.0	4.0	
Lane Util. Factor		1.00	0.88		1.00		0.97	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.96		1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	
Flt Protected		0.97	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1837	2663		1711		3502	3560		1805	3564	
Flt Permitted		0.97	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1837	2663		1711		3502	3560		1805	3564	
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)	11	5	440	16	5	5	609	984	16	11	918	16
RTOR Reduction (vph)	0	0	399	0	5	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	16	41	0	21	0	609	999	0	11	933	0
Confl. Peds. (#/hr)			7	7			5		4	4		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	2%	8%	0%	0%	0%	1%	8%	0%	1%	0%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		6.3	6.3		2.2		20.3	59.0		1.0	39.7	
Effective Green, g (s)		8.3	8.3		2.7		20.3	62.0		2.0	42.7	
Actuated g/C Ratio		0.09	0.09		0.03		0.23	0.69		0.02	0.47	
Clearance Time (s)		6.0	6.0		4.5		4.0	7.0		4.0	7.0	
Vehicle Extension (s)		1.0	1.0		0.5		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		169	245		51		789	2452		40	1690	
v/s Ratio Prot		0.01			c0.01		c0.17	0.28		0.01	c0.26	
v/s Ratio Perm			c0.02									
v/c Ratio		0.09	0.17		0.41		0.77	0.41		0.28	0.55	
Uniform Delay, d1		37.4	37.7		42.9		32.7	6.1		43.3	16.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.1		2.0		4.3	0.5		1.4	1.3	
Delay (s)		37.5	37.8		44.9		37.0	6.6		44.6	18.1	
Level of Service		D	D		D		D	A		D	B	
Approach Delay (s)		37.8			44.9			18.1			18.5	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			21.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			18.5		
Intersection Capacity Utilization			57.9%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

14: Keizer Station Blvd & Ulali Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	90	105	125	105	25	45	105	90	10	155	80
Future Volume (veh/h)	125	90	105	125	105	25	45	105	90	10	155	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1870	1870	1900	1885	1900
Adj Flow Rate, veh/h	142	102	119	142	119	28	51	119	102	11	176	91
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	2	2	0	1	0
Cap, veh/h	621	241	281	550	453	107	630	323	277	610	655	560
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	1260	790	921	1178	1487	350	1130	930	797	1178	1885	1610
Grp Volume(v), veh/h	142	0	221	142	0	147	51	0	221	11	176	91
Grp Sat Flow(s),veh/h/ln	1260	0	1711	1178	0	1837	1130	0	1727	1178	1885	1610
Q Serve(g_s), s	2.2	0.0	2.4	2.5	0.0	1.4	0.8	0.0	2.2	0.2	1.5	0.9
Cycle Q Clear(g_c), s	3.6	0.0	2.4	4.9	0.0	1.4	2.3	0.0	2.2	2.4	1.5	0.9
Prop In Lane	1.00		0.54	1.00		0.19	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	621	0	521	550	0	560	630	0	600	610	655	560
V/C Ratio(X)	0.23	0.00	0.42	0.26	0.00	0.26	0.08	0.00	0.37	0.02	0.27	0.16
Avail Cap(c_a), veh/h	1387	0	1561	1266	0	1676	1759	0	2326	1787	2539	2169
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.4	0.0	6.4	8.3	0.0	6.0	6.2	0.0	5.6	6.5	5.4	5.2
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.4	0.4	0.0	0.3	0.1	0.0	0.3	0.0	0.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.5	0.0	6.6	8.4	0.0	6.1	6.3	0.0	5.8	6.5	5.5	5.2
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	363					289		272		278		
Approach Delay, s/veh	6.9					7.3		5.9		5.4		
Approach LOS	A					A		A		A		
Timer - Assigned Phs	2		4			6		8				
Phs Duration (G+Y+Rc), s	12.0		11.0			12.0		11.0				
Change Period (Y+Rc), s	4.0		4.0			4.0		4.0				
Max Green Setting (Gmax), s	31.0		21.0			31.0		21.0				
Max Q Clear Time (g_c+I1), s	4.4		6.9			4.3		5.6				
Green Ext Time (p_c), s	0.2		0.2			0.3		0.3				
Intersection Summary												
HCM 6th Ctrl Delay			6.4									
HCM 6th LOS			A									

HCM Signalized Intersection Capacity Analysis

15: River Rd & Lockhaven Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	260	175	325	210	190	125	835	275	155	750	120
Future Volume (vph)	160	260	175	325	210	190	125	835	275	155	750	120
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	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	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	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	1863	1557	3400	1863	1577	1805	3574	1523	1787	3474	1200
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	1863	1557	3400	1863	1577	1805	3574	1523	1787	3474	1200
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)	165	268	180	335	216	196	129	861	284	160	773	124
RTOR Reduction (vph)	0	0	149	0	0	160	0	0	158	0	8	0
Lane Group Flow (vph)	165	268	31	335	216	36	129	861	126	160	889	0
Confl. Peds. (#/hr)	1		7	7		1	5		3	3		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	1%	3%	2%	1%	0%	1%	3%	1%	1%	3%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8			4			2			
Actuated Green, G (s)	15.8	22.9	22.9	16.9	24.0	24.0	12.7	58.6	58.6	18.1	64.0	
Effective Green, g (s)	16.8	23.9	23.9	17.9	25.0	25.0	13.2	60.6	60.6	18.6	66.0	
Actuated g/C Ratio	0.12	0.17	0.17	0.13	0.18	0.18	0.10	0.44	0.44	0.14	0.48	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.5	6.0	6.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	219	325	271	444	339	287	173	1580	673	242	1673	
v/s Ratio Prot	0.09	c0.14		c0.10	0.12		c0.07	c0.24		c0.09	0.26	
v/s Ratio Perm			0.02			0.02			0.08			
v/c Ratio	0.75	0.82	0.12	0.75	0.64	0.12	0.75	0.54	0.19	0.66	0.53	
Uniform Delay, d1	58.1	54.5	47.6	57.4	51.8	46.8	60.3	28.1	23.2	56.2	24.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.2	14.8	0.1	6.4	2.9	0.1	14.1	1.4	0.6	5.2	1.2	
Delay (s)	70.3	69.3	47.7	63.8	54.7	46.9	74.4	29.4	23.8	61.4	25.9	
Level of Service	E	E	D	E	D	D	E	C	C	E	C	
Approach Delay (s)		63.3			56.7			32.7			31.3	
Approach LOS		E			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			42.2									
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			137.0									
Intersection Capacity Utilization			68.9%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

16: Verda Ln & Lockhaven Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	600	20	45	740	145	25	50	65	185	45	25
Future Volume (veh/h)	20	600	20	45	740	145	25	50	65	185	45	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1841	1841	1826	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	632	21	47	779	158	26	54	68	201	49	27
Peak Hour Factor	0.92	0.95	0.95	0.95	0.95	0.92	0.95	0.92	0.95	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	5	2	2	2	2	2	2	2	2
Cap, veh/h	253	1092	36	436	930	189	115	183	189	368	69	35
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.23	0.24	0.24	0.23	0.24	0.24
Sat Flow, veh/h	598	1771	59	761	1508	306	163	762	787	1068	289	147
Grp Volume(v), veh/h	22	0	653	47	0	937	148	0	0	277	0	0
Grp Sat Flow(s), veh/h/ln	598	0	1830	761	0	1814	1712	0	0	1504	0	0
Q Serve(g_s), s	1.7	0.0	11.9	2.2	0.0	22.8	0.0	0.0	0.0	5.2	0.0	0.0
Cycle Q Clear(g_c), s	24.5	0.0	11.9	14.1	0.0	22.8	4.1	0.0	0.0	9.3	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.17	0.18		0.46	0.73		0.10
Lane Grp Cap(c), veh/h	253	0	1128	436	0	1118	472	0	0	459	0	0
V/C Ratio(X)	0.09	0.00	0.58	0.11	0.00	0.84	0.31	0.00	0.00	0.60	0.00	0.00
Avail Cap(c_a), veh/h	465	0	1779	707	0	1764	885	0	0	814	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.2	0.0	6.4	10.6	0.0	8.5	17.7	0.0	0.0	19.5	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.5	0.1	0.0	2.1	0.4	0.0	0.0	1.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	3.0	0.3	0.0	6.1	1.5	0.0	0.0	3.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.4	0.0	6.9	10.7	0.0	10.6	18.0	0.0	0.0	20.8	0.0	0.0
LnGrp LOS	B	A	A	B	A	B	B	A	A	C	A	A
Approach Vol, veh/h	675			984			148			277		
Approach Delay, s/veh	7.2			10.6			18.0			20.8		
Approach LOS	A			B			B			C		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	17.4			38.4			17.4			38.4		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	27.3			53.7			27.3			53.7		
Max Q Clear Time (g_c+I1), s	6.1			26.5			11.3			24.8		
Green Ext Time (p_c), s	0.8			5.0			1.5			9.0		

Intersection Summary

HCM 6th Ctrl Delay	11.4
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary

17: Kafir Dr/14th Ave & Lockhaven Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	815	20	10	905	140	20	55	15	45	25	40
Future Volume (veh/h)	55	815	20	10	905	140	20	55	15	45	25	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.98		0.97	0.97		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1870	1900	1900	1900	1900	1885	1900	1900
Adj Flow Rate, veh/h	57	840	21	10	933	144	21	57	15	46	26	41
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
Percent Heavy Veh, %	0	4	4	0	2	0	0	0	0	1	0	0
Cap, veh/h	355	1334	33	419	1365	1149	191	182	48	177	76	119
Arrive On Green	0.02	0.75	0.75	0.01	0.73	0.73	0.13	0.13	0.13	0.12	0.12	0.12
Sat Flow, veh/h	1810	1788	45	1810	1870	1575	1322	1439	379	1304	649	1024
Grp Volume(v), veh/h	57	0	861	10	933	144	21	0	72	46	0	67
Grp Sat Flow(s), veh/h/ln	1810	0	1833	1810	1870	1575	1322	0	1817	1304	0	1673
Q Serve(g_s), s	0.8	0.0	22.5	0.2	26.9	2.7	1.5	0.0	3.6	3.4	0.0	3.7
Cycle Q Clear(g_c), s	0.8	0.0	22.5	0.2	26.9	2.7	5.2	0.0	3.6	7.0	0.0	3.7
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.21	1.00		0.61
Lane Grp Cap(c), veh/h	355	0	1368	419	1365	1149	191	0	230	177	0	195
V/C Ratio(X)	0.16	0.00	0.63	0.02	0.68	0.13	0.11	0.00	0.31	0.26	0.00	0.34
Avail Cap(c_a), veh/h	457	0	1368	550	1365	1149	327	0	418	325	0	385
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.5	0.0	6.1	6.0	7.3	4.0	42.1	0.0	39.7	43.8	0.0	40.7
Incr Delay (d2), s/veh	0.1	0.0	2.2	0.0	2.8	0.2	0.1	0.0	0.3	0.3	0.0	0.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.3	0.0	7.2	0.0	9.3	0.8	0.5	0.0	1.6	1.1	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.5	0.0	8.3	6.0	10.1	4.2	42.2	0.0	40.0	44.1	0.0	41.0
LnGrp LOS	A	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h	918			1087			93			113		
Approach Delay, s/veh	8.2			9.3			40.5			42.3		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	78.6		16.7	6.4	77.0		16.7				
Change Period (Y+Rc), s	4.0	5.0		* 5	4.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	56.0		* 23	8.0	56.0		22.0				
Max Q Clear Time (g_c+11.2), s	12.2	24.5		9.0	2.8	28.9		7.2				
Green Ext Time (p_c), s	0.0	1.3		0.1	0.0	1.4		0.1				

Intersection Summary

HCM 6th Ctrl Delay 11.8

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

18: McLeod Ln & Lockhaven Dr

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	775	15	30	935	290	15	60	10	135	30	25
Future Volume (veh/h)	45	775	15	30	935	290	15	60	10	135	30	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1885	1885	1900	1870	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	842	16	33	1016	315	16	65	11	147	33	27
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
Percent Heavy Veh, %	0	4	4	0	1	1	0	2	0	0	0	0
Cap, veh/h	63	2591	49	42	1948	599	19	101	86	111	101	83
Arrive On Green	0.04	0.74	0.73	0.05	1.00	1.00	0.01	0.05	0.05	0.06	0.10	0.10
Sat Flow, veh/h	1810	3511	67	1810	2682	825	1810	1870	1601	1810	965	790
Grp Volume(v), veh/h	49	419	439	33	676	655	16	65	11	147	0	60
Grp Sat Flow(s),veh/h/ln	1810	1749	1829	1810	1791	1716	1810	1870	1601	1810	0	1755
Q Serve(g_s), s	3.5	10.7	10.8	2.3	0.0	0.0	1.1	4.4	0.9	8.0	0.0	4.1
Cycle Q Clear(g_c), s	3.5	10.7	10.8	2.3	0.0	0.0	1.1	4.4	0.9	8.0	0.0	4.1
Prop In Lane	1.00		0.04	1.00		0.48	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	63	1291	1350	42	1301	1246	19	101	86	111	0	184
V/C Ratio(X)	0.77	0.32	0.32	0.78	0.52	0.53	0.83	0.64	0.13	1.32	0.00	0.33
Avail Cap(c_a), veh/h	167	1291	1350	111	1301	1246	111	317	271	111	0	297
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.2	5.9	5.9	61.6	0.0	0.0	64.2	60.3	58.6	61.0	0.0	53.9
Incr Delay (d2), s/veh	7.2	0.7	0.6	7.7	1.0	1.1	27.3	2.5	0.2	193.6	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	3.7	3.9	1.1	0.4	0.4	0.7	2.2	0.3	9.7	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.4	6.5	6.5	69.3	1.0	1.1	91.5	62.8	58.8	254.6	0.0	54.3
LnGrp LOS	E	A	A	E	A	A	F	E	E	F	A	D
Approach Vol, veh/h	907		1364				92		207			
Approach Delay, s/veh	9.9		2.7				67.3		196.6			
Approach LOS	A		A				E		F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.0	100.0	5.4	17.6	8.6	98.4	12.0	11.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	8.0	75.0	8.0	22.0	12.0	71.0	8.0	22.0				
Max Q Clear Time (g_c+I4.3	12.8	12.8	3.1	6.1	5.5	2.0	10.0	6.4				
Green Ext Time (p_c), s	0.0	1.1	0.0	0.1	0.0	2.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	23.2
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary 19: Chemawa Rd & Lockhaven Dr & Keizer Station Blvd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	740	15	455	1125	65	10	105	245	275	90	120
Future Volume (veh/h)	165	740	15	455	1125	65	10	105	245	275	90	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1900	1885	1885	1900	1811	1811	1900	1826	1826
Adj Flow Rate, veh/h	172	771	16	474	1172	68	10	109	255	286	94	125
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
Percent Heavy Veh, %	3	3	3	0	1	1	0	6	6	0	5	5
Cap, veh/h	220	1834	38	432	1989	115	13	202	294	223	416	347
Arrive On Green	0.13	1.00	1.00	0.12	0.58	0.57	0.01	0.11	0.11	0.12	0.23	0.23
Sat Flow, veh/h	3428	3532	73	3510	3441	199	1810	1811	2638	1810	1826	1526
Grp Volume(v), veh/h	172	385	402	474	610	630	10	109	255	286	94	125
Grp Sat Flow(s),veh/h/ln	1714	1763	1842	1755	1791	1849	1810	1811	1319	1810	1826	1526
Q Serve(g_s), s	6.3	0.0	0.0	16.0	28.3	28.4	0.7	7.4	12.4	16.0	5.4	9.0
Cycle Q Clear(g_c), s	6.3	0.0	0.0	16.0	28.3	28.4	0.7	7.4	12.4	16.0	5.4	9.0
Prop In Lane	1.00		0.04	1.00		0.11	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	220	915	957	432	1035	1069	13	202	294	223	416	347
V/C Ratio(X)	0.78	0.42	0.42	1.10	0.59	0.59	0.79	0.54	0.87	1.28	0.23	0.36
Avail Cap(c_a), veh/h	527	915	957	432	1035	1069	139	265	386	223	416	347
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.8	0.0	0.0	57.0	17.5	17.6	64.5	54.6	56.8	57.0	40.9	42.2
Incr Delay (d2), s/veh	2.1	1.3	1.3	72.2	2.5	2.4	32.0	0.8	12.4	157.5	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.3	0.3	11.4	11.9	12.3	0.4	3.4	4.6	17.0	2.5	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.9	1.3	1.3	129.2	20.0	20.0	96.4	55.4	69.2	214.5	41.0	42.5
LnGrp LOS	E	A	A	F	B	B	F	E	E	F	D	D
Approach Vol, veh/h	959				1714		374		505			
Approach Delay, s/veh	11.4				50.2		65.9		139.6			
Approach LOS	B				D		E		F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	71.5	4.9	33.6	12.3	79.2	20.0	18.5				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	60.0	62.0	10.0	25.0	20.0	58.0	16.0	19.0				
Max Q Clear Time (g_c+I1), s	11.0	2.0	2.7	11.0	8.3	30.4	18.0	14.4				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.8	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	54.1
HCM 6th LOS	D

HCM 6th Signalized Intersection Summary

20: Chemawa Rd & SB Ramp

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑	↑↑	↑↑						↑	↑↑
Traffic Volume (veh/h)	0	690	1040	500	1805	0	0	0	0	275	15	390
Future Volume (veh/h)	0	690	1040	500	1805	0	0	0	0	275	15	390
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1856	1885	1885	1885	0				1870	1648	1870
Adj Flow Rate, veh/h	0	719	1083	521	1880	0				286	16	406
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	1	1	1	0				2	17	2
Cap, veh/h	0	1502	1198	669	2387	0				353	20	660
Arrive On Green	0.00	0.43	0.43	0.19	0.67	0.00				0.21	0.24	0.24
Sat Flow, veh/h	0	3618	2812	3483	3676	0				1490	83	2790
Grp Volume(v), veh/h	0	719	1083	521	1880	0				302	0	406
Grp Sat Flow(s), veh/h/ln	0	1763	1406	1742	1791	0				1574	0	1395
Q Serve(g_s), s	0.0	12.2	29.7	11.7	30.5	0.0				15.1	0.0	10.7
Cycle Q Clear(g_c), s	0.0	12.2	29.7	11.7	30.5	0.0				15.1	0.0	10.7
Prop In Lane	0.00		1.00	1.00		0.00				0.95		1.00
Lane Grp Cap(c), veh/h	0	1502	1198	669	2387	0				373	0	660
V/C Ratio(X)	0.00	0.48	0.90	0.78	0.79	0.00				0.81	0.00	0.61
Avail Cap(c_a), veh/h	0	1749	1395	885	2387	0				781	0	1384
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	17.1	22.1	31.7	9.7	0.0				30.7	0.0	28.2
Incr Delay (d2), s/veh	0.0	0.1	7.2	2.3	1.7	0.0				1.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.6	10.1	5.0	10.0	0.0				5.6	0.0	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	17.2	29.3	34.0	11.3	0.0				32.4	0.0	28.5
LnGrp LOS	A	B	C	C	B	A				C	A	C
Approach Vol, veh/h		1802			2401						708	
Approach Delay, s/veh		24.5			16.3						30.2	
Approach LOS		C			B						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	9.9	39.2		23.6		59.1						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	39.0	39.0		39.0		39.0						
Max Q Clear Time (g_c+I1), s	31.7	31.7		17.1		32.5						
Green Ext Time (p_c), s	0.1	1.5		0.5		3.0						

Intersection Summary

HCM 6th Ctrl Delay	21.3
HCM 6th LOS	C

HCM Signalized Intersection Capacity Analysis

21: NB Ramp & Chemawa Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	715	0	0	1115	250	1190	0	505	0	0	0
Future Volume (vph)	250	715	0	0	1115	250	1190	0	505	0	0	0
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	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			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	1.00			0.97		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1770	3505			3457		1698	1698	1568			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1770	3505			3457		1698	1698	1568			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	266	761	0	0	1186	266	1266	0	537	0	0	0
RTOR Reduction (vph)	0	0	0	0	17	0	0	0	91	0	0	0
Lane Group Flow (vph)	266	761	0	0	1435	0	633	633	446	0	0	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	3%	0%	0%	1%	4%	1%	0%	3%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases							4		4			
Actuated Green, G (s)	16.7	52.0			29.3		40.0	40.0	40.0			
Effective Green, g (s)	18.7	54.0			31.3		42.0	42.0	42.0			
Actuated g/C Ratio	0.18	0.52			0.30		0.40	0.40	0.40			
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0	6.0			
Vehicle Extension (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lane Grp Cap (vph)	318	1819			1040		685	685	633			
v/s Ratio Prot	c0.15	0.22			c0.42							
v/s Ratio Perm							c0.37	0.37	0.28			
v/c Ratio	0.84	0.42			1.38		0.92	0.92	0.71			
Uniform Delay, d1	41.2	15.4			36.4		29.5	29.5	25.8			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	16.4	0.1			177.1		17.9	17.9	2.9			
Delay (s)	57.6	15.4			213.4		47.4	47.4	28.8			
Level of Service	E	B			F		D	D	C			
Approach Delay (s)		26.3			213.4			41.9			0.0	
Approach LOS		C			F			D			A	
Intersection Summary												
HCM 2000 Control Delay			96.3				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			1.08									
Actuated Cycle Length (s)			104.0				Sum of lost time (s)		14.0			
Intersection Capacity Utilization			95.6%				ICU Level of Service		F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

22: Portland Rd & Chemawa Rd/Hazegreen Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	560	410	65	415	35	550	495	145	120	635	125
Future Volume (veh/h)	125	560	410	65	415	35	550	495	145	120	635	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1841	1841	1870	1841	1885	1885	1900	1826	1826	1781	1870	1856
Adj Flow Rate, veh/h	134	602	441	70	446	38	591	532	156	129	683	134
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
Percent Heavy Veh, %	4	4	2	4	1	1	0	5	5	8	2	3
Cap, veh/h	177	637	549	100	518	44	248	772	225	179	923	408
Arrive On Green	0.10	0.35	0.35	0.06	0.30	0.28	0.14	0.29	0.27	0.11	0.26	0.26
Sat Flow, veh/h	1753	1841	1585	1753	1713	146	1810	2648	773	1697	3554	1572
Grp Volume(v), veh/h	134	602	441	70	0	484	591	348	340	129	683	134
Grp Sat Flow(s),veh/h/ln	1753	1841	1585	1753	0	1859	1810	1735	1687	1697	1777	1572
Q Serve(g_s), s	6.0	25.5	20.2	3.1	0.0	19.7	11.0	14.2	14.4	5.9	14.1	5.5
Cycle Q Clear(g_c), s	6.0	25.5	20.2	3.1	0.0	19.7	11.0	14.2	14.4	5.9	14.1	5.5
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	177	637	549	100	0	562	248	506	492	179	923	408
V/C Ratio(X)	0.76	0.94	0.80	0.70	0.00	0.86	2.38	0.69	0.69	0.72	0.74	0.33
Avail Cap(c_a), veh/h	241	637	549	241	0	603	248	563	547	233	1153	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.1	25.5	23.7	37.1	0.0	26.5	34.6	25.2	25.6	34.7	27.2	24.0
Incr Delay (d2), s/veh	7.5	22.8	8.2	6.3	0.0	11.3	633.3	2.8	2.9	6.2	1.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	13.9	8.0	1.4	0.0	9.5	48.2	5.7	5.7	2.7	6.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.6	48.3	32.0	43.4	0.0	37.7	667.9	27.9	28.6	40.9	28.9	24.4
LnGrp LOS	D	D	C	D	A	D	F	C	C	D	C	C
Approach Vol, veh/h	1177			554			1279			946		
Approach Delay, s/veh	41.5			38.5			323.8			29.9		
Approach LOS	D			D			F			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.0	24.8	12.1	28.2	12.5	27.4	8.6	31.8				
Change Period (Y+Rc), s	4.5	6.0	4.5	6.0	4.5	6.0	4.5	6.0				
Max Green Setting (Gmax), s	10.5	24.0	10.5	24.0	10.5	24.0	10.5	24.0				
Max Q Clear Time (g_c+I1), s	16.1	16.1	8.0	21.7	7.9	16.4	5.1	27.5				
Green Ext Time (p_c), s	0.0	2.7	0.1	0.5	0.1	2.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	129.6
HCM 6th LOS	F

HCM 6th Signalized Intersection Summary

23: River Rd & Chemawa Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	225	200	180	295	130	210	1075	110	155	900	110
Future Volume (veh/h)	150	225	200	180	295	130	210	1075	110	155	900	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1710	1697	1683	1697	1710	1697	1697	1697	1697	1697	1683	1683
Adj Flow Rate, veh/h	158	237	211	189	311	137	221	1132	116	163	947	116
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
Percent Heavy Veh, %	0	1	2	1	0	1	1	1	1	1	2	2
Cap, veh/h	180	266	215	211	303	245	243	1393	143	182	1257	154
Arrive On Green	0.11	0.16	0.16	0.13	0.18	0.18	0.15	0.47	0.47	0.23	0.88	0.87
Sat Flow, veh/h	1629	1697	1369	1616	1710	1387	1616	2947	302	1616	2862	351
Grp Volume(v), veh/h	158	237	211	189	311	137	221	618	630	163	529	534
Grp Sat Flow(s),veh/h/ln	1629	1697	1369	1616	1710	1387	1616	1612	1637	1616	1599	1613
Q Serve(g_s), s	12.4	17.8	20.0	15.0	23.0	11.7	17.5	42.7	42.9	12.7	15.5	15.6
Cycle Q Clear(g_c), s	12.4	17.8	20.0	15.0	23.0	11.7	17.5	42.7	42.9	12.7	15.5	15.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		0.22
Lane Grp Cap(c), veh/h	180	266	215	211	303	245	243	762	774	182	702	708
V/C Ratio(X)	0.88	0.89	0.98	0.90	1.03	0.56	0.91	0.81	0.81	0.89	0.75	0.75
Avail Cap(c_a), veh/h	194	266	215	242	303	245	360	762	774	186	702	708
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89
Uniform Delay (d), s/veh	56.9	53.7	54.6	55.6	53.5	48.9	54.4	29.3	29.4	49.6	5.4	5.5
Incr Delay (d2), s/veh	26.6	24.4	50.7	27.6	59.1	1.7	15.6	9.2	9.2	33.4	6.6	6.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	9.4	9.9	7.7	14.8	4.2	8.1	17.9	18.3	6.2	3.4	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.5	78.1	105.3	83.2	112.6	50.6	70.0	38.5	38.5	82.9	12.0	12.0
LnGrp LOS	F	E	F	F	F	D	E	D	D	F	B	B
Approach Vol, veh/h	606			637			1469			1226		
Approach Delay, s/veh	89.0			90.6			43.3			21.4		
Approach LOS	F			F			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	65.9	21.0	24.4	23.5	61.1	18.4	27.0					
Change Period (Y+Rc), s	4.0	4.5	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	60.0	60.0	19.5	19.0	29.0	46.0	15.5	23.0				
Max Q Clear Time (g_c+14.7), s	44.9	44.9	17.0	22.0	19.5	17.6	14.4	25.0				
Green Ext Time (p_c), s	0.0	1.7	0.0	0.0	0.0	1.5	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	51.1
HCM 6th LOS	D

HCM 6th Roundabout
24: Verda Ln & Chemawa Rd

2043 Land Use Option 1 - PM Peak Hour

09/08/2020

Intersection				
Intersection Delay, s/veh 10.4				
Intersection LOS B				
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	505	557	531	123
Demand Flow Rate, veh/h	510	565	536	124
Vehicles Circulating, veh/h	292	368	276	746
Vehicles Exiting, veh/h	578	444	526	187
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.5	12.3	9.7	7.9
Approach LOS	A	B	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	510	565	536	124
Cap Entry Lane, veh/h	1024	948	1041	645
Entry HV Adj Factor	0.990	0.986	0.990	0.993
Flow Entry, veh/h	505	557	531	123
Cap Entry, veh/h	1014	935	1031	641
V/C Ratio	0.498	0.596	0.515	0.192
Control Delay, s/veh	9.5	12.3	9.7	7.9
LOS	A	B	A	A
95th %tile Queue, veh	3	4	3	1

HCM 6th Signalized Intersection Summary

25: Salem Pkwy & Verda Ln/Hyacinth St

2043 Land Use Option 1 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	640	40	455	850	305	95	1195	625	200	905	210
Future Volume (veh/h)	40	640	40	455	850	305	95	1195	625	200	905	210
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1885	1885	1870	1826	1885	1856	1885	1870	1856	1900
Adj Flow Rate, veh/h	41	653	41	464	867	311	97	1219	0	204	923	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
Percent Heavy Veh, %	0	3	1	1	2	5	1	3	1	2	3	0
Cap, veh/h	111	343	289	359	604	492	134	1193		260	1472	
Arrive On Green	0.06	0.18	0.18	0.20	0.32	0.32	0.07	0.34	0.00	0.15	0.42	0.00
Sat Flow, veh/h	1810	1856	1566	1795	1870	1522	1795	3526	1598	1781	3526	1610
Grp Volume(v), veh/h	41	653	41	464	867	311	97	1219	0	204	923	0
Grp Sat Flow(s), veh/h/ln	1810	1856	1566	1795	1870	1522	1795	1763	1598	1781	1763	1610
Q Serve(g_s), s	2.8	24.0	2.3	26.0	42.0	22.6	6.9	44.0	0.0	14.4	26.9	0.0
Cycle Q Clear(g_c), s	2.8	24.0	2.3	26.0	42.0	22.6	6.9	44.0	0.0	14.4	26.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	111	343	289	359	604	492	134	1193		260	1472	
V/C Ratio(X)	0.37	1.91	0.14	1.29	1.43	0.63	0.72	1.02		0.78	0.63	
Avail Cap(c_a), veh/h	111	343	289	359	604	492	290	1193		274	1472	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	58.6	53.0	29.4	52.0	44.0	37.4	58.8	43.0	0.0	53.5	29.9	0.0
Incr Delay (d2), s/veh	2.0	418.6	0.2	150.8	205.0	2.0	7.1	31.6	0.0	13.2	2.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	50.9	1.1	26.6	53.5	8.6	3.3	23.2	0.0	7.1	11.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.6	471.6	29.6	202.8	249.0	39.4	65.9	74.6	0.0	66.7	31.9	0.0
LnGrp LOS	E	F	C	F	F	D	E	F		E	C	
Approach Vol, veh/h	735			1642			1316			A	1127	A
Approach Delay, s/veh	424.0			196.3			74.0				38.2	
Approach LOS	F			F			E				D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	3.7	58.3	12.0	46.0	24.0	48.0	30.0	28.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	6.0	* 6	5.0	5.0				
Max Green Setting (Gmax), s	20.0	41.0	7.0	41.0	19.0	* 42	25.0	23.0				
Max Q Clear Time (g_c+1/3), s	28.9	28.9	4.8	44.0	16.4	46.0	28.0	26.0				
Green Ext Time (p_c), s	0.1	5.1	0.0	0.0	0.1	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	160.7
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

2043 Land Use Option 2 - PM Peak Hour

1: River Rd & Brooklake Rd

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	95	30	315	145	195	25	125	145	270	175	25
Future Volume (veh/h)	5	95	30	315	145	195	25	125	145	270	175	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1604	1870	1870	1870	1841	1841	1856	1856	1856	1870	1870	1870
Adj Flow Rate, veh/h	5	99	31	328	151	203	26	130	151	281	182	26
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
Percent Heavy Veh, %	20	2	2	2	4	4	3	3	3	2	2	2
Cap, veh/h	252	455	143	474	234	315	101	416	438	495	296	39
Arrive On Green	0.33	0.33	0.32	0.33	0.33	0.32	0.52	0.53	0.52	0.52	0.53	0.52
Sat Flow, veh/h	881	1366	428	1260	702	944	67	781	821	751	556	73
Grp Volume(v), veh/h	5	0	130	328	0	354	307	0	0	489	0	0
Grp Sat Flow(s),veh/h/ln	881	0	1793	1260	0	1647	1668	0	0	1380	0	0
Q Serve(g_s), s	0.3	0.0	3.1	15.2	0.0	11.0	0.0	0.0	0.0	8.3	0.0	0.0
Cycle Q Clear(g_c), s	11.3	0.0	3.1	18.3	0.0	11.0	6.2	0.0	0.0	14.5	0.0	0.0
Prop In Lane	1.00		0.24	1.00		0.57	0.08		0.49	0.57		0.05
Lane Grp Cap(c), veh/h	252	0	598	474	0	549	941	0	0	819	0	0
V/C Ratio(X)	0.02	0.00	0.22	0.69	0.00	0.64	0.33	0.00	0.00	0.60	0.00	0.00
Avail Cap(c_a), veh/h	252	0	598	474	0	549	941	0	0	819	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.8	0.0	14.4	21.0	0.0	17.1	8.1	0.0	0.0	9.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.2	4.3	0.0	2.6	0.9	0.0	0.0	3.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.0	4.3	0.0	3.8	1.7	0.0	0.0	3.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	0.0	14.6	25.2	0.0	19.7	9.0	0.0	0.0	12.9	0.0	0.0
LnGrp LOS	C	A	B	C	A	B	A	A	A	B	A	A
Approach Vol, veh/h		135			682			307			489	
Approach Delay, s/veh		14.9			22.4			9.0			12.9	
Approach LOS		B			C			A			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.0		24.0		36.0		24.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		31.5		19.5		31.5		19.5				
Max Q Clear Time (g_c+I1), s		8.2		13.3		16.5		20.3				
Green Ext Time (p_c), s		1.6		0.2		2.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				16.3								
HCM 6th LOS				B								

HCM 6th TWSC
2: SB Ramps & Brooklake Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	58.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗		↖	↑						↖	↗
Traffic Vol, veh/h	0	420	400	340	360	0	0	0	0	125	0	465
Future Vol, veh/h	0	420	400	340	360	0	0	0	0	125	0	465
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	180	-	-	-	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	16974	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	12	9	3	12	0	0	0	0	0	0	10
Mvmt Flow	0	442	421	358	379	0	0	0	0	132	0	489
Major/Minor	Major1			Major2			Minor2					
Conflicting Flow All	-	0	0	863	0	0				1748	1958	379
Stage 1	-	-	-	-	-	-				1095	1095	-
Stage 2	-	-	-	-	-	-				653	863	-
Critical Hdwy	-	-	-	4.13	-	-				6.4	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-				5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.4	5.5	-
Follow-up Hdwy	-	-	-	2.227	-	-				3.5	4	3.39
Pot Cap-1 Maneuver	0	-	-	775	-	0				~ 96	64	651
Stage 1	0	-	-	-	-	0				323	292	-
Stage 2	0	-	-	-	-	0				522	374	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	775	-	-				~ 52	0	651
Mov Cap-2 Maneuver	-	-	-	-	-	-				~ 52	0	-
Stage 1	-	-	-	-	-	-				323	0	-
Stage 2	-	-	-	-	-	-				281	0	-
Approach	EB			WB			SB					
HCM Control Delay, s	0			6.6			202.8					
HCM LOS							F					
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2						
Capacity (veh/h)	-	-	775	-	52	651						
HCM Lane V/C Ratio	-	-	0.462	-	2.53	0.752						
HCM Control Delay (s)	-	-	13.6	-	\$ 862.9	25.3						
HCM Lane LOS	-	-	B	-	F	D						
HCM 95th %tile Q(veh)	-	-	2.5	-	13.6	6.8						
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

HCM 6th TWSC

3: Brooklake Rd & NB Ramps

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	149.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	325	220	0	0	505	160	195	0	305	0	0	0
Future Vol, veh/h	325	220	0	0	505	160	195	0	305	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	155	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	18	4	0	0	4	0	14	0	4	0	0	0
Mvmt Flow	357	242	0	0	555	176	214	0	335	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	731	0	- - - 0 1599 1687 242
Stage 1	-	-	- - - 956 956 -
Stage 2	-	-	- - - 643 731 -
Critical Hdwy	4.28	-	- - - 6.54 6.5 6.24
Critical Hdwy Stg 1	-	-	- - - 5.54 5.5 -
Critical Hdwy Stg 2	-	-	- - - 5.54 5.5 -
Follow-up Hdwy	2.362	-	- - - 3.626 4 3.336
Pot Cap-1 Maneuver	805	-	0 0 - - ~ 109 95 792
Stage 1	-	-	0 0 - - 355 339 -
Stage 2	-	-	0 0 - - 501 430 -
Platoon blocked, %	-	-	- -
Mov Cap-1 Maneuver	805	-	- - - ~ 61 0 792
Mov Cap-2 Maneuver	-	-	- - - ~ 61 0 -
Stage 1	-	-	- - - ~ 198 0 -
Stage 2	-	-	- - - 501 0 -

Approach	EB	WB	NB
HCM Control Delay, s	7.7	0	\$ 503.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	61	792	805	-	-	-
HCM Lane V/C Ratio	3.513	0.423	0.444	-	-	-
HCM Control Delay (s)	\$ 1272	12.8	13	-	-	-
HCM Lane LOS	F	B	B	-	-	-
HCM 95th %tile Q(veh)	22.7	2.1	2.3	-	-	-

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary

4: Portland Rd & Brooklake Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	90	240	55	165	75	70	550	55	80	525	330
Future Volume (veh/h)	165	90	240	55	165	75	70	550	55	80	525	330
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1856	1870	1870	1870	1811	1856	1856	1900	1870	1826
Adj Flow Rate, veh/h	174	95	0	58	174	79	74	579	58	84	553	347
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
Percent Heavy Veh, %	7	7	3	2	2	2	6	3	3	0	2	5
Cap, veh/h	312	133		137	320	131	330	747	75	328	850	703
Arrive On Green	0.28	0.30	0.00	0.28	0.30	0.28	0.05	0.45	0.43	0.05	0.45	0.45
Sat Flow, veh/h	719	450	1572	220	1076	441	1725	1659	166	1810	1870	1547
Grp Volume(v), veh/h	269	0	0	311	0	0	74	0	637	84	553	347
Grp Sat Flow(s),veh/h/ln	1169	0	1572	1738	0	0	1725	0	1826	1810	1870	1547
Q Serve(g_s), s	4.1	0.0	0.0	0.0	0.0	0.0	1.4	0.0	17.7	1.5	13.7	9.5
Cycle Q Clear(g_c), s	13.2	0.0	0.0	9.2	0.0	0.0	1.4	0.0	17.7	1.5	13.7	9.5
Prop In Lane	0.65		1.00	0.19		0.25	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	426	0		558	0	0	330	0	822	328	850	703
V/C Ratio(X)	0.63	0.00		0.56	0.00	0.00	0.22	0.00	0.77	0.26	0.65	0.49
Avail Cap(c_a), veh/h	829	0		1089	0	0	476	0	1309	474	1342	1110
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.9	0.0	0.0	18.2	0.0	0.0	10.1	0.0	14.0	11.2	12.7	11.5
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.6	0.0	0.0	0.3	0.0	2.3	0.3	1.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	0.0	3.5	0.0	0.0	0.4	0.0	6.2	0.5	4.8	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.0	0.0	0.0	18.9	0.0	0.0	10.3	0.0	16.2	11.5	13.9	12.3
LnGrp LOS	C	A		B	A	A	B	A	B	B	B	B
Approach Vol, veh/h		269	A		311			711			984	
Approach Delay, s/veh		21.0			18.9			15.6			13.1	
Approach LOS		C			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.2	31.0		21.8	6.9	31.2		21.8				
Change Period (Y+Rc), s	4.5	* 5.4		5.0	4.5	* 5.4		5.0				
Max Green Setting (Gmax), s	7.5	* 42		36.0	7.5	* 42		36.0				
Max Q Clear Time (g_c+I1), s	3.5	19.7		15.2	3.4	15.7		11.2				
Green Ext Time (p_c), s	0.0	5.9		1.4	0.0	7.4		1.5				

Intersection Summary

HCM 6th Ctrl Delay 15.6

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
5: Wheatland Rd & Clear Lake Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	90	0	20	0	65	55	15	190	0
Future Vol, veh/h	0	0	0	90	0	20	0	65	55	15	190	0
Conflicting Peds, #/hr	0	0	0	2	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	89	92	89	92	89	89	89	89	92
Heavy Vehicles, %	2	2	2	0	2	0	2	2	2	8	0	2
Mvmt Flow	0	0	0	101	0	22	0	73	62	17	213	0
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	362	384	215	355	353	106	213	0	0	137	0	0
Stage 1	247	247	-	106	106	-	-	-	-	-	-	-
Stage 2	115	137	-	249	247	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.1	6.52	6.2	4.12	-	-	4.18	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.1	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.5	4.018	3.3	2.218	-	-	2.272	-	-
Pot Cap-1 Maneuver	594	550	825	604	572	954	1357	-	-	1411	-	-
Stage 1	757	702	-	905	807	-	-	-	-	-	-	-
Stage 2	890	783	-	759	702	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	574	541	823	596	563	952	1357	-	-	1408	-	-
Mov Cap-2 Maneuver	574	541	-	596	563	-	-	-	-	-	-	-
Stage 1	757	692	-	903	805	-	-	-	-	-	-	-
Stage 2	869	781	-	747	692	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		12			0			0.6			
HCM LOS	A		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1357	-	-	-	639	1408	-	-				
HCM Lane V/C Ratio	-	-	-	-	0.193	0.012	-	-				
HCM Control Delay (s)	0	-	-	0	12	7.6	0	-				
HCM Lane LOS	A	-	-	A	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	-	0.7	0	-	-				

HCM 6th TWSC
6: River Rd & Clear Lake Rd/Quinaby Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	21.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	
Traffic Vol, veh/h	25	50	20	90	115	105	30	150	55	80	430	45
Future Vol, veh/h	25	50	20	90	115	105	30	150	55	80	430	45
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	30	-	-	50	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	6	6	0	0	7	0	2	0	8	1	0
Mvmt Flow	26	52	21	93	119	108	31	155	57	82	443	46
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	935	904	467	914	899	184	489	0	0	212	0	0
Stage 1	630	630	-	246	246	-	-	-	-	-	-	-
Stage 2	305	274	-	668	653	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.26	7.1	6.5	6.27	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.354	3.5	4	3.363	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	248	273	588	256	281	846	1085	-	-	1323	-	-
Stage 1	473	469	-	762	706	-	-	-	-	-	-	-
Stage 2	709	676	-	451	467	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	124	241	587	188	248	846	1085	-	-	1323	-	-
Mov Cap-2 Maneuver	124	241	-	188	248	-	-	-	-	-	-	-
Stage 1	457	429	-	737	683	-	-	-	-	-	-	-
Stage 2	494	654	-	350	427	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	32.6		69.4		1.1		1.1					
HCM LOS	D		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1085	-	-	183	587	218	846	1323	-	-		
HCM Lane V/C Ratio	0.029	-	-	0.423	0.035	0.969	0.128	0.062	-	-		
HCM Control Delay (s)	8.4	0	-	38.3	11.4	99.8	9.9	7.9	0	-		
HCM Lane LOS	A	A	-	E	B	F	A	A	A	-		
HCM 95th %tile Q(veh)	0.1	-	-	1.9	0.1	8.5	0.4	0.2	-	-		

HCM 6th TWSC
7: 35th Ave & Quinaby Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	2.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	180	50	15	330	90	20
Future Vol, veh/h	180	50	15	330	90	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	0	0	3	0	0
Mvmt Flow	220	61	18	402	110	24
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	281	0	689	251
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	438	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1293	-	415	793
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	655	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1293	-	408	793
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	643	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		16.4	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	448	-	-	1293	-	
HCM Lane V/C Ratio	0.299	-	-	0.014	-	
HCM Control Delay (s)	16.4	-	-	7.8	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	1.2	-	-	0	-	

HCM 6th TWSC
8: Portland Rd & Quinaby Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	33.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	115	145	465	615	155
Future Vol, veh/h	105	115	145	465	615	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	240	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	4	5	1	2
Mvmt Flow	111	121	153	489	647	163
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1524	729	810	0	-	0
Stage 1	729	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	131	420	807	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 106	420	807	-	-	-
Mov Cap-2 Maneuver	~ 106	-	-	-	-	-
Stage 1	390	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	234.1	2.5		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	807	-	174	-	-	
HCM Lane V/C Ratio	0.189	-	1.331	-	-	
HCM Control Delay (s)	10.5	-	234.1	-	-	
HCM Lane LOS	B	-	F	-	-	
HCM 95th %tile Q(veh)	0.7	-	13.6	-	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 6th TWSC
9: River Rd & Perkins St

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	14.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	185	30	245	200	35	480
Future Vol, veh/h	185	30	245	200	35	480
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	1	0	2	2	0	1
Mvmt Flow	213	34	282	230	40	552
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1029	397	0	0	512	0
Stage 1	397	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	260	657	-	-	1064	-
Stage 1	681	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	246	657	-	-	1064	-
Mov Cap-2 Maneuver	246	-	-	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	75.8	0		0.6		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 270		1064	-	
HCM Lane V/C Ratio	-	- 0.915		0.038	-	
HCM Control Delay (s)	-	- 75.8		8.5	0	
HCM Lane LOS	-	- F		A	A	
HCM 95th %tile Q(veh)	-	- 8.3		0.1	-	

HCM 6th TWSC
10: 35th Ave & Perkins St

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	12.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	5	45	100	145	75	10	70	95	165	15	45	5
Future Vol, veh/h	5	45	100	145	75	10	70	95	165	15	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	5	0
Mvmt Flow	6	51	114	165	85	11	80	108	188	17	51	6
Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	498	544	54	533	453	202	57	0	0	296	0	0
Stage 1	88	88	-	362	362	-	-	-	-	-	-	-
Stage 2	410	456	-	171	91	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.51	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.009	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	486	442	1019	461	504	844	1560	-	-	1277	-	-
Stage 1	925	816	-	661	627	-	-	-	-	-	-	-
Stage 2	623	563	-	836	821	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	389	408	1019	349	466	844	1560	-	-	1277	-	-
Mov Cap-2 Maneuver	389	408	-	349	466	-	-	-	-	-	-	-
Stage 1	867	805	-	619	587	-	-	-	-	-	-	-
Stage 2	492	528	-	686	810	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB		SB		SB	
HCM Control Delay, s	12.1		30.9		1.6		1.8					
HCM LOS	B		D									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1560	-	-	678	391	1277	-	-				
HCM Lane V/C Ratio	0.051	-	-	0.251	0.668	0.013	-	-				
HCM Control Delay (s)	7.4	-	-	12.1	30.9	7.9	0	-				
HCM Lane LOS	A	-	-	B	D	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	1	4.7	0	-	-				

HCM 6th TWSC
11: Portland Rd & Perkins St

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	15					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	190	150	600	660	35
Future Vol, veh/h	35	190	150	600	660	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	6	0	4	2	0
Mvmt Flow	38	204	161	645	710	38
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1696	729	748	0	-	0
Stage 1	729	-	-	-	-	-
Stage 2	967	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.2	-	-	-
Pot Cap-1 Maneuver	103	416	870	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	73	416	870	-	-	-
Mov Cap-2 Maneuver	73	-	-	-	-	-
Stage 1	342	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	104.3	2		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	870	-	240	-	-	
HCM Lane V/C Ratio	0.185	-	1.008	-	-	
HCM Control Delay (s)	10.1	0	104.3	-	-	
HCM Lane LOS	B	A	F	-	-	
HCM 95th %tile Q(veh)	0.7	-	9.6	-	-	

HCM 6th TWSC
12: River Rd & Parkmeadow Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	4.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	100	230	400	575	90
Future Vol, veh/h	45	100	230	400	575	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	1	1	1	1	0
Mvmt Flow	50	111	256	444	639	100
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1645	689	739	0	-	0
Stage 1	689	-	-	-	-	-
Stage 2	956	-	-	-	-	-
Critical Hdwy	6.43	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	109	447	872	-	-	-
Stage 1	497	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	77	447	872	-	-	-
Mov Cap-2 Maneuver	200	-	-	-	-	-
Stage 1	351	-	-	-	-	-
Stage 2	372	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	26.7	4		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	872	-	323	-	-	
HCM Lane V/C Ratio	0.293	-	0.499	-	-	
HCM Control Delay (s)	10.8	-	26.7	-	-	
HCM Lane LOS	B	-	D	-	-	
HCM 95th %tile Q(veh)	1.2	-	2.6	-	-	

HCM Signalized Intersection Capacity Analysis

13: River Rd & Wheatland Rd/Springwood Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	5	395	15	5	5	570	1020	15	15	915	15
Future Volume (vph)	15	5	395	15	5	5	570	1020	15	15	915	15
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		3.0	4.0	
Lane Util. Factor		1.00	0.88		1.00		0.97	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.96		1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	1.00		1.00	1.00	
Flt Protected		0.96	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1830	2663		1711		3502	3561		1805	3565	
Flt Permitted		0.96	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1830	2663		1711		3502	3561		1805	3565	
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)	16	5	429	16	5	5	620	1109	16	16	995	16
RTOR Reduction (vph)	0	0	389	0	5	0	0	1	0	0	1	0
Lane Group Flow (vph)	0	21	40	0	21	0	620	1124	0	16	1010	0
Confl. Peds. (#/hr)			7	7			5		4	4		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	2%	8%	0%	0%	0%	1%	8%	0%	1%	0%
Turn Type	Split	NA	Perm	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		3	3		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)		6.3	6.3		2.2		20.9	58.1		1.9	39.1	
Effective Green, g (s)		8.3	8.3		2.7		20.9	61.1		2.9	42.1	
Actuated g/C Ratio		0.09	0.09		0.03		0.23	0.68		0.03	0.47	
Clearance Time (s)		6.0	6.0		4.5		4.0	7.0		4.0	7.0	
Vehicle Extension (s)		1.0	1.0		0.5		0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)		168	245		51		813	2417		58	1667	
v/s Ratio Prot		0.01			c0.01		c0.18	0.32		0.01	c0.28	
v/s Ratio Perm			c0.01									
v/c Ratio		0.12	0.16		0.41		0.76	0.47		0.28	0.61	
Uniform Delay, d1		37.5	37.6		42.9		32.2	6.8		42.5	17.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1	0.1		2.0		3.8	0.6		0.9	1.6	
Delay (s)		37.6	37.8		44.9		36.1	7.4		43.5	19.4	
Level of Service		D	D		D		D	A		D	B	
Approach Delay (s)		37.8			44.9			17.6			19.8	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			21.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			18.5		
Intersection Capacity Utilization			60.1%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

14: Keizer Station Blvd & Ulali Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	90	110	125	105	25	45	105	90	10	160	80
Future Volume (veh/h)	125	90	110	125	105	25	45	105	90	10	160	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1870	1870	1900	1885	1900
Adj Flow Rate, veh/h	142	102	125	142	119	28	51	119	102	11	182	91
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
Percent Heavy Veh, %	0	0	0	0	0	0	0	2	2	0	1	0
Cap, veh/h	624	236	290	548	458	108	621	322	276	606	652	557
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	1260	767	940	1172	1487	350	1124	930	797	1178	1885	1610
Grp Volume(v), veh/h	142	0	227	142	0	147	51	0	221	11	182	91
Grp Sat Flow(s),veh/h/ln	1260	0	1707	1172	0	1837	1124	0	1727	1178	1885	1610
Q Serve(g_s), s	2.2	0.0	2.5	2.5	0.0	1.4	0.8	0.0	2.2	0.2	1.6	0.9
Cycle Q Clear(g_c), s	3.6	0.0	2.5	5.0	0.0	1.4	2.4	0.0	2.2	2.4	1.6	0.9
Prop In Lane	1.00		0.55	1.00		0.19	1.00		0.46	1.00		1.00
Lane Grp Cap(c), veh/h	624	0	526	548	0	566	621	0	597	606	652	557
V/C Ratio(X)	0.23	0.00	0.43	0.26	0.00	0.26	0.08	0.00	0.37	0.02	0.28	0.16
Avail Cap(c_a), veh/h	1380	0	1550	1251	0	1668	1739	0	2315	1778	2527	2158
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.4	0.0	6.4	8.4	0.0	6.0	6.4	0.0	5.7	6.6	5.5	5.2
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.4	0.4	0.0	0.3	0.1	0.0	0.3	0.0	0.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.4	0.0	6.6	8.5	0.0	6.1	6.4	0.0	5.8	6.6	5.6	5.3
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h	369				289		272				284	
Approach Delay, s/veh	6.9				7.3		5.9				5.5	
Approach LOS	A				A		A				A	
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	12.0		11.1		12.0		11.1					
Change Period (Y+Rc), s	4.0		4.0		4.0		4.0					
Max Green Setting (Gmax), s	31.0		21.0		31.0		21.0					
Max Q Clear Time (g_c+I1), s	4.4		7.0		4.4		5.6					
Green Ext Time (p_c), s	0.2		0.2		0.3		0.3					
Intersection Summary												
HCM 6th Ctrl Delay			6.4									
HCM 6th LOS			A									

HCM Signalized Intersection Capacity Analysis

15: River Rd & Lockhaven Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	240	165	320	200	205	120	875	260	155	760	115
Future Volume (vph)	170	240	165	320	200	205	120	875	260	155	760	115
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	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	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	1.00	0.85	1.00	1.00	0.85	1.00	0.98	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	1863	1557	3400	1863	1577	1805	3574	1523	1787	3478	115
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1787	1863	1557	3400	1863	1577	1805	3574	1523	1787	3478	115
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)	175	247	170	330	206	211	124	902	268	160	784	119
RTOR Reduction (vph)	0	0	142	0	0	176	0	0	145	0	7	0
Lane Group Flow (vph)	175	247	28	330	206	35	124	902	123	160	896	0
Confl. Peds. (#/hr)	1		7	7		1	5		3	3		5
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	1%	3%	2%	1%	0%	1%	3%	1%	1%	3%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	NA
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases			8			4			2			
Actuated Green, G (s)	16.4	21.7	21.7	16.7	22.0	22.0	12.4	60.6	60.6	17.5	65.7	
Effective Green, g (s)	17.4	22.7	22.7	17.7	23.0	23.0	12.9	62.6	62.6	18.0	67.7	
Actuated g/C Ratio	0.13	0.17	0.17	0.13	0.17	0.17	0.09	0.46	0.46	0.13	0.49	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.5	6.0	6.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	226	308	257	439	312	264	169	1633	695	234	1718	
v/s Ratio Prot	c0.10	c0.13		0.10	0.11		c0.07	c0.25		c0.09	0.26	
v/s Ratio Perm			0.02			0.02			0.08			
v/c Ratio	0.77	0.80	0.11	0.75	0.66	0.13	0.73	0.55	0.18	0.68	0.52	
Uniform Delay, d1	57.9	55.0	48.6	57.5	53.3	48.5	60.4	27.0	22.0	56.8	23.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.9	13.2	0.1	6.3	4.0	0.1	13.2	1.4	0.6	6.4	1.1	
Delay (s)	71.8	68.2	48.6	63.9	57.4	48.6	73.6	28.4	22.5	63.2	24.7	
Level of Service	E	E	D	E	E	D	E	C	C	E	C	
Approach Delay (s)		63.6			57.8			31.5			30.5	
Approach LOS		E			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			41.7									
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			137.0									
Intersection Capacity Utilization			69.1%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

16: Verda Ln & Lockhaven Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	580	25	50	745	140	25	55	70	185	60	25
Future Volume (veh/h)	20	580	25	50	745	140	25	55	70	185	60	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1841	1841	1826	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	611	26	53	784	152	26	60	74	201	65	27
Peak Hour Factor	0.92	0.95	0.95	0.95	0.95	0.92	0.95	0.92	0.95	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	5	2	2	2	2	2	2	2	2
Cap, veh/h	241	1070	46	434	929	180	110	195	200	353	90	34
Arrive On Green	0.61	0.61	0.61	0.61	0.61	0.61	0.24	0.25	0.25	0.24	0.25	0.25
Sat Flow, veh/h	598	1752	75	772	1521	295	150	773	794	988	358	137
Grp Volume(v), veh/h	22	0	637	53	0	936	160	0	0	293	0	0
Grp Sat Flow(s), veh/h/ln	598	0	1827	772	0	1816	1718	0	0	1483	0	0
Q Serve(g_s), s	1.8	0.0	12.1	2.6	0.0	24.1	0.0	0.0	0.0	6.0	0.0	0.0
Cycle Q Clear(g_c), s	25.9	0.0	12.1	14.7	0.0	24.1	4.5	0.0	0.0	10.5	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.16	0.16		0.46	0.69		0.09
Lane Grp Cap(c), veh/h	241	0	1115	434	0	1109	490	0	0	465	0	0
V/C Ratio(X)	0.09	0.00	0.57	0.12	0.00	0.84	0.33	0.00	0.00	0.63	0.00	0.00
Avail Cap(c_a), veh/h	434	0	1703	683	0	1693	852	0	0	777	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.5	0.0	6.8	11.2	0.0	9.1	18.0	0.0	0.0	20.1	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.5	0.1	0.0	2.5	0.4	0.0	0.0	1.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	3.3	0.4	0.0	6.9	1.7	0.0	0.0	3.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	0.0	7.2	11.3	0.0	11.6	18.4	0.0	0.0	21.5	0.0	0.0
LnGrp LOS	B	A	A	B	A	B	B	A	A	C	A	A
Approach Vol, veh/h	659			989			160			293		
Approach Delay, s/veh	7.7			11.6			18.4			21.5		
Approach LOS	A			B			B			C		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	18.6			39.5			18.6			39.5		
Change Period (Y+Rc), s	4.5			4.5			4.5			4.5		
Max Green Setting (Gmax), s	27.3			53.7			27.3			53.7		
Max Q Clear Time (g_c+I1), s	6.5			27.9			12.5			26.1		
Green Ext Time (p_c), s	0.9			4.8			1.6			8.9		

Intersection Summary

HCM 6th Ctrl Delay	12.3
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary

17: Kafir Dr/14th Ave & Lockhaven Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	810	15	10	905	145	20	50	15	50	20	40
Future Volume (veh/h)	55	810	15	10	905	145	20	50	15	50	20	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.98		0.97	0.97		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1870	1900	1900	1900	1900	1885	1900	1900
Adj Flow Rate, veh/h	57	835	15	10	933	149	21	52	15	52	21	41
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
Percent Heavy Veh, %	0	4	4	0	2	0	0	0	0	1	0	0
Cap, veh/h	352	1343	24	424	1362	1147	196	180	52	182	66	129
Arrive On Green	0.02	0.74	0.74	0.01	0.73	0.73	0.13	0.13	0.13	0.12	0.12	0.12
Sat Flow, veh/h	1810	1802	32	1810	1870	1575	1328	1406	406	1309	561	1096
Grp Volume(v), veh/h	57	0	850	10	933	149	21	0	67	52	0	62
Grp Sat Flow(s), veh/h/ln	1810	0	1835	1810	1870	1575	1328	0	1812	1309	0	1657
Q Serve(g_s), s	0.8	0.0	22.0	0.2	27.0	2.8	1.5	0.0	3.3	3.8	0.0	3.4
Cycle Q Clear(g_c), s	0.8	0.0	22.0	0.2	27.0	2.8	4.9	0.0	3.3	7.1	0.0	3.4
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.22	1.00		0.66
Lane Grp Cap(c), veh/h	352	0	1367	424	1362	1147	196	0	231	182	0	195
V/C Ratio(X)	0.16	0.00	0.62	0.02	0.68	0.13	0.11	0.00	0.29	0.29	0.00	0.32
Avail Cap(c_a), veh/h	454	0	1367	556	1362	1147	332	0	417	329	0	381
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.5	0.0	6.1	5.9	7.4	4.1	41.7	0.0	39.5	43.7	0.0	40.4
Incr Delay (d2), s/veh	0.1	0.0	2.1	0.0	2.8	0.2	0.1	0.0	0.3	0.3	0.0	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.3	0.0	7.1	0.0	9.3	0.8	0.5	0.0	1.5	1.2	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.6	0.0	8.2	5.9	10.2	4.3	41.8	0.0	39.8	44.0	0.0	40.8
LnGrp LOS	A	A	A	A	B	A	D	A	D	D	A	D
Approach Vol, veh/h	907			1092			88			114		
Approach Delay, s/veh	8.2			9.3			40.2			42.2		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	78.5		16.8	6.4	76.8		16.8				
Change Period (Y+Rc), s	4.0	5.0		* 5	4.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	56.0		* 23	8.0	56.0		22.0				
Max Q Clear Time (g_c+11.2), s	12.2	24.0		9.1	2.8	29.0		6.9				
Green Ext Time (p_c), s	0.0	1.3		0.1	0.0	1.4		0.1				

Intersection Summary

HCM 6th Ctrl Delay 11.8

HCM 6th LOS B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

18: McLeod Ln & Lockhaven Dr

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	775	15	35	940	290	15	60	15	125	30	25
Future Volume (veh/h)	45	775	15	35	940	290	15	60	15	125	30	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1841	1841	1900	1885	1885	1900	1870	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	842	16	38	1022	315	16	65	16	136	33	27
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
Percent Heavy Veh, %	0	4	4	0	1	1	0	2	0	0	0	0
Cap, veh/h	63	2578	49	49	1951	596	19	101	86	111	101	83
Arrive On Green	0.04	0.73	0.73	0.05	1.00	1.00	0.01	0.05	0.05	0.06	0.10	0.10
Sat Flow, veh/h	1810	3511	67	1810	2686	821	1810	1870	1601	1810	965	790
Grp Volume(v), veh/h	49	419	439	38	678	659	16	65	16	136	0	60
Grp Sat Flow(s),veh/h/ln	1810	1749	1829	1810	1791	1716	1810	1870	1601	1810	0	1755
Q Serve(g_s), s	3.5	10.9	10.9	2.7	0.0	0.0	1.1	4.4	1.2	8.0	0.0	4.1
Cycle Q Clear(g_c), s	3.5	10.9	10.9	2.7	0.0	0.0	1.1	4.4	1.2	8.0	0.0	4.1
Prop In Lane	1.00		0.04	1.00		0.48	1.00		1.00	1.00		0.45
Lane Grp Cap(c), veh/h	63	1284	1343	49	1301	1247	19	101	86	111	0	184
V/C Ratio(X)	0.77	0.33	0.33	0.78	0.52	0.53	0.83	0.64	0.19	1.22	0.00	0.33
Avail Cap(c_a), veh/h	167	1284	1343	111	1301	1247	111	317	271	111	0	297
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.66	0.66	0.66	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.2	6.0	6.0	61.1	0.0	0.0	64.2	60.3	58.8	61.0	0.0	53.9
Incr Delay (d2), s/veh	7.2	0.7	0.6	6.4	1.0	1.1	27.3	2.5	0.4	156.4	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	3.8	4.0	1.3	0.4	0.4	0.7	2.2	0.5	8.5	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.4	6.7	6.7	67.5	1.0	1.1	91.5	62.8	59.1	217.4	0.0	54.3
LnGrp LOS	E	A	A	E	A	A	F	E	E	F	A	D
Approach Vol, veh/h	907		1375				97			196		
Approach Delay, s/veh	10.1		2.9				66.9			167.5		
Approach LOS	B		A				E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.5	99.5	5.4	17.6	8.6	98.4	12.0	11.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	75.0	75.0	8.0	22.0	12.0	71.0	8.0	22.0				
Max Q Clear Time (g_c+14), s	12.9	12.9	3.1	6.1	5.5	2.0	10.0	6.4				
Green Ext Time (p_c), s	0.0	1.1	0.0	0.1	0.0	2.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

19: Chemawa Rd & Lockhaven Dr & Keizer Station Blvd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	740	5	450	1125	65	10	105	255	280	95	130
Future Volume (veh/h)	170	740	5	450	1125	65	10	105	255	280	95	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No				No				No			
Adj Sat Flow, veh/h/ln	1856	1856	1856	1900	1885	1885	1900	1811	1811	1900	1826	1826
Adj Flow Rate, veh/h	177	771	5	469	1172	68	10	109	266	292	99	135
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
Percent Heavy Veh, %	3	3	3	0	1	1	0	6	6	0	5	5
Cap, veh/h	225	1850	12	432	1970	114	13	209	305	223	423	354
Arrive On Green	0.13	1.00	1.00	0.12	0.57	0.56	0.01	0.12	0.12	0.12	0.23	0.23
Sat Flow, veh/h	3428	3591	23	3510	3441	199	1810	1811	2639	1810	1826	1526
Grp Volume(v), veh/h	177	378	398	469	610	630	10	109	266	292	99	135
Grp Sat Flow(s),veh/h/ln	1714	1763	1851	1755	1791	1849	1810	1811	1319	1810	1826	1526
Q Serve(g_s), s	6.5	0.0	0.0	16.0	28.7	28.8	0.7	7.4	12.9	16.0	5.7	9.7
Cycle Q Clear(g_c), s	6.5	0.0	0.0	16.0	28.7	28.8	0.7	7.4	12.9	16.0	5.7	9.7
Prop In Lane	1.00		0.01	1.00		0.11	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	225	908	954	432	1025	1059	13	209	305	223	423	354
V/C Ratio(X)	0.79	0.42	0.42	1.09	0.59	0.60	0.79	0.52	0.87	1.31	0.23	0.38
Avail Cap(c_a), veh/h	527	908	954	432	1025	1059	139	265	386	223	423	354
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.6	0.0	0.0	57.0	18.0	18.1	64.5	54.1	56.5	57.0	40.6	42.1
Incr Delay (d2), s/veh	2.1	1.3	1.2	68.3	2.5	2.5	32.0	0.7	13.9	168.3	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.3	0.3	11.1	12.1	12.5	0.4	3.4	4.9	17.7	2.6	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.7	1.3	1.2	125.3	20.5	20.5	96.4	54.8	70.4	225.3	40.7	42.3
LnGrp LOS	E	A	A	F	C	C	F	D	E	F	D	D
Approach Vol, veh/h	953				1709				385		526	
Approach Delay, s/veh	11.7				49.3				66.7		143.6	
Approach LOS	B				D				E		F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	71.0	4.9	34.1	12.5	78.4	20.0	19.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0				
Max Green Setting (Gmax), s	60.0	62.0	10.0	25.0	20.0	58.0	16.0	19.0				
Max Q Clear Time (g_c+I1), s	11.0	2.0	2.7	11.7	8.5	30.8	18.0	14.9				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.8	0.0	0.1				

Intersection Summary

HCM 6th Ctrl Delay	55.0
HCM 6th LOS	E

HCM 6th Signalized Intersection Summary

20: Chemawa Rd & SB Ramp

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑↑	↑↑	↑↑						↑↑	↑↑
Traffic Volume (veh/h)	0	695	1040	485	1790	0	0	0	0	290	15	410
Future Volume (veh/h)	0	695	1040	485	1790	0	0	0	0	290	15	410
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Work Zone On Approach		No			No						No	
Adj Sat Flow, veh/h/ln	0	1856	1885	1885	1885	0				1870	1648	1870
Adj Flow Rate, veh/h	0	724	1083	505	1865	0				302	16	427
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	0	3	1	1	1	0				2	17	2
Cap, veh/h	0	1498	1195	651	2361	0				367	19	686
Arrive On Green	0.00	0.42	0.42	0.19	0.66	0.00				0.22	0.25	0.25
Sat Flow, veh/h	0	3618	2812	3483	3676	0				1494	79	2790
Grp Volume(v), veh/h	0	724	1083	505	1865	0				318	0	427
Grp Sat Flow(s), veh/h/ln	0	1763	1406	1742	1791	0				1573	0	1395
Q Serve(g_s), s	0.0	12.5	30.4	11.6	31.2	0.0				16.2	0.0	11.5
Cycle Q Clear(g_c), s	0.0	12.5	30.4	11.6	31.2	0.0				16.2	0.0	11.5
Prop In Lane	0.00		1.00	1.00		0.00				0.95		1.00
Lane Grp Cap(c), veh/h	0	1498	1195	651	2361	0				387	0	686
V/C Ratio(X)	0.00	0.48	0.91	0.78	0.79	0.00				0.82	0.00	0.62
Avail Cap(c_a), veh/h	0	1715	1368	868	2361	0				766	0	1357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	17.5	22.7	32.6	10.2	0.0				31.0	0.0	28.3
Incr Delay (d2), s/veh	0.0	0.1	7.6	2.2	1.7	0.0				1.7	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.7	10.4	5.0	10.5	0.0				6.0	0.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	17.6	30.3	34.7	11.9	0.0				32.7	0.0	28.6
LnGrp LOS	A	B	C	C	B	A				C	A	C
Approach Vol, veh/h		1807			2370						745	
Approach Delay, s/veh		25.2			16.8						30.4	
Approach LOS		C			B						C	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	9.7	39.8		24.7		59.5						
Change Period (Y+Rc), s	6.0	6.0		6.0		6.0						
Max Green Setting (Gmax), s	39.0	39.0		39.0		39.0						
Max Q Clear Time (g_c+I1), s	32.4	32.4		18.2		33.2						
Green Ext Time (p_c), s	0.1	1.4		0.5		2.8						

Intersection Summary

HCM 6th Ctrl Delay	21.9
HCM 6th LOS	C

HCM Signalized Intersection Capacity Analysis

21: NB Ramp & Chemawa Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	285	700	0	0	1095	315	1180	0	530	0	0	0
Future Volume (vph)	285	700	0	0	1095	315	1180	0	530	0	0	0
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	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			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	1.00			0.97		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1770	3505			3432		1698	1698	1568			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1770	3505			3432		1698	1698	1568			
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	303	745	0	0	1165	335	1255	0	564	0	0	0
RTOR Reduction (vph)	0	0	0	0	24	0	0	0	95	0	0	0
Lane Group Flow (vph)	303	745	0	0	1476	0	627	628	469	0	0	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	2%	3%	0%	0%	1%	4%	1%	0%	3%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA	Perm			
Protected Phases	5	2			6			4				
Permitted Phases							4		4			
Actuated Green, G (s)	18.1	53.3			29.2		40.2	40.2	40.2			
Effective Green, g (s)	20.1	55.3			31.2		42.2	42.2	42.2			
Actuated g/C Ratio	0.19	0.52			0.30		0.40	0.40	0.40			
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0	6.0			
Vehicle Extension (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lane Grp Cap (vph)	337	1837			1014		679	679	627			
v/s Ratio Prot	c0.17	0.21			c0.43							
v/s Ratio Perm							0.37	0.37	0.30			
v/c Ratio	0.90	0.41			1.46		0.92	0.92	0.75			
Uniform Delay, d1	41.7	15.2			37.1		30.1	30.1	27.1			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	24.7	0.1			210.6		18.0	18.2	4.3			
Delay (s)	66.4	15.2			247.7		48.1	48.3	31.4			
Level of Service	E	B			F		D	D	C			
Approach Delay (s)		30.0			247.7			43.0			0.0	
Approach LOS		C			F			D			A	
Intersection Summary												
HCM 2000 Control Delay			110.2				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			105.5				Sum of lost time (s)		14.0			
Intersection Capacity Utilization			98.8%				ICU Level of Service		F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

22: Portland Rd & Chemawa Rd/Hazegreen Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	555	435	60	410	35	560	525	130	110	650	140
Future Volume (veh/h)	145	555	435	60	410	35	560	525	130	110	650	140
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1841	1841	1870	1841	1885	1885	1900	1826	1826	1781	1870	1856
Adj Flow Rate, veh/h	156	597	468	65	441	38	602	565	140	118	699	151
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
Percent Heavy Veh, %	4	4	2	4	1	1	0	5	5	8	2	3
Cap, veh/h	200	660	568	94	509	44	241	816	202	167	927	410
Arrive On Green	0.11	0.36	0.36	0.05	0.30	0.27	0.13	0.30	0.27	0.10	0.26	0.26
Sat Flow, veh/h	1753	1841	1585	1753	1711	147	1810	2757	681	1697	3554	1572
Grp Volume(v), veh/h	156	597	468	65	0	479	602	355	350	118	699	151
Grp Sat Flow(s),veh/h/ln	1753	1841	1585	1753	0	1859	1810	1735	1703	1697	1777	1572
Q Serve(g_s), s	7.1	25.4	22.2	3.0	0.0	20.1	11.0	14.9	15.1	5.6	14.9	6.5
Cycle Q Clear(g_c), s	7.1	25.4	22.2	3.0	0.0	20.1	11.0	14.9	15.1	5.6	14.9	6.5
Prop In Lane	1.00		1.00	1.00		0.08	1.00		0.40	1.00		1.00
Lane Grp Cap(c), veh/h	200	660	568	94	0	553	241	513	504	167	927	410
V/C Ratio(X)	0.78	0.90	0.82	0.69	0.00	0.87	2.50	0.69	0.69	0.71	0.75	0.37
Avail Cap(c_a), veh/h	234	660	568	234	0	586	241	547	537	226	1120	495
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.5	25.1	24.1	38.4	0.0	27.5	35.8	25.7	26.1	36.1	28.1	24.9
Incr Delay (d2), s/veh	12.5	15.9	9.3	6.7	0.0	12.1	685.4	3.2	3.3	4.9	2.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	12.7	8.9	1.4	0.0	9.8	50.5	6.1	6.1	2.5	6.4	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.0	41.0	33.4	45.1	0.0	39.6	721.1	28.9	29.4	41.0	30.2	25.3
LnGrp LOS	D	D	C	D	A	D	F	C	C	D	C	C
Approach Vol, veh/h	1221			544			1307			968		
Approach Delay, s/veh	39.0			40.3			347.9			30.8		
Approach LOS	D			D			F			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.0	25.5	13.4	28.6	12.1	28.4	8.4	33.6				
Change Period (Y+Rc), s	4.5	6.0	4.5	6.0	4.5	6.0	4.5	6.0				
Max Green Setting (Gmax), s	10.5	24.0	10.5	24.0	10.5	24.0	10.5	24.0				
Max Q Clear Time (g_c+I1), s	16.9	16.9	9.1	22.1	7.6	17.1	5.0	27.4				
Green Ext Time (p_c), s	0.0	2.6	0.0	0.4	0.1	1.9	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 137.1

HCM 6th LOS F

HCM 6th Signalized Intersection Summary

23: River Rd & Chemawa Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	220	205	190	305	140	210	1110	110	150	915	105
Future Volume (veh/h)	155	220	205	190	305	140	210	1110	110	150	915	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1710	1697	1683	1697	1710	1697	1697	1697	1697	1697	1683	1683
Adj Flow Rate, veh/h	163	232	216	200	321	147	221	1168	116	158	963	111
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
Percent Heavy Veh, %	0	1	2	1	0	1	1	1	1	1	2	2
Cap, veh/h	185	260	210	222	303	245	243	1398	139	178	1258	145
Arrive On Green	0.11	0.15	0.15	0.14	0.18	0.18	0.15	0.47	0.47	0.22	0.87	0.86
Sat Flow, veh/h	1629	1697	1368	1616	1710	1387	1616	2957	293	1616	2884	332
Grp Volume(v), veh/h	163	232	216	200	321	147	221	636	648	158	534	540
Grp Sat Flow(s),veh/h/ln	1629	1697	1368	1616	1710	1387	1616	1612	1639	1616	1599	1617
Q Serve(g_s), s	12.8	17.4	19.9	15.8	23.0	12.7	17.5	44.6	44.9	12.3	16.7	16.9
Cycle Q Clear(g_c), s	12.8	17.4	19.9	15.8	23.0	12.7	17.5	44.6	44.9	12.3	16.7	16.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		0.21
Lane Grp Cap(c), veh/h	185	260	210	222	303	245	243	762	774	178	697	705
V/C Ratio(X)	0.88	0.89	1.03	0.90	1.06	0.60	0.91	0.83	0.84	0.89	0.77	0.77
Avail Cap(c_a), veh/h	194	260	210	242	303	245	360	762	774	186	697	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89
Uniform Delay (d), s/veh	56.7	54.0	55.0	55.2	53.5	49.3	54.4	29.9	29.9	50.0	5.8	5.8
Incr Delay (d2), s/veh	27.9	25.2	64.8	30.1	68.8	2.8	15.6	10.4	10.5	31.9	7.0	7.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	9.3	10.6	8.3	15.6	4.6	8.1	18.9	19.3	6.0	3.6	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.7	79.2	119.9	85.3	122.3	52.1	70.0	40.3	40.4	81.9	12.8	12.8
LnGrp LOS	F	E	F	F	F	D	E	D	D	F	B	B
Approach Vol, veh/h	611					668		1505		1232		
Approach Delay, s/veh	95.0					95.8		44.7		21.7		
Approach LOS	F					F		D		C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	65.9	21.8	23.9	23.5	60.7	18.8	27.0					
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.5	4.0	4.0				
Max Green Setting (Gmax), s	60.0	60.0	19.5	19.0	29.0	46.0	15.5	23.0				
Max Q Clear Time (g_c+14.3), s	46.9	46.9	17.8	21.9	19.5	18.9	14.8	25.0				
Green Ext Time (p_c), s	0.0	1.8	0.0	0.0	0.0	1.5	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	53.8
HCM 6th LOS	D

HCM 6th Roundabout
24: Verda Ln & Chemawa Rd

2043 Land Use Option 2 - PM Peak Hour

09/08/2020

Intersection				
Intersection Delay, s/veh 10.6				
Intersection LOS B				
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	500	567	541	123
Demand Flow Rate, veh/h	505	575	546	124
Vehicles Circulating, veh/h	297	378	271	756
Vehicles Exiting, veh/h	583	439	531	197
Ped Vol Crossing Leg, #/h	0	0	2	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.5	12.9	9.8	8.0
Approach LOS	A	B	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	505	575	546	124
Cap Entry Lane, veh/h	1019	938	1047	638
Entry HV Adj Factor	0.990	0.986	0.990	0.993
Flow Entry, veh/h	500	567	541	123
Cap Entry, veh/h	1009	925	1036	634
V/C Ratio	0.495	0.613	0.522	0.194
Control Delay, s/veh	9.5	12.9	9.8	8.0
LOS	A	B	A	A
95th %tile Queue, veh	3	4	3	1

HCM 6th Signalized Intersection Summary

25: Salem Pkwy & Verda Ln/Hyacinth St

2043 Land Use Option 2 - PM Peak Hour

09/08/2020



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	650	45	450	880	345	90	1200	640	205	900	170
Future Volume (veh/h)	40	650	45	450	880	345	90	1200	640	205	900	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1885	1885	1870	1826	1885	1856	1885	1870	1856	1900
Adj Flow Rate, veh/h	41	663	46	459	898	352	92	1224	0	209	918	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
Percent Heavy Veh, %	0	3	1	1	2	5	1	3	1	2	3	0
Cap, veh/h	111	343	289	359	604	492	129	1193		260	1483	
Arrive On Green	0.06	0.18	0.18	0.20	0.32	0.32	0.07	0.34	0.00	0.15	0.42	0.00
Sat Flow, veh/h	1810	1856	1566	1795	1870	1522	1795	3526	1598	1781	3526	1610
Grp Volume(v), veh/h	41	663	46	459	898	352	92	1224	0	209	918	0
Grp Sat Flow(s), veh/h/ln	1810	1856	1566	1795	1870	1522	1795	1763	1598	1781	1763	1610
Q Serve(g_s), s	2.8	24.0	2.6	26.0	42.0	26.5	6.5	44.0	0.0	14.8	26.5	0.0
Cycle Q Clear(g_c), s	2.8	24.0	2.6	26.0	42.0	26.5	6.5	44.0	0.0	14.8	26.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	111	343	289	359	604	492	129	1193		260	1483	
V/C Ratio(X)	0.37	1.94	0.16	1.28	1.49	0.72	0.71	1.03		0.80	0.62	
Avail Cap(c_a), veh/h	111	343	289	359	604	492	290	1193		274	1483	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	58.6	53.0	29.8	52.0	44.0	38.7	59.0	43.0	0.0	53.7	29.5	0.0
Incr Delay (d2), s/veh	2.0	431.5	0.3	145.1	227.5	4.3	7.1	32.8	0.0	15.1	2.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	52.1	1.3	26.0	57.2	10.3	3.1	23.4	0.0	7.4	10.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.6	484.5	30.0	197.1	271.5	43.0	66.2	75.8	0.0	68.8	31.5	0.0
LnGrp LOS	E	F	C	F	F	D	E	F		E	C	
Approach Vol, veh/h	750			1709			1316			A	1127	A
Approach Delay, s/veh	433.5			204.4			75.1				38.4	
Approach LOS	F			F			E				D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	3.3	58.7	12.0	46.0	24.0	48.0	30.0	28.0				
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	6.0	* 6	5.0	5.0				
Max Green Setting (Gmax), s	20.0	41.0	7.0	41.0	19.0	* 42	25.0	23.0				
Max Q Clear Time (g_c+10), s	10.5	28.5	4.8	44.0	16.8	46.0	28.0	26.0				
Green Ext Time (p_c), s	0.1	5.2	0.0	0.0	0.1	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 166.6

HCM 6th LOS F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
6: River Rd & Clear Lake Rd/Quinaby Rd

2043 Future Mitigations - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	9.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	50	20	90	115	105	30	150	55	80	430	45
Future Vol, veh/h	25	50	20	90	115	105	30	150	55	80	430	45
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	100	-	30	100	-	50	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	6	6	0	0	7	0	2	0	8	1	0
Mvmt Flow	26	52	21	93	119	108	31	155	57	82	443	46

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	935	904	467	914	899	184	489	0	0	212	0	0
Stage 1	630	630	-	246	246	-	-	-	-	-	-	-
Stage 2	305	274	-	668	653	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.56	6.26	7.1	6.5	6.27	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.56	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.054	3.354	3.5	4	3.363	2.2	-	-	2.272	-	-
Pot Cap-1 Maneuver	248	273	588	256	281	846	1085	-	-	1323	-	-
Stage 1	473	469	-	762	706	-	-	-	-	-	-	-
Stage 2	709	676	-	451	467	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	129	249	587	194	256	846	1085	-	-	1323	-	-
Mov Cap-2 Maneuver	129	249	-	194	256	-	-	-	-	-	-	-
Stage 1	459	440	-	740	686	-	-	-	-	-	-	-
Stage 2	497	656	-	360	438	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB				
HCM Control Delay, s	25.1		26.2		1.1			1.1				
HCM LOS	D		D									

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1085	-	-	129	249	587	194	256	846	1323	-	-
HCM Lane V/C Ratio	0.029	-	-	0.2	0.207	0.035	0.478	0.463	0.128	0.062	-	-
HCM Control Delay (s)	8.4	-	-	39.7	23.2	11.4	39.5	30.6	9.9	7.9	-	-
HCM Lane LOS	A	-	-	E	C	B	E	D	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.8	0.1	2.3	2.3	0.4	0.2	-	-

HCM 6th TWSC
8: Portland Rd & Quinaby Rd

2043 Future Mitigations - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	7.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	115	145	465	615	155
Future Vol, veh/h	105	115	145	465	615	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	240	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	4	5	1	2
Mvmt Flow	111	121	153	489	647	163
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1524	729	810	0	-	0
Stage 1	729	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	131	420	807	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 106	420	807	-	-	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	390	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	45	2.5		0		
HCM LOS	E					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	807	-	308	-	-	
HCM Lane V/C Ratio	0.189	-	0.752	-	-	
HCM Control Delay (s)	10.5	-	45	-	-	
HCM Lane LOS	B	-	E	-	-	
HCM 95th %tile Q(veh)	0.7	-	5.7	-	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 6th TWSC
9: River Rd & Perkins St

2043 Future Mitigations - PM Peak Hour

09/08/2020

Intersection						
Int Delay, s/veh	4.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	185	30	245	200	35	480
Future Vol, veh/h	185	30	245	200	35	480
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	1	0	2	2	0	1
Mvmt Flow	213	34	282	230	40	552
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1029	397	0	0	512	0
Stage 1	397	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	260	657	-	-	1064	-
Stage 1	681	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	250	657	-	-	1064	-
Mov Cap-2 Maneuver	377	-	-	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	24.1	0	0.6			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 377 657 1064	-	-		
HCM Lane V/C Ratio	-	- 0.564 0.052 0.038	-	-		
HCM Control Delay (s)	-	- 26.2 10.8 8.5	-	-		
HCM Lane LOS	-	- D B A	-	-		
HCM 95th %tile Q(veh)	-	- 3.3 0.2 0.1	-	-		

HCM 6th TWSC
10: 35th Ave & Perkins St

2043 Future Mitigations - PM Peak Hour

09/08/2020

Intersection												
Int Delay, s/veh	9.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	45	100	145	75	10	70	95	165	15	45	5
Future Vol, veh/h	5	45	100	145	75	10	70	95	165	15	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	5	0	0	1	0	0	0	0	0	5	0
Mvmt Flow	6	51	114	165	85	11	80	108	188	17	51	6

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	498	544	54	533	453	202	57	0	0	296	0	0
Stage 1	88	88	-	362	362	-	-	-	-	-	-	-
Stage 2	410	456	-	171	91	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.1	6.51	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.1	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.5	4.009	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	486	442	1019	461	504	844	1560	-	-	1277	-	-
Stage 1	925	816	-	661	627	-	-	-	-	-	-	-
Stage 2	623	563	-	836	821	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	389	408	1019	349	466	844	1560	-	-	1277	-	-
Mov Cap-2 Maneuver	389	408	-	349	466	-	-	-	-	-	-	-
Stage 1	867	805	-	619	587	-	-	-	-	-	-	-
Stage 2	492	528	-	686	810	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.9		20.5		1.6		1.8	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1560	-	-	389	696	349	492	1277	-	-
HCM Lane V/C Ratio	0.051	-	-	0.015	0.237	0.472	0.196	0.013	-	-
HCM Control Delay (s)	7.4	0	-	14.4	11.8	24.2	14.1	7.9	0	-
HCM Lane LOS	A	A	-	B	B	C	B	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	0.9	2.4	0.7	0	-	-

HCM Signalized Intersection Capacity Analysis

11: Portland Rd & Perkins St

2043 Future Mitigations - PM Peak Hour

09/08/2020

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	35	190	150	600	660	35
Future Volume (vph)	35	190	150	600	660	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	1.00			1.00	1.00	
Frpb, ped/bikes	0.98			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	0.89			1.00	0.99	
Flt Protected	0.99			0.99	1.00	
Satd. Flow (prot)	1561			1823	1852	
Flt Permitted	0.99			0.61	1.00	
Satd. Flow (perm)	1561			1121	1852	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	38	204	161	645	710	38
RTOR Reduction (vph)	163	0	0	0	2	0
Lane Group Flow (vph)	79	0	0	806	746	0
Confl. Bikes (#/hr)		1				
Heavy Vehicles (%)	0%	6%	0%	4%	2%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	18.0			63.0	63.0	
Effective Green, g (s)	18.0			63.0	63.0	
Actuated g/C Ratio	0.20			0.70	0.70	
Clearance Time (s)	4.5			4.5	4.5	
Lane Grp Cap (vph)	312			784	1296	
v/s Ratio Prot	c0.05				0.40	
v/s Ratio Perm				c0.72		
v/c Ratio	0.25			1.03	0.58	
Uniform Delay, d1	30.3			13.5	6.8	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.9			39.5	1.9	
Delay (s)	32.3			53.0	8.6	
Level of Service	C			D	A	
Approach Delay (s)	32.3			53.0	8.6	
Approach LOS	C			D	A	
Intersection Summary						
HCM 2000 Control Delay			31.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.85			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	9.0
Intersection Capacity Utilization			101.6%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

CITY COUNCIL MEETING: November 2, 2020

AGENDA ITEM NUMBER:_____

TO: MAYOR CLARK AND COUNCIL MEMBERS

THROUGH: CHRISTOPHER C. EPPLEY, CITY MANAGER

FROM: E. SHANNON JOHNSON, CITY ATTORNEY

SUBJECT: THIRD DECLARATION OF LOCAL STATE OF EMERGENCY

The Council passed a local state of emergency declaration on July 6, 2020 by Ordinance 2020-816 that expired on September 9, 2020. The Council passed a second local state of emergency declaration on September 8 by Ordinance 2020-823. Such Ordinance expires on November 3, 2020. Consequently, I have prepared a new Ordinance that is similar to the previous Ordinance. This Ordinance expires on January 5, 2021.

Note that temporary rules from the state Occupational Safety and Health Administration are expected to go into force shortly. Such rules are likely to supersede City rules regarding social distancing and mask use.

RECOMMENDATION:

Review the attached Ordinance declaring the third state of emergency, revise if appropriate and adopt the Ordinance.

Please contact me if you have any questions. Thank you.

1 A BILL ORDINANCE NO.
 2 2020-_____
 3 FOR
 4
 5 AN ORDINANCE
 6

7 DECLARING A THIRD LOCAL STATE OF EMERGENCY IN
 8 THE CITY OF KEIZER AS A RESULT OF COVID-19
 9 PANDEMIC; DECLARING AN EMERGENCY
 10

11 The City Council of the City of Keizer finds as follows:

12 WHEREAS, pursuant to Ordinance No. 2009-588, the City Council finds that the
 13 following factors have resulted in the need for a state of emergency declaration;

14 WHEREAS, COVID-19 (novel coronavirus) was declared a pandemic by the
 15 World Health Organization on March 11, 2020;

16 WHEREAS, Coronaviruses are a group of viruses that can cause respiratory
 17 disease, with the potential to cause serious illness or loss of life;

18 WHEREAS, COVID-19 requires a significant amount of resources at the local
 19 level to keep the public and community informed and as safe as possible;

20 WHEREAS, On March 8, 2020, Governor Kate Brown declared a state of
 21 emergency due to the COVID-19 outbreak in Oregon (Executive Order No. 20-03),
 22 finding that COVID-19 has created a threat to public health and safety, and constitutes a
 23 statewide emergency under ORS 401.025(1). Governor Brown also issued guidance
 24 regarding group gatherings and social distancing to minimize potential opportunities for
 25 the COVID-19 to spread;

1 WHEREAS, the Governor has issued additional Executive Orders on this matter;

2 WHEREAS, the COVID-19 pandemic will create significant social, health,
3 financial and other impacts to the community of unknown duration;

4 WHEREAS, the City has been closely monitoring updated information for the
5 state through the Governor's office, the Oregon Health Authority (OSHA), and the
6 Centers for Disease Control (CDC) for U.S. updates. The primary focus at the City is to
7 restrict the spread of COVID-19 and to maintain the health of our workforce and the
8 community so the City can continue to provide crucial City services.

9 WHEREAS, pursuant to ORS 401.309(1), the governing body of a City may
10 declare, by Ordinance or Resolution, that a state of emergency exists within the City;

11 WHEREAS, pursuant to Keizer Ordinance No. 2009-588 ("Emergency
12 Ordinance"), if the City Manager determines that a state of emergency exists, the City
13 Manager may declare a state of emergency. Section 2 of the Emergency Ordinance sets
14 out the actions the City can take, which include the ability to prohibit or limit the number
15 of people to public places, commit to mutual aid agreements, and other measures "for the
16 protection of life and/or property."

17 WHEREAS, the City Manager has declared a local state of emergency which has
18 been ratified by the City Council;

19

20

1 WHEREAS, the latest City Manager declaration expired on July 7, 2020;

2 WHEREAS, the City Council has declared a local state of emergency on July 6,
3 2020;

4 WHEREAS, the City Council declaration (Ordinance No. 2020-816) expired on
5 September 9, 2020;

6 WHEREAS, the City Council has declared a second local state of emergency on
7 September 8, 2020;

8 WHEREAS, the City Council second declaration (Ordinance No. 2020-823)
9 expires on November 3, 2020;

10 The City Council of the City of Keizer ordains as follows:

11 Section 1. The findings noted above are hereby adopted.

12 Section 2. A Local State of Emergency is declared to exist and the area of
13 emergency is the entire City of Keizer. The Emergency Operations Center may be
14 opened if deemed necessary.

15 Section 3. To eliminate exposure to and spread of COVID-19, and in support
16 of state and federal guidelines for social distancing, the following measures are in effect:

17 a. All open houses are cancelled unless social distancing modifications are in
18 place.

19 b. All public meetings will be in-person with appropriate social distancing
20 requirements in place for both participants and audience members. This

1 includes, but is not limited to Peer Court and Hearings Officer
2 proceedings.

3 c. All standing and ad hoc committee/board/commission meetings and
4 activities will be in-person with appropriate social distancing requirements
5 in place for both participants and audience members.

6 d. City Council meetings will be in-person, but with social distancing
7 modifications for both participants and audience members.

8 e. Masks or face coverings are recommended when social distancing cannot
9 be maintained.

10 f. The City will review the information from the federal Centers for Disease
11 Control and Marion County Health for updated decisions as appropriate.

12 Section 4. Previously, utility shutoffs were suspended. However, grant
13 funding is now available for customers. Therefore, the City will send shut-off notices or
14 shut off water for non-payment of unpaid water bills beginning with the October 2020
15 billing.

16 Section 5. To respond to the COVID-19 Pandemic, the City may procure
17 needed goods and services in accordance with ORS 279B.080 and without compliance
18 with normal procurement procedures, redirect any necessary City funds for emergency
19 purposes, and take any other actions set forth in the Emergency Ordinance, including any
20 actions necessary for the protection of health and safety.

1 Section 6. The Keizer Municipal Court shall conduct business as ordered by the
2 Municipal Court Judge.

3 Section 7. As allowed by state law and/or collective bargaining contracts, the
4 City may change employees' shifts, hours of work and call out for overtime without
5 notice or regard to seniority.

6 Section 8. The City may take any other emergency acts as allowed by law,
7 including but not limited to committing to mutual aid agreements.

8 Section 9. The City will take all necessary steps authorized by law to
9 coordinate the response and recovery of this emergency, including but not limited to,
10 requesting assistance from the federal government, the State of Oregon and Marion
11 County.

12 Section 10. The City will take all necessary steps necessary to comply with the
13 temporary COVID-19 rules if adopted by the Occupational Safety and Health
14 Administration (OSHA). If applicable, such OSHA rules may supersede some or all of
15 the rules set forth herein.

16 Section 11. The City will temporarily suspend enforcement of temporary sign
17 regulations while this emergency is in place to allow businesses the ability to let
18 customers know they are open.

19

20

1 Section 12. This Ordinance being necessary for the immediate preservation of
2 the public health, safety, and welfare, an emergency is declared to exist and this
3 Ordinance shall take effect immediately upon its passage.

4 Section 13. This Ordinance is repealed on January 5, 2021.

5 PASSED this _____ day of _____, 2020.

6

7 SIGNED this _____ day of _____, 2020.

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14

Mayor

City Recorder

CITY COUNCIL MEETING: November 2, 2020

AGENDA ITEM NUMBER: _____

TO: MAYOR CLARK AND CITY COUNCIL MEMBERS

THROUGH: CHRISTOPHER C. EPPLEY, CITY MANAGER

FROM: TIM WOOD, FINANCE DIRECTOR

SUBJECT: RELATING TO WASTEWATER SERVICE CHARGES

BACKGROUND:

The City of Keizer is part of a regional sewer system managed and operated by the City of Salem. The City of Salem sets the sewer rates for the regional system based on the results of a cost of service analysis specific to providing service to Keizer residents. In October 2020 the City of Salem adopted rate increases of 3.0% effective January 1, 2021 and January 1, 2022. This equates to a \$12.60 and \$12.72 annual increase in 2021 and 2022 for the average residential customer. The primary reason for the rate increases is to support the ongoing sewer system capital improvement plan.

The City of Keizer is responsible for the sewer billing function for Keizer residents. Sewer charges are included on the combined bimonthly utility billing statement with water and stormwater charges. The sewer revenues are then remitted back to the City of Salem.

FISCAL IMPACT:

The sewer rate charges are collected by the City of Keizer and passed on to the City of Salem so there is no net fiscal impact to the City of Keizer.

RECOMMENDATION:

Staff recommends Council receive public testimony on sewer rate increases. After all public testimony has been received, staff recommends the Council adopt the attached Resolution.

CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON

Resolution R2020-_____

RELATING TO WASTEWATER SERVICE CHARGES (2021-2022);
REPEAL OF RESOLUTION R2018-2919

WHEREAS, the City of Keizer is responsible for the City's sewer collection system and contracts for treatment with the City of Salem;

WHEREAS, the City of Keizer has agreed to adopt the City of Salem's wastewater service charges;

WHEREAS, the City Council adopted the 2019 and 2020 wastewater service charges by Resolution R2018-2919;

WHEREAS, the City of Salem has adopted wastewater service charges for the 2021 and 2022 calendar years, with the first increase effective for the billing cycle beginning January 1, 2021, and the second increase effective for the billing cycle beginning January 1, 2022;

WHEREAS, it is appropriate for the City of Keizer to adopt the fees by Resolution;

NOW, THEREFORE,

BE IT RESOLVED by the City Council of the City of Keizer that wastewater service charges attached in Exhibit "A" and by this reference incorporated herein shall be effective on January 1, 2021 and January 1, 2022 as shown in such Exhibit.

1 BE IT FURTHER RESOLVED that Resolution R2018-2919 (Relating to
 2 Wastewater Services Charges (2019-2020)) is hereby repealed in its entirety on January
 3 1, 2021.

4 BE IT FURTHER RESOLVED that this Resolution shall take effect immediately.

5 PASSED this _____ day of _____, 2020.

6

7 SIGNED this _____ day of _____, 2020.

8

9

10

 Mayor

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12

13

 City Recorder

Rates charged for wastewater collection and processing are based on service area and customer classification. A base charge is assessed per wastewater connection and a volume rate is applied per hundred cubic feet (ccf) of average water consumption of two or more readings on or after November 1. The wastewater volume for each account not separately measured is established annually and shall be calculated on the average measurable water consumption using two or more meter readings on or after November 1. Commercial customers using an average of more than 10,000 cubic feet (cf) of water per month may install, at the customer's expense, a separate meter to measure water used in a production process or for irrigation which does not flow through to the wastewater collection system. Rates listed will appear on bills dated on or after February 1 of each year identified below and shall be applied to all accounts on a monthly basis. The City of Salem charges a five percent franchise fee on services to customers in Salem city limits.

Wastewater Service Charges

		Effective Dates:	
		1/1/2021	1/1/2022
Turner Service Area (Wholesale)			
Billing (per invoice)	\$	2.31	\$ 2.38
Volume (per ccf)		3.72	3.83
Keizer Service Area (Retail by Customer Class)			
Single Family Residential			
Base charge (per account)		13.45	13.85
Volume rate (per ccf)		3.75	3.86
Without measurable water consumption (wastewater volume at 5 ccf)		32.20	33.15
New (without history; wastewater volume at 6 ccf)		35.95	37.01
Vacant (wastewater volume at 0.5 ccf)		15.33	15.78
Utility Rate Relief Program Base Charge (per account)	(1)	(10.09)	(10.39)
Multifamily			
Base charge - Duplex (per account)		14.80	15.24
Base charge - Triplex (per account)		16.14	16.62
Base charge - Fourplex (per account)		17.49	18.01
Base charge - Fiveplex (per account)		18.84	19.41
Add the following to base charge for each unit over five		1.35	1.39
Volume rate (per ccf)		3.75	3.86
New or without measurable water consumption (Base charge by units plus wastewater volume at 5 ccf per unit)	(2)		
Commercial/Public			
Base charge (per account)		21.34	21.98
Volume rate (per ccf)		5.15	5.30
New or without measurable water consumption (Base charge plus volume (ccf) equal to like business)			

(1) The Utility Rate Relief Program provides a discount for qualifying elderly or disabled customers that have a gross household income equal to or less than 60 percent of Oregon median income. The discount represents 60 percent of the wastewater base rate on each utility bill. The program is limited to single-family residential utility accounts and one discount per household may be approved. To qualify, customers must complete the application process. Once approved for the program the discount will begin on the next utility bill.

(2) Wastewater volumes for new accounts without history are set as indicated and may be adjusted upon the customer's request, based on actual usage after a minimum of two full billing cycles.

CITY COUNCIL MEETING: November 2, 2020

AGENDA ITEM NUMBER: _____

TO: MAYOR CLARK AND CITY COUNCIL MEMBERS

**THROUGH: CHRIS EPPELY
CITY MANAGER**

**FROM: BILL LAWYER
PUBLIC WORKS DIRECTOR**

SUBJECT: CITY HALL MINOR REMODEL

DATE: October 27th, 2020

BACKGROUND:

The Department of Public Works solicited bids through the public bidding process for the City Hall Minor Remodel project. This project involves the installation of permanent glass panels for the front counter areas in Utility Billing, Reception, Municipal Court, Public Works and Community Development, replacement of the existing gate with a door in the Public Works - Community Development area and HVAC system modifications to create positive air flow from the staff areas into the lobby areas.

This work is being done to reduce the risk of COVID-19 transmission and is eligible for Coronavirus Relief Funds.

A total of 5 bids were received ranging from \$223,556.00 to \$167,000.00 with DGS General Construction Inc. submitting the lowest bid.

FISCAL IMPACT:

The funds for this project are available in the General Fund to be reimbursed through the CARES Act.

RECOMMENDATION:

Staff recommends Council adopt the attached resolution authorizing the City Manger to enter into a contract, after the protest period expires, with **DGS General Construction Inc.** in the amount of \$167,000.00 for the City Hall Minor Remodel project.

Please feel free to contact me with any questions or concerns.

1 CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON

2
3 Resolution R2020-____4
5 AUTHORIZING THE CITY MANAGER TO AWARD AND ENTER
6 INTO AN AGREEMENT WITH DGS GENERAL
7 CONSTRUCTION, INC. FOR THE KEIZER CITY HALL MINOR
8 REMODEL
910 WHEREAS, COVID-19 (novel coronavirus) was declared a pandemic by the World
11 Health Organization on March 11, 2020;12 WHEREAS, on March 8, 2020, Governor Kate Brown declared a state of emergency due
13 to the COVID-19 outbreak in Oregon, finding that COVID-19 has created a threat to public
14 health and safety, and constitutes a statewide emergency under ORS 401.025(1);15 WHEREAS, Governor Kate Brown and the Oregon Health Authority has issued
16 guidance regarding distancing to minimize potential opportunities for the COVID-19 to spread;17 WHEREAS, the COVID-19 pandemic will create significant social, health, financial and
18 other impacts to the community of unknown duration;19 WHEREAS, the City Manager declared a local state of emergency which the City
20 Council ratified;

21 WHEREAS, the City Council declared a local state of emergency;

22 WHEREAS, it has been determined that the City should procure services needed to
23 modify the existing transaction counter tops in city hall to separate public areas from the office
24 areas;

1 WHEREAS, funds available to complete this project are in the General Fund and is
 2 anticipated to be reimbursed under the Amended and Restated Grant Agreement No. 1079
 3 between the State of Oregon and the City;

4 WHEREAS, five bids for this project were received. DGS General Construction, Inc.
 5 submitted the low bid for a total amount of \$167,000.00;

6 NOW, THEREFORE,

7 BE IT RESOLVED by the City Council of the City of Keizer that the City Manager is
 8 hereby authorized to award the contract to, and if no objections are received, enter into an
 9 agreement with DGS General Construction, Inc. for a total cost of \$167,000.00 to modify the
 10 existing transaction counter tops in city hall to separate the public areas from the office areas.
 11 Funding for this project is from the General Fund.

12 BE IT FURTHER RESOLVED that this Resolution shall take effect immediately upon
 13 the date of its passage.

14 PASSED this _____ day of _____, 2020.

15

16 SIGNED this _____ day of _____, 2020.

17

18

19

 Mayor

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22

 City Recorder



MINUTES
KEIZER CITY COUNCIL
Monday, October 19, 2020
Keizer Civic Center, Council Chambers
Keizer, Oregon

CALL TO ORDER

Mayor Clark called the meeting to order at 7:00 pm. Roll call was taken as follows:

Present:

Cathy Clark, Mayor
Kim Freeman, Councilor
Roland Herrera, Councilor
Daniel Kohler, Councilor
Laura Reid, Councilor
Elizabeth Smith, Councilor

Staff:

Chris Eppley, City Manager
Shannon Johnson, City Attorney
Bill Lawyer, Public Works Director
Shane Witham, Community Development
Tim Wood, Finance Director
Andrew Copeland, Police Chief
Tracy Davis, City Recorder

Absent:

Marlene Parsons, Councilor

FLAG SALUTE

Mayor Clark led the pledge of allegiance.

SPECIAL ORDERS OF BUSINESS

a. PROCLAMATION Mayor Clark read the proclamation.

**– Domestic
Violence
Prevention
Month**

Michele Roland-Schwartz, Executive Director of the Oregon Attorney General's Sexual Assault Task Force, shared information regarding the impact of restrictions implemented during the pandemic, resources available, community needs, and the importance of awareness.

Angela Watts, Safety Compass, described the organization and provided detailed information regarding domestic violence, fundraising efforts and training available.

**COMMITTEE
REPORTS**

Frank Hostler reported that the Planning Commission had sworn in two new Commissioners: Jane Herb and Francisco Saldivar; elected Matt Lawyer and Jeffrey Watson as Chair and Vice Chair respectively for the coming year; and after hearing the Traffic Impact Cost of Growth presentation from the consultant and reviewing the study, unanimously voted to recommend adoption to Council.

David Loudon reported that the Parks Advisory Board had approved of a grant for an Eagle Scout project, three Eagle Scout projects have been completed in parks, Claggett Creek Watershed Council had a cleanup day at Wallace House Park, an individual volunteer collected 16 bags of

debris and trash at that park, installation of exercise equipment in parks has been delayed due to equipment shortage, and construction of the new play structure at Claggett Creek Park is underway.

Wayne Frey reported that the Traffic Safety/Bikeways/Pedestrian Committee has been exploring the possibility of applying for the Oregon Department of Transportation 'Oregon Community Paths' Grant but found that the seven possible projects did not qualify. The committee is making a 'safety request' that the City to consider putting a crosswalk near Target and Volcano Stadium. Mayor Clark responded that this would need to go through a study to make sure it was effective and safe and asked Planning staff to advise on this.

Mr. Frey added that the committee had considered the River Road remodel project. Mr. Eppley interjected that this project is not quite ready but knowing there may be a source of funding is important. Councilor Herrera urged the committee to consider getting more crosswalks on River Road. Mayor Clark noted that she would be forwarding information about the sidewalk rehabilitation program in Independence from Mayor McCardle to the committee and that she had asked Councilor Kohler to get information on sidewalk rehabilitation programs to share with the committee in an effort to repair sidewalks and fill 'missing links'.

PUBLIC TESTIMONY

Carolyn Holman, Keizer, stated that a strong inclusivity resolution will send a good message to everyone in the community. Mayor Clark interjected that she would like to see the Keizer motto "Pride, Spirit & Volunteerism" displayed at the focal point in different languages. Ms. Holman also voiced support for rehabilitating area sidewalks.

Ashley Carson Cottingham, Salem, announced that she is running for Marion County Commissioner and shared extensive information about herself.

Rich Rodriguez, Keizer, suggested that instead of purchasing gas powered police vehicles Council consider electric ones to reduce costs and improve the atmosphere. He urged Council to delay the vehicle purchase agenda item for this meeting until data comparing the two options is made available.

PUBLIC HEARING

None

ADMINISTRATIVE ACTION

a. Keizer Growth Transportation Study

Interim Community Development Director Shane Witham introduced Carl Springer from DKS. Mr. Springer gave his presentation. Discussion followed regarding the River-Cherry Overlay District, Transportation System Plan, Urban Growth Boundary, and location of railroad lines.

Councilor Freeman moved that the Keizer City Council direct staff to prepare a resolution approving the Keizer Growth Transportation Impact Study for Council adoption at the next meeting. Councilor Herrera

seconded. Motion passed as follows:

AYES: Clark, Reid, Freeman, Herrera, Smith and Kohler (6)

NAYS: None (0)

ABSTENTIONS: None (0)

ABSENT: Parsons (1)

**b. Municipal Court
Judge
Evaluation
Report**

Mayor Clark explained that this is done annually by assignment.

Councilor Smith praised Judge Myers for his thorough technical explanations, being very reasonable, giving opportunities to establish a payment plan, taking steps to get licenses back and possibly reducing fees.

Mayor Clark echoed Councilor Smith's comments and praised Judge Myers for paying attention to Covid protocols, his patience, and his support of and respect for police officers. She added that she had met the new judge pro tem Patrick Mercurio and felt he would be a great fit.

Discussion followed regarding the procedure for assignment of councilors for the next review. Council agreed by consensus that there was no need to do a formal evaluation.

Councilor Freeman moved that the Keizer City Council extend the Mayor's announcement of the Councilors for the upcoming year to the first meeting in January 2021. Councilor Herrera seconded. Motion passed as follows:

AYES: Clark, Reid, Freeman, Herrera, Smith and Kohler (6)

NAYS: None (0)

ABSTENTIONS: None (0)

ABSENT: Parsons (1)

**CONSENT
CALENDAR**

- a. RESOLUTION – Authorizing City Manager to Enter into Professional Services Contract for Keizer Parks Master Plan Update with MIG
- b. RESOLUTION – Ratifying Finance Director's Signing of Agreement with Council of Mid-Willamette Society of St. Vincent DePaul for CARES Act Community Support Fund Grant
- c. RESOLUTION – Authorizing the Finance Director to Enter into Lease Agreement with Ricoh USA Inc. for City Hall Main Copier
- d. RESOLUTION – Authorizing the City Manager to Purchase Two 2021 K8A AWD Police Interceptor Utility Vehicles for Police Department
- e. Approval of September 28, 2020 City Council Work Session Minutes
- f. Approval of October 5, 2020 City Council Regular Session Minutes

Councilor Freeman pulled item b.

Councilor Freeman moved that the Keizer City Council approve items a, c, d, e, and f of the Consent Calendar. Councilor Herrera seconded. Motion passed as follows:

AYES: Clark, Reid, Freeman, Herrera, Smith and Kohler (6)
 NAYS: None (0)
 ABSTENTIONS: None (0)
 ABSENT: Parsons (1)

Councilor Freeman voiced concern that the grant agreement does not specify that demographic information would be collected by St. Vincent DePaul noting that she felt it was important for the City to know where the funds are going and who is being helped. Mr. Wood explained that demographics are collected and would be supplied on request and that notice of availability of funds has gone out with utility bills, and to Northwest Natural, PGE and Salem Electric. Past due accounts are being made aware of the availability of funds via personal phone calls and shut-offs have been re-instated.

Councilor Freeman moved that the Keizer City Council approve item b of the Consent Calendar. Councilor Herrera seconded. Motion passed as follows:

AYES: Clark, Reid, Freeman, Herrera, Smith and Kohler (6)
 NAYS: None (0)
 ABSTENTIONS: None (0)
 ABSENT: Parsons (1)

COUNCIL LIAISON REPORTS

Councilor Kohler reported on various events and meetings he had attended and announced that his most recent Facebook post is a video regarding the home rule charter ballot measure.

Councilor Reid shared information on candidate forums in which she had participated, meetings and events she had attended and announced future meetings and parent-teacher conferences.

Councilor Freeman reported on meetings and events she had attended, praised the efforts of everyone for complying with Covid requirements, announced openings on City committees, thanked Councilor Kohler for his efforts in helping businesses receive grant funds and urged everyone to support area businesses and to vote.

Councilor Smith reviewed her disaster relief/recovery efforts and contacts, reported that SEDCOR is partnering with Rich Duncan to rebuild City Hall and the Community Center at Detroit Lake, and praised the enormous efforts of various community members willing to help in every capacity to restore that area. She shared information about the League of Oregon Cities conference, announced upcoming meetings and urged everyone to vote yes on the Charter ballot measure.

Councilor Herrera reported that he had attended all the candidate forums, urged everyone to vote, shared information from the League of Oregon Cities conference, announced upcoming meetings and events,

expressed his condolences to the Carolyn Limbeck family on her recent passing, wished Richard Walsh a speedy recovery and thanked volunteers.

Mayor Clark shared information regarding the search for a new executive director for the Mid-Willamette Valley Council of Governments, requested a Work Session in November to look at housing equity, reported on various meetings and events she had attended, announced that the Heritage Board had received a grant to assist in running the Cultural Center, and announced upcoming events.

OTHER BUSINESS Lieutenant Copeland reported that the new hires will start on the 26th and 27th and commended Safety Compass for their assistance and responsiveness.

Finance Director Tim Wood reminded everyone that conserving water now will keep their wastewater charges at a minimum and that the PERS rate change will cost the City about \$400,000 which will impact the General fund at \$265,000.

City Attorney Shannon Johnson reviewed the policy relating to Social Media in the Council Procedures and reminded Council that City staff is not allowed to discuss or comment on election issues.

WRITTEN COMMUNICATIONS Mayor Clark referred to a letter and photograph requesting that RVs be prohibited from parking in driveways. Mr. Witham acknowledged that Code Enforcement has initiated a case on this particular violation and provided an explanation on what would be allowed and the current parking ordinance.

Mayor Clark circulated a letter from the Oregon Historical Society and stressed the importance of the work they do to help everyone understand, preserve and teach the history of the state.

Councilor Kohler congratulated Councilor Herrera who was elected to the League of Oregon Cities Board. Councilor Herrera responded that he was honored to serve.

AGENDA INPUT October 26, 2020 – 6:00 p.m. – City Council Work Session – Community Demographics, Equity and Diversity
November 2, 2020 – 7:00 p.m. – Council Regular Session
November 9, 2020 – 6:00 p.m. – Work Session
November 16, 2020 – 7:00 p.m. – Council Regular Session
November 30, 2020 – 6:00 p.m. – Work Session on Housing Equity

ADJOURNMENT Mayor Clark adjourned the meeting at 9:42 p.m.

MAYOR:

APPROVED:

Cathy Clark

Debbie Lockhart, Deputy City Recorder

COUNCIL MEMBERS

Councilor #1 – Laura Reid

Councilor #4 – Roland Herrera

Councilor #2 – Kim Freeman

Councilor #5 – Elizabeth Smith

~ Absent ~

Councilor #3 – Marlene Parsons

Councilor #6 – Daniel R. Kohler

Minutes approved: _____

Written Communications/Testimony and Submitted Documents

Read into
Record under
P.T.

Public Testimony received 11-2-20 via email.

Dear Tracy Davis, City Recorder,

Please makes this testimony letter available to Mayor Clark and to all of the City Councilors,

Re: Inclusivity Resolutions and Denouncing of White Supremacy

Dear Mayor Clark and City Councilors, I write to you on behalf of Mano a Mano Family Center, a Salem-based nonprofit serving more than 100 families in Keizer.

We realize that these are scary times. As our own Vic Backlund used to say, do the right thing because it is the right thing to do. That's it. If you can't live up to that maxim, public service may not be for you.

American heroes, of all stripes, fought against fascism, tyranny, and White Supremacy. Denouncing White Supremacy is the right thing to do and the easiest thing to do.

White Supremacy movements are not comparable to Black Lives Matter. We all should have no problem denouncing White Supremacy movements such as Proud Boys, Nazis, and anti-immigrant groups. Denounce White Supremacy. Full stop. Qualifying your denouncement, or watering it down in any way is suspicious.

This Council has a history created by the adoption of the anti-LGBTQ language in chapter 44 of the City Charter. That history doesn't define you as Council members, if you walk away from it. The closer you stay to that history, the more it will stain you.

Mayor Clark, you are not alone in your efforts. Don't go at it alone, because it should be a shared effort. If it doesn't go well, it will be on your shoulders, and it should be a shared responsibility.

Sincerely,

Levi Herrera-Lopez, Executive Director
(1997 McNary Graduate)
Mano a Mano Family Center
levi@manoamanofc.org
503-389-0822 Cell Phone

Courtney
11-2-2020

Madam Mayor and members of the council,

I am here today out of deep concern over the discussion that took place last week regarding the draft of the inclusivity/value statement.

I am deeply concerned that after councilor Herrera suggested the statement include denouncing White Supremacy, he was faced with a barrage of reasons not to include it.

Councilor Reid said not all people have the same definition of white supremacy.

According to Merriam Webster, White supremacy is the belief that the white race is inherently superior to other races and that white people should have control over people of other races. White supremacy is the social, economic, and political systems that collectively enable white people to maintain power over people of other races.

The fact that people carry different definitions of White Supremacy is a part of both the explicit and implicit bias people carry. How others may define white supremacy is not the responsibility of you as the council to tip toe around. Given the official Merriam Webster definition, do you condemn this belief? As a city, do we condemn this belief? If the answer is yes, it needs to be said.

Councilor Kohler said he, "would be opposed to putting something in there that is white supremacy because then you would have to find every group under the sun to put in there."

Councilor Kohler, White supremacy is not a group. It is a belief. It is a belief that has no place in this country, in this state or our city.

Councilor Freeman mentioned moving forward the council should be going to the community to listen to what the people have to say ...have you gone to the community to ask what they would like to see in an inclusivity statement?

Have you asked people of color in our community what words in a statement would matter to them and make them feel more welcome? Councilor Herrera has asked to have something included that condemns white supremacy. Are you listening to him as the sole person of color on this council?

Have you asked the Black members of our community? The LatinX community members? The members with disabilities, LGBTQIA+ community members? If as a council you want to create

a statement about our community being welcoming and have it actual mean something, you MUST include the people who experience the hate and discrimination in this community?

I hear more than one of you reference our neighborhoods are “diverse and all are welcome” People of color may be there, but do they actually feel welcome? Are they a part of our community as a whole?? If you have yet to believe racism and hate are here in Keizer, come to a BLM rally or sit down and really listen to our communities of color, listen to our students and their families.... Keizer has many great people in our community, but we also have community members who have been allowed to demonstrate hate. I have seen it firsthand. As I stood on the corner on a Saturday afternoon just two weeks ago with our Black neighbors, we were supported by many with thumbs up and honks, but also flipped off, yelled at, blown out with exhaust from trucks that revved their engines as they drove by and required to dodge things being thrown at us. The HATE is HERE and must no longer be ignored. You as a council MUST call it out. By not naming it, it will be allowed to continue.

Mayor Clark, I heard and understand your desire to use the affirmative statements because affirmative statements are where you get action...I can, I will, I do, I shall. You said in the negative, there is an absence of action. I do not believe we can successfully move toward an ideal if we do not first condemn the beliefs and behaviors that are not desirable and keeping us from achieving that ideal of welcoming all. Let’s turn the negative into an action...A statement that boldly states the city of Keizer condemns white supremacy, discrimination, hate, exclusion, bullying, violence, and intimidation is necessary. Actively condemning behaviors is an action and will continue to be an action if it is included in the statement.

A general positive statement feels like fluff. It does not make a strong enough statement against undesirable behaviors. Councilor Smith shared a much bolder statement from Philomath that was closer to denouncing undesirable behaviors, however, our communities of color need to read that our city condemns white supremacy, even if some of our white councilors and some of our white community members don’t agree. You begin REAL steps toward inclusion and welcoming all when you are willing to take a stand for ALL, even if it makes you uncomfortable. True anti-racist work IS uncomfortable. I implore you to take a stronger stand in your statement of inclusion and condemn white supremacy.

Carol Dourfater
11-2-2020

DRAFT:
Keizer Statement of Values
Justice, Equity, Diversity and Inclusion

- #3
- a. Whereas All people shall be treated with dignity and respect; and (*Keizer City Council Resolution R2018-2912*);
 - b. Whereas "All" people includes but is not limited to the Federal and State Definitions of Protected Classes of people:
 - b.i. Federal definition – Race, color, religion, national origin, sex, familial status, disability
 - b.ii. State of Oregon additions – Source of income, marital status, sexual orientation, gender identity; and
 - c. Whereas equity is both a process and an outcome; and (*Salem-Keizer School District*);
 - d. Whereas the City of Keizer recognizes that Federal and State of Oregon practices, policies, laws and regulations have historically resulted in discrimination and disparity against people based on any protected class listed above.

#1 NOW, THEREFORE, The City of Keizer has taken action and commits to continuing to take action to be a city that welcomes every person regardless of their race, color, religion, national origin, sex, familial status, disability, source of income, marital status, sexual orientation, or gender identity.

#2 In addition, the City of Keizer affirms its commitment to ensure that all members of the community are free from acts that are rooted in racism, discrimination, intolerance, bigotry, and hostility. We will strive to inspire and continually pursue a culture of safety and wellbeing.

From: Rich Rodriguez <84822tango@gmail.com>
Sent: Monday, November 2, 2020 9:10 PM
To: Davis, Tracy <DavisT@keizer.org>
Subject: Public Testimony - Thanks

Announce I'm the coordinator for the Keizer Sustainability Committee (see facebook)

Today -

- Few moments of silence for some recent losses in Oregon
- Review Resolution XXX-YYY from last Council meeting authorizing the purchase of two police vehicle and the process behind that ill advised decision.
- Summary

Recent Losses – A moment of silence

- For the people impacted by the recent fires in Detroit, Southern Oregon, and elsewhere, where a blaze killed at least several people, destroyed an estimated 600 homes.
- And for the loss of the Clark Glacier on the flanks of South Sister. That glacier was deemed officially dead October 20 by the Oregon Glaciers Institute.
- Let us now have a movement of silence for these climate impacts affecting thousands of Oregonians right now.

Thank you

Now I turn our attention to the October 19th Council Meeting.

At that meeting I spoke against the Resolution to purchase two new police cars. I spoke against the purchase on two grounds; financial and environmental.

Financial: In my testamentary I asked if there was a life cycle analysis of the vehicles (total price of \$67,440.74). Nobody from City Staff nor any Council Member raised their voice to speak to this question. Nobody. Nobody asked me a question about this.

I found no life cycle analysis in the documents submitted to Council in the Council meeting packet.

I noticed, though, when I asked about life cycle cost, the City Manager, Attorney, and Finance Manager fidgeted in their seats. Why? Likely they knew there was no life cycle cost analysis (notably fossil fuel vs. electric energy) in the materials presented to you, Council Members. Had this analysis been it may have revealed an electric vehicle would be more cost effective (including being fast and nearly silent) than a fossil vehicle. The cost of gasoline, oil changes, air

filters, spark plugs, service labor costs, resale value... all these things were seemingly excluded from the Staff's analysis and recommendations to you.

You seemingly had no idea if the choice of a fossil is in the best financial interest of the City and its citizens. Despite my raising this issue of life cycle cost analysis, you proceeded to spend some \$63,000 of funds belonging to the Citizens of Keizer.

While I have respect for many of you, your decision of your was simply ill advised in light the questions raised – you have no idea if this was a least cost life cycle purchase decision.

I recommend the City begin a planning a process NOW for future vehicle purchases that includes a life cycle analysis (electric vs. fissile). I encourage the City to engage Forth in Portland (forthmobility.o) to recommended an appropriate life cycle cost analysis model. Do not wait and repeat this mistake again at the cost to our citizens.

Environmental: I also objected to the \$63,000 vehicle purchase on environmental grounds. YOU, Council Members, gave absolutely no consideration to the 200,000 lbs of CO2 these vehicles will emit over their lifetime. YOU seemingly considered this CO2 as having no merirt for consideration in this purchasing decision. This CO2 load will impact this community, your children, grandchildren, grandchildren.

I recommend the Council task a staff or a committee with recommendation for establishing a cost of carbon and factor that into the City's decision making processes. Council or Committee is encouraged to engage professional cons

In summary

- Moment of silence – thank you for your concern environmental losses
- Police Vehicle Purchase – Recommendations for improvements in processes
- Financial analysis
- Environmental analysis