



TUALATIN CITY COUNCIL MEETING

MONDAY, JULY 08, 2019

JUANITA POHL CENTER
8513 SW TUALATIN ROAD
TUALATIN, OR 97062

Mayor Frank Bubenik
Council President Nancy Grimes
Councilor Paul Morrison Councilor Robert Kellogg
Councilor Bridget Brooks Councilor Maria Reyes

5:00 PM WORK SESSION

- 1. 5:00 p.m. (60 min) – Water Emergency Recovery Plan Presentation and Water Supply Strategy Update.** Staff will provide Council with an update on the City's water supply planning efforts including a water system recovery plan to be included in the Water Master Plan and a brief update on the Water Supply Strategy project.
- 2. 6:00 p.m. (30 min) – Social Gaming in Tualatin.** At Council's direction, staff researched the subject of Social Gaming in Tualatin, including how it is regulated, what other cities are doing, and common standards contained in similar ordinances. Staff would like feedback on whether or not to move forward with developing an ordinance.
- 3. 6:30 p.m. (30 min) – Council Meeting Agenda Review, Communications & Roundtable.** Council will review the agenda for the July 8th City Council meeting and brief the Council on issues of mutual interest.

7:00 P.M. CITY COUNCIL MEETING

Call to Order

Pledge of Allegiance

Announcements

- 1.** Tualatin Youth Advisory Council Update for July 2019
- 2.** New Employee Introduction- Police Officer Eli Fults
- 3.** New Employee Introduction- Police Officer Jason Farlow

Public Comment

This section of the agenda allows anyone to address the Council regarding any issue not on the agenda, or to request to have an item removed from the consent agenda. The duration for each individual speaking is limited to 3 minutes. Matters requiring further investigation or detailed answers will be referred to City staff for follow-up and report at a future meeting.

Consent Agenda

The Consent Agenda will be enacted with one vote. The Mayor will ask Councilors if there is anyone who wishes to remove any item from the Consent Agenda for discussion and consideration. If you wish to request an item to be removed from the consent agenda you should do so during the Citizen Comment section of the agenda.

1. Consideration of Approval of the Minutes for the Work Session and Regular Meeting of June 10, 2019

Public Hearings - Quasi-Judicial

1. Consideration of PTA 19-0002 to amend the Tualatin Development Code Chapters 49 and 73F and PMA 19-0002 to rezone the City Operations Center property from Light Manufacturing (ML) to Institutional (IN).

General Business

If you wish to speak on a general business item please fill out a Speaker Request Form and you will be called forward during the appropriate item. The duration for each individual speaking is limited to 3 minutes. Matters requiring further investigation or detailed answers will be referred to City staff for follow-up and report at a future meeting.

1. Consideration of **Ordinance No. 1422-19** Amending Tualatin Development Code Chapter 49: Institutional Zone and Chapter 73F: Wireless Communication Facilities (PTA 19-0002); and Amending Map 9-1 To Rezone the City Operations Center Property from Light Manufacturing to Institutional Zone (PMA 19-0002)

Public Comment

Adjournment

Meeting materials, including agendas, packets, public hearing and public comment guidelines, and Mayor and Councilor bios are available at www.tualatinoregon.gov/council.

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In compliance with the Americans with Disabilities Act, this meeting location is accessible to persons with disabilities. To request accommodations, please contact the City Manager's Office at 503.691.3011 36 hours in advance of the meeting.



City of Tualatin

CITY OF TUALATIN Staff Report

TO: Honorable Mayor and Members of the City Council

THROUGH: Sherilyn Lombos, City Manager

FROM: Kelsey Lewis, Management Analyst II
Jeff Fuchs, PE, Public Works Director

DATE: July 8, 2019

SUBJECT:
Water Emergency Recovery Plan Presentation and Water Supply Strategy Update

RECOMMENDATION:
Staff will provide Council with an update on the City's water supply planning efforts including a water system recovery plan to be included in the Water Master Plan and a brief update on the Water Supply Strategy project.

EXECUTIVE SUMMARY:

Water Emergency Recovery Plan

Why Are We Here?

In addition to being good stewards of the public's water supply, cities in Oregon are required to evaluate their water supply and distribution systems to better understand their vulnerability during a large earthquake.

As part of that evaluation, Tualatin decided to take it a step further and plan for the likely failure of our water distribution system during a large earthquake.

Based on the type of pipe and pipe joints that make up most of Tualatin's water system, we expect to see multiple failures throughout the city that will prevent us from delivering water to customers in Tualatin after a large earthquake.

In addition, we expect that after a large earthquake there will probably be breaks or large leaks in the large-diameter pipelines that supply water from Portland to Tualatin.

Staff is working to create a chapter in the water master plan update to address seismic resiliency, which includes coordination with stakeholders. After holding workshops with First Responders and Tualatin's Citizen Emergency Response Team (CERT), the plan evolved into a coordinated recovery plan for the water system after a large earthquake.

Where Does Our Water Come From?

Tualatin purchases water from the City of Portland and sells that water to customers in Tualatin. We are considered a wholesale customer and we purchase water under a 20 year agreement that renews or expires in 2026.

Water provided by Portland comes from two sources. The primary source is the Bull Run watershed located east of Portland near Sandy. The secondary source is from groundwater wells located in the Columbia South Shore Well Field (26 wells located in northeast Portland and north of Gresham). See the water supply overview map on page 4 of the Powerpoint presentation.

Bull Run includes two reservoirs that are regularly used to capture and store rainfall. A third natural lake, Bull Run Lake is available during certain drought conditions to provide an additional water source to Portland's supply. The Bull Run reservoirs hold 9.9 billion gallons of water. Once rainfall slows down in the summer, water stored in the reservoir is used to provide water to Portland and its wholesale customers (including Tualatin). You can learn more about our water supply from Portland's website: <https://www.portlandoregon.gov/water>.

Water from Bull Run flows to Portland through three large-diameter pipes. The pipes are older, and not seismically resilient, i.e., they could fail during a large earthquake.

Water is delivered from Portland to Tualatin in a series of large-diameter pipes. Water flows through the Washington County Supply Line (WCLS) from Powell Butte Reservoir in Portland to the Tualatin-Metzger turnout in Beaverton. The WCLS is shared by Tualatin, Tualatin Valley Water District (TVWD), Raleigh Hills Water District, and Portland. The WCLS is also in pretty good condition, but it was also not designed to withstand a large earthquake.

From the Tualatin Metzger turnout, water from Portland flows through the Metzger-Tualatin pipeline that is jointly owned by Tualatin and TVWD. South of Metzger near Florence Lane and SW 80th Avenue, the water enters a pipeline owned solely by Tualatin. The Tualatin Supply pipe flows through Washington County and Tigard before entering Tualatin near Bridgeport Village. The pipe continues into Tualatin, under the Tualatin River and then disperses into our distribution system. Our pipe was also not designed to withstand a large earthquake.

Once in our distribution system, water from Portland fills six reservoirs with an operating capacity of 14 million gallons. Water is also used to charge our ASR (Aquifer Storage and Recovery well). The ASR stores about 100 million gallons, but we can only recover about 40 million gallons each summer at a flow rate that is about one-quarter of our average daily flow in winter and 1/20th of our peak day flow in summer.

What have we done to develop our water emergency recovery plan?

This planning effort is really focused on what to do during a catastrophic emergency, such as a Cascadia Subduction Zone earthquake, assuming the distribution system that moves water from the reservoirs to the rest of the City will be disrupted or disabled.

During this planning process, we engaged with professionals (police, fire, medical, emergency planning, etc.) in the Emergency Responders Workshop on January 14th to learn about roles after a catastrophic emergency and identify potential emergency water distribution sites. On February 15th, the City engaged with CERT in a workshop to give CERT members a better understanding of the water system and CERT roles in distributing water during an emergency and to get input on the

proposed recovery plan.

This plan focuses on what to do during a catastrophic emergency. Other emergencies that would cause a disruption in service include cryptosporidium outbreak (requiring a boil water notice), cyanotoxin outbreak (requiring a do not drink notice), or a fire at the watershed/source (requiring curtailment). We have other strategies for those situations which we are not going into today.

The Water Emergency Recovery Plan

The proposed water system recovery plan has four stages: 1) keep the water we have in our reservoirs, 2) distribute emergency water with the help of CERT and other members of the community, 3) gradually restore an emergency distribution system along the City's pipe backbone, and 4) restore full normal function of the water distribution system.

1. Keep the water we have in our reservoirs

The City has six reservoirs that hold up to 14 million gallons. In an ideal scenario, the reservoirs would be full when we have an earthquake. In reality, the reservoirs will be less than full, but will still hold a significant amount of water after an earthquake. Assuming the recommended amount of one gallon per person per day during a catastrophic emergency, the water in our reservoirs should last a very long time while we recover from a major earthquake.

The final version of the emergency plan will include specific technical recommendations for keeping as much water in the reservoirs after an event as possible. Technical solutions include installing things like seismic valves that automatically close if the system experiences shaking similar to an earthquake. The goal is to save as much water as possible in the reservoirs if the distribution system breaks or leaks.

2. Distribute emergency water with the help of CERT and other members of the community

Immediately after an event, City staff will work with CERT and first responders to establish water distribution systems near each reservoir. The distribution systems will be capable of filling water trucks or other large volume containers and smaller containers carried by individuals. We will need the help of the Community Emergency Response Team to deliver water to sensitive groups.

The water emergency recovery plan will identify the best equipment for distributing and transporting water. Equipment could include large plastic totes that fit in the beds of pickup trucks. The totes could be stored near each reservoir site so they will be ready when needed after an event. Other equipment could include trailer mounted distribution systems that connect to the reservoirs or fire hydrants and allow many people to fill water containers at the same time.

3. Gradually restore an emergency distribution system along the City's pipe backbone

During the recovery after a large earthquake, Water Division staff will be focused on checking for leaks and restoring the distribution system starting at the reservoirs and repairing pipe one section at a time toward the customers. As the system is restored, distribution sites will be moved further into town away from the reservoirs. Eventually, over months, the system will be connected to the Aquifer Storage and Recovery (ASR) well, which will then be able to refill the City's water reservoirs from the ASR well.

With additional improvements, the City's ASR could also be available as a source of water after an earthquake. The City stores a generator on the ASR site to power the well pumps when electricity is not available. The ASR can store about 100 million gallons of water. However, the pumps in the ASR move the water too quickly to be able to distribute through a normal distribution trailer. To be useable as a source of water immediately after an earthquake, the ASR needs a reservoir to pump into. This could be one of the recommended projects in the water master plan.

4. Restore full normal function of the water distribution system

Over a period of months or years, the City will gradually restore the distribution system around Tualatin and make connections with other water supply systems as they become available. As part of the water supply strategy, Tualatin is coordinating with neighboring water supply providers to better understand opportunities for intertie connections that could possibly provide water during emergencies.

Next steps

Specific capital investments will be required in order to implement this plan. Projects such as purchasing water totes, distribution trailers, and installing seismic valves on the reservoirs to preserve the water in the reservoirs when the earthquake occurs will be recommended in the water master plan.

The emergency planning chapter in our Water Master Plan will identify recommended investments and the City will begin purchasing needed equipment and integrating it into the system.

The final Water Master Plan update will include a list of capital improvements necessary to meet the City's water demands and provide for seismic resiliency. The Plan will come back to Council for adoption later this year.

Water Supply Strategy

The Water Supply Strategy is a separate but related initiative to better understand our neighboring water supplies, explore community priorities, and prepare for a more reliable water future.

To date, we have conducted stakeholder interviews with City Council members, health and safety professionals, business owners, educators, and community leaders such as CIO presidents. Staff and consultants also met with neighboring water agencies to discuss partnership possibilities and better understand what supplies are available. We will continue with community outreach at summer events and an online survey of water customers.

The themes that have emerged so far include interest of all utilities in diversifying supply, differentiating between supply-level versus localized interties, and thinking beyond a single emergency supply to a resilient supply network.

The next steps will be exploring the cost and the challenges of the various supply sources. Staff will continue with public engagement over the summer and return to City Council in the fall to discuss those issues.

Other General Water Updates

The Public Works team is currently working on multiple water related initiatives, which we will bring back to Council in the coming months.

Willamette River Water Coalition (WRWC)

In late July, we will bring to you a new inter-governmental agreement (IGA) that redefines the role of the Willamette River Water Coalition (WRWC). Tualatin is a member of WRWC, along with Tigard, Sherwood, and Tualatin Valley Water District. The primary purpose of WRWC is to manage Willamette River water rights from the member agencies. While Tualatin does not hold water rights on the Willamette River, the WRWC IGA includes a provision that provides access to 3.1 million gallons per day of water rights through TVWD's rights.

The WRWC partners have developed a final version of the IGA that each agency will bring to their elected bodies for adoption.

ATTACHMENTS:

Powerpoint Presentation

Tualatin's Water Emergency Recovery Plan



CITY OF
TUALATIN OREGON

Today's agenda



- Introduction to Tualatin's water system
- Emergency scenarios
- Overview of workshops (first responders & CERT)
- Four stages of the City's proposed Water System Recovery Plan
- Next steps

Introduction to Tualatin's Water System



Where does our water come from?

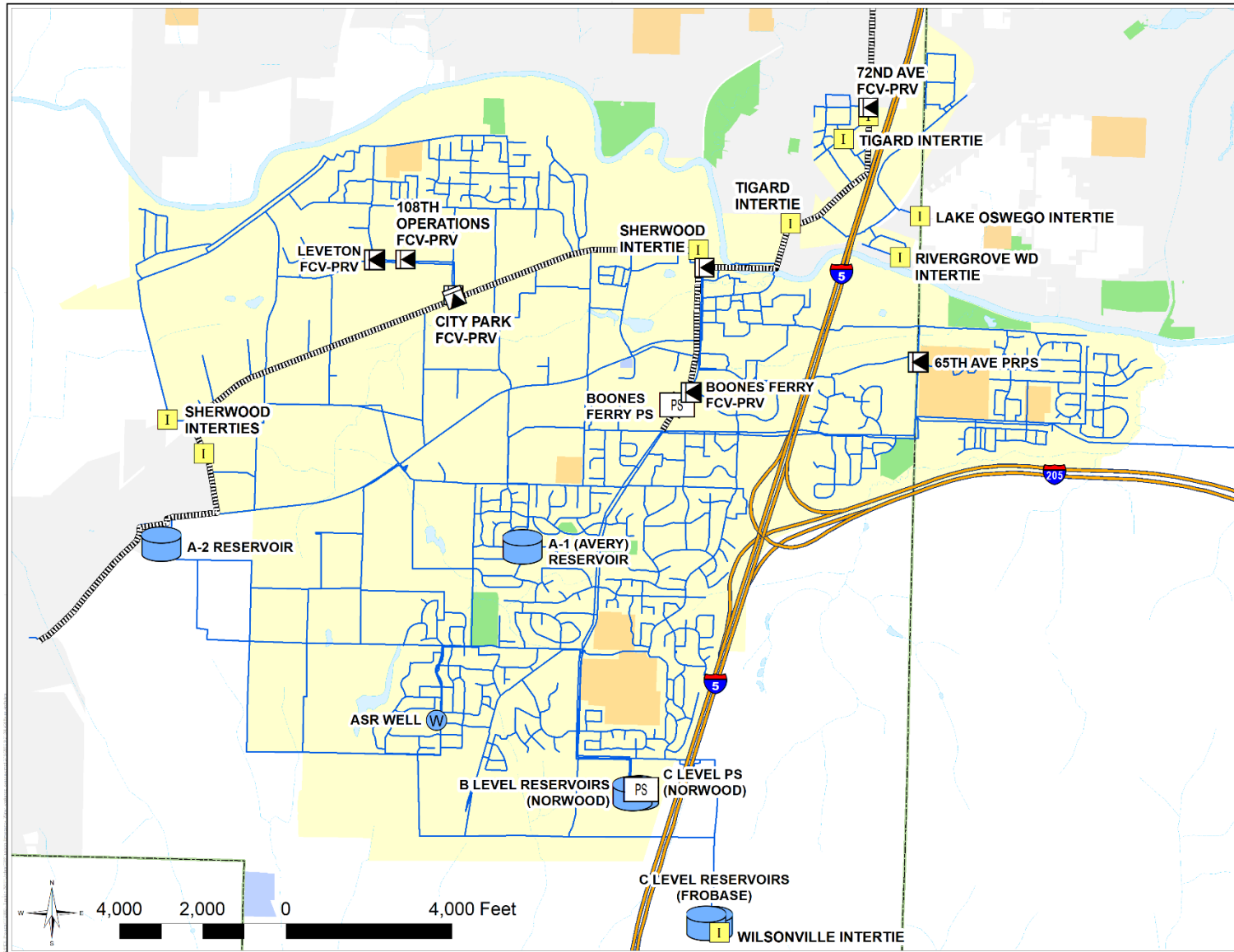
How does it get from the source to homes and businesses?

Water Supply Overview



~ 50 Miles from Source to Tualatin

Water System Overview



Emergency Scenarios





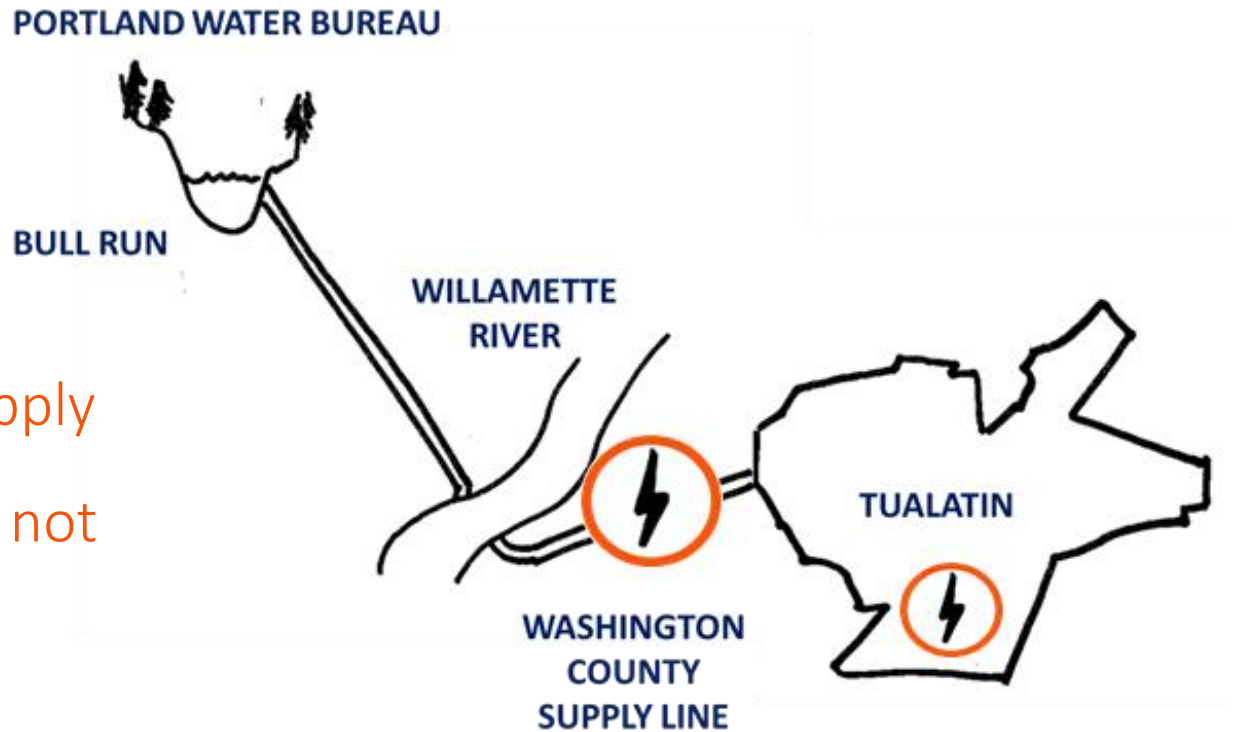
What types of emergencies is the City preparing for?

What types of emergencies are we focusing on today?

Emergency Scenario – Catastrophic Earthquake



-  Loss of Portland Supply
-  Distribution system not operational



Emergency Scenario – Catastrophic Earthquake



What can we expect from the water system?

- Supply from Portland Water Bureau disrupted - over 50 miles of pipeline
- Multiple pipe breaks distributed throughout City
- Reservoirs isolated to conserve water – no distribution at customer services
- No water supply at fire hydrants
- Any water in the system after event may be at risk of contamination

CERT and other members of the community will be our first responders!

Emergency Responders Workshop



What were our goals?

What did we learn?

Emergency Responders Workshop



Attendees:

Tualatin Public Works

Tualatin Police Department

Tualatin Valley Fire and
Rescue

American Red Cross

Legacy Meridian Park
Medical Center

Washington County
Emergency Management

Clackamas County
Emergency Management



Workshop Goals



- Learn about roles after a catastrophic emergency
- Get input on the number and characteristics of emergency water distribution sites
- Identify potential emergency water distribution



Draft Water System Recovery Plan
identifying four stages of system recovery

CERT Workshop Goals (February 25, 2019)



CERT members walk away with:

- ✓ Better understanding of the water system
- ✓ Know what to expect from the water system after a catastrophic emergency
- ✓ Understand CERT roles in distributing water during an emergency

City walks away with:

- ✓ Input on the proposed Water System Recovery Plan to make the plan better!

CERT Feedback



- Emergency water should be available at locations familiar to Tualatin residents (e.g., schools)
- Distribution locations should be provided throughout the City (including east of I-5)
- CERT members would like training and clear written instructions on emergency water procedures (how to operate equipment and disinfect water, how much water to give per person)
- Attendees appreciated the planning effort “It is flexible and seems to focus on what is doable as the main goal.”

Proposed Water System Recovery Plan

How will we bring the water system back on after a catastrophic event?

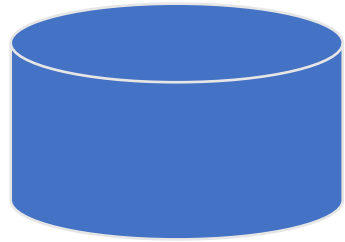


Stage 1 – First few weeks

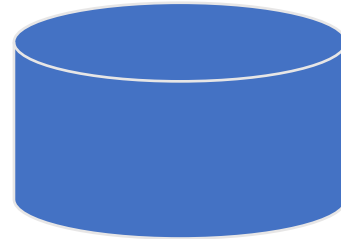


- ✓ Hold onto the water we have!
- ✓ Allow volunteers to access the water we have and move it around the City

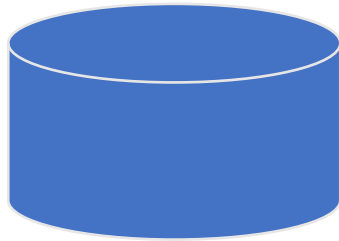
Stage 1 – First few weeks



A-1, A-2
2.2 MG, 5 MG



B-1, B-2
5 MG

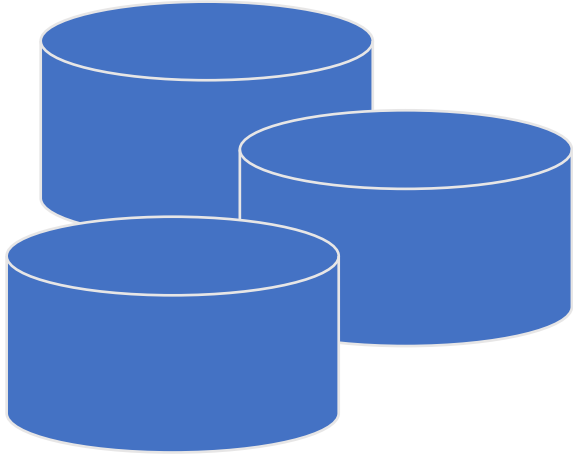


C-1, C-2
1.6 MG

Water trapped in reservoirs with seismic valves

We don't have seismic valves now, but will be recommending them as part of this plan.

Stage 1 – First few weeks



How long could this water last?

Total capacity = 13.8 MG

Population = 27,000

Number of days at 2 gal/pp/day if
reservoirs half full = 127 days

Stage 1 – First few weeks



How will water get from the reservoirs to where people are?

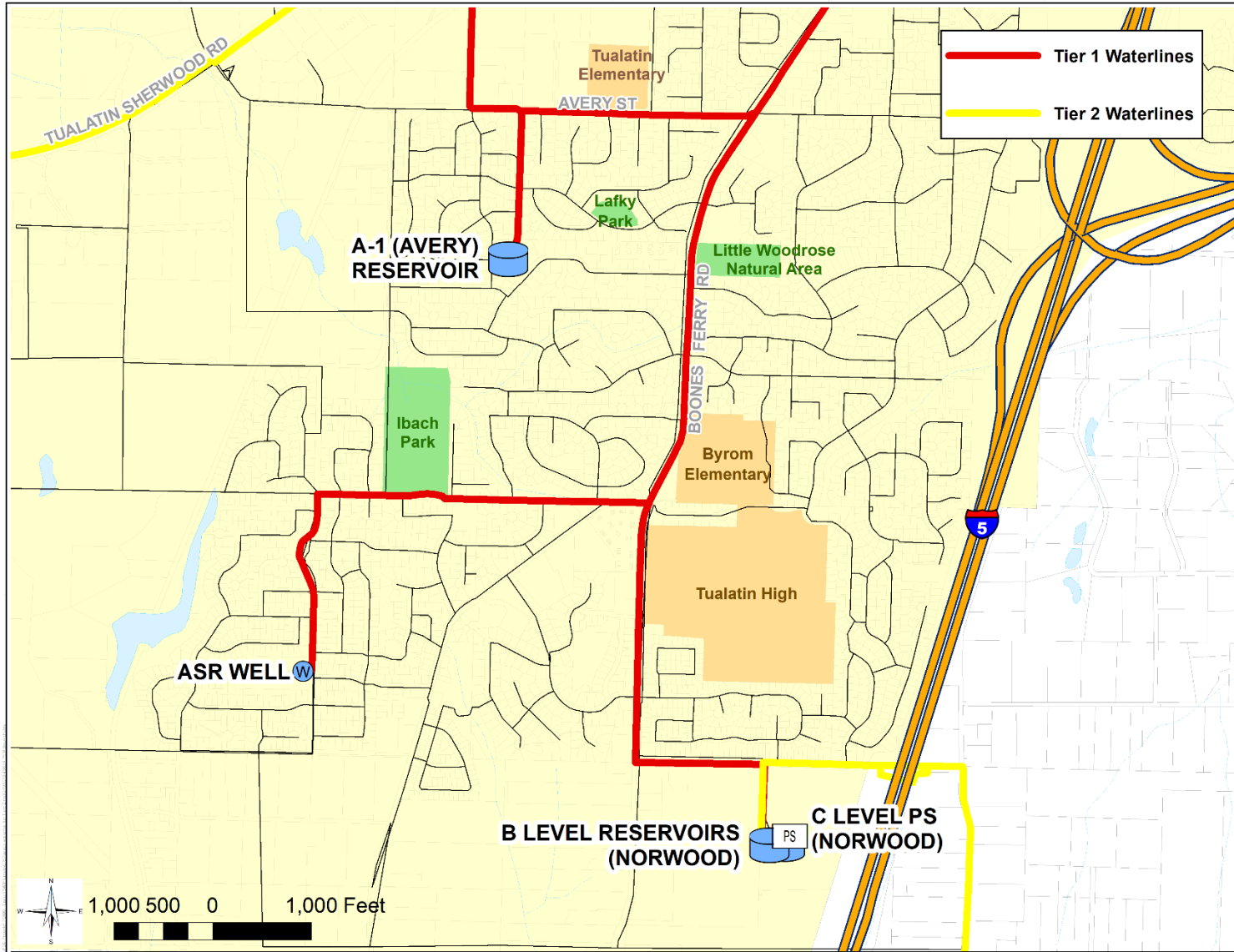


Stage 2 – First couple months



- ✓ Create a sustained, emergency level, water distribution system
- ✓ Get running water to a series of emergency water distribution sites along the City's pipe backbone
- ✓ Connect the City's well to that backbone system

Stage 2 – First couple months



Stage 2 – First couple months



Criteria for emergency water distribution system sites developed at the Emergency Responders Workshop:

- Traffic flow in/out
- On a major street
- Same site for other emergency needs
- Near demand
- Supplies can be secured
- Familiar
- Away from hazards
- Helicopter access

Tualatin will be working in cooperation with other agencies to identify and secure specific sites.

Stage 2 – First couple months



The City's well can sustain a good portion of our City's needs at emergency water levels:

Well produces - 450 gpm = 27,000 gph = 650,000 gpd

Emergency generator with stored fuel for 48 hours

Emergency water needs met with approx. 2 hours of operation per day, so 24 days of supply available with existing fuel storage

Stage 2 – First couple months



How will people get water at the emergency water distribution sites?



Stage 3 – 1 to 4 months



- ✓ Connect our emergency backbone to the Portland supply or other available working supply

Stage 4 – several months to years



- ✓ Recover full normal function of the water distribution system
- ✓ Restore water service to individual homes and businesses throughout the City

Water System Recovery Plan



- Stage 1 – Water trapped in reservoirs
First few weeks
- Stage 2 – Running water to emergency water distribution sites with supply from the City’s well
First couple months
- Stage 3 – Running water to emergency distribution sites with supply from Portland or other available supply
One to four months
- Stage 4 – Recovery of normal water system operations, section by section across the City
Months to years

Water System Resiliency Improvements



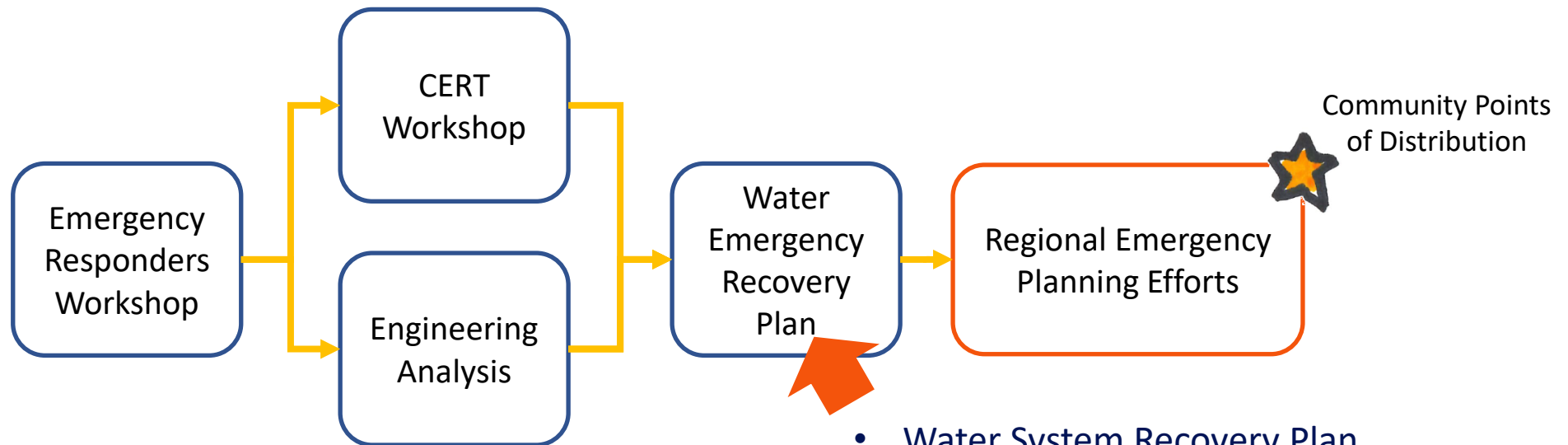
- Preserve stored water
Seismic Valves, Flexible Pipe Connections
- Procure emergency water distribution equipment
Water distribution manifolds, pipe and fittings
- Harden backbone piping when opportunities arise
Age, condition, capacity, mapped vulnerabilities
- Improvements incorporated into the Water Master Plan capital improvements list

Avoid single use items that require storage, maintenance and renewal

Next Steps



Improving Tualatin's emergency water preparedness



- Water System Recovery Plan (bringing the system back on-line)
- Improvement projects (e.g., access valves at reservoirs)
- Supplies needed for repairs (e.g. spare pipe, collars)
- Emergency supplies (e.g., blivets or tanks)

Questions



Tualatin's Water Supply Strategy



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Why do we need a plan?



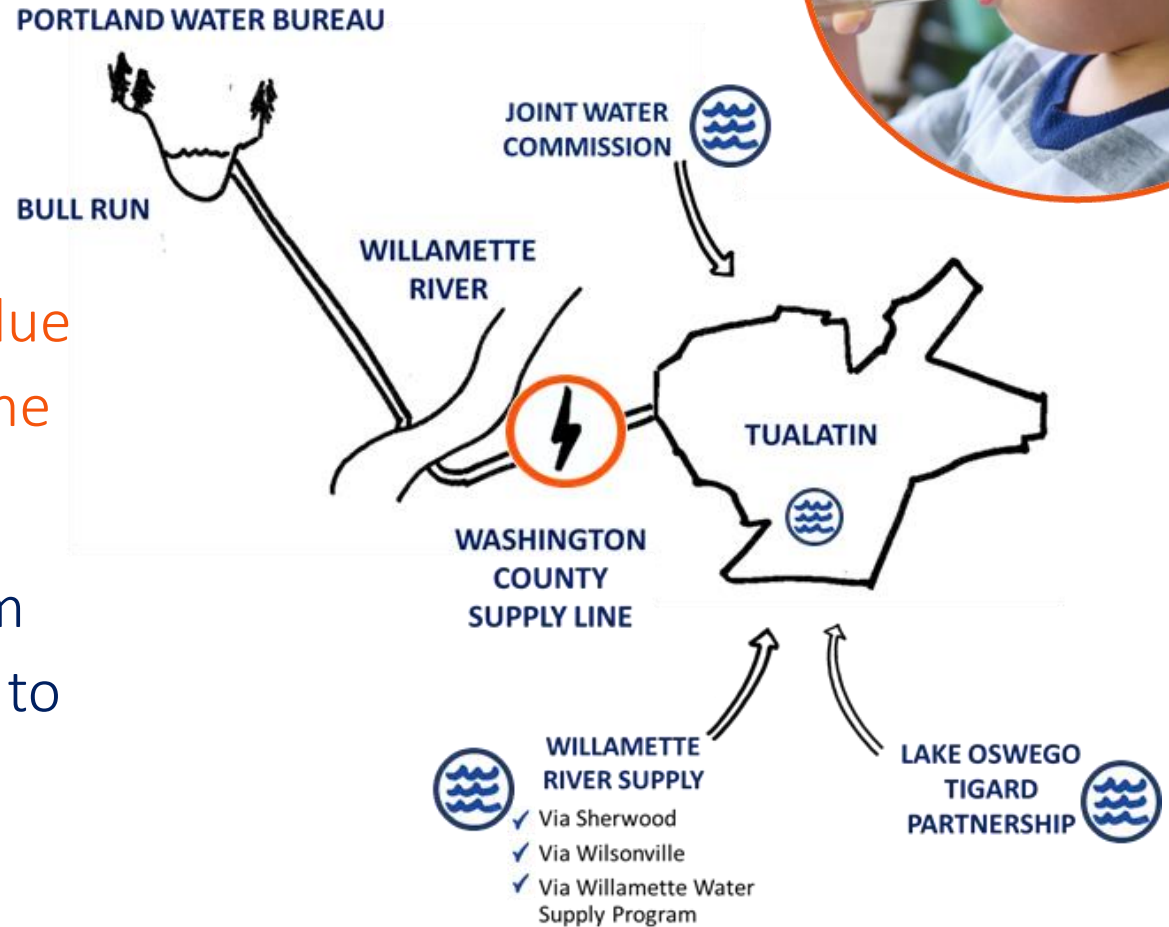
Loss of Portland Supply due to localized event (pipeline outage, toxic algae)



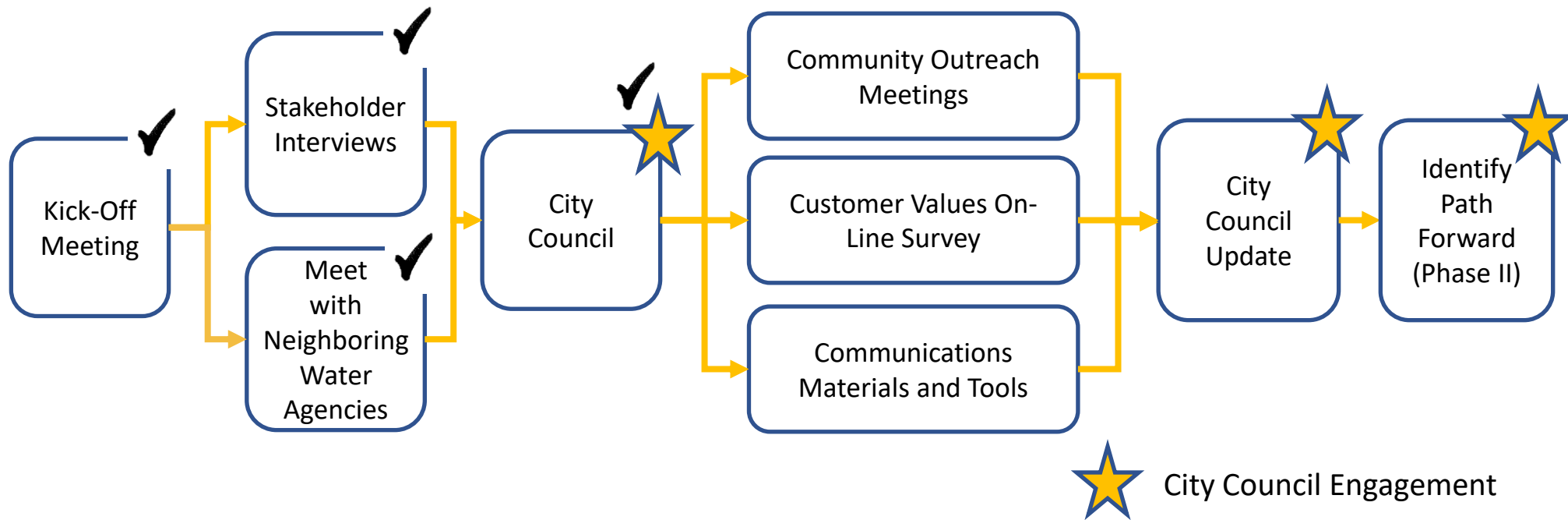
Water distribution system still able to deliver water to taps



Other regional supplies available



Planning is still in the early stages



Early themes



- ✓ Reliability and water quality are top stakeholder values
- ✓ Cost is secondary, but still important
- ✓ Water agencies are interested in having more than one source
- ✓ Need to differentiate between local interties and supply-level interties
- ✓ Think beyond a single supply scenario to develop a resilient supply network

Willamette River Water Coalition Agreement



- Tualatin, Tigard, Sherwood, and Tualatin Valley Water District
- WRWC purpose is transitioning to managing member water rights on the Willamette River
- WRWC holds 130 million gallons per day in water rights
- Tualatin doesn't have water rights
- New IGA would provide Tualatin with access to 3.1 MGD from TVWD if needed in the future

Questions





City of Tualatin

**CITY OF TUALATIN
Staff Report**

TO: Honorable Mayor and Members of the City Council

THROUGH: Sherilyn Lombos, City Manager

FROM: Don Hudson, Assistant City Manager/Finance Director
Lisa Thorpe, Management Analyst II

DATE: July 8, 2019

SUBJECT:
Social Gaming in Tualatin

EXECUTIVE SUMMARY:
At Council's direction, staff researched the subject of Social Gaming in Tualatin, including how it is regulated, what other cities are doing, and common standards contained in similar ordinances. Staff would like feedback on whether or not to move forward with constructing an ordinance.

ATTACHMENTS:

- Powerpoint Presentation



Social Gaming



City of Tualatin

What is Social Gaming?

- Game between players in a private business/club
- No house player, house bank, house odds or house income
- Games other than Lottery such as Bingo, Raffles, and Casino-like games



How is it regulated?

- ORS 167.121 states that counties and cities may, by ordinance, allow social gaming in their jurisdictions
- Public Social Gaming must be authorized by local jurisdictions to be legal
- Department of Justice regulates social games conducted by charitable, fraternal or religious organizations



Social Gaming

What are our neighbors doing?

City	Ordinance	Allows social gaming?	License Required?	Amount	Age	Hours
Tigard	Yes	Yes	Yes	\$100	21	while open
Hillsboro	Yes	Yes	No	none	18	while open
Sherwood	Yes	Yes	Yes	\$40	18	5 hr/day limit
West Linn	Yes	No	No	none	none	none
Lake Oswego	Yes	No	Yes	none	none	none
Wilsonville	No					
Beaverton	No					
Bend	Yes	Yes	Yes	\$75 per table	none	none
Harrisburg	Yes	Yes	Yes	\$75	21	11am - 2am

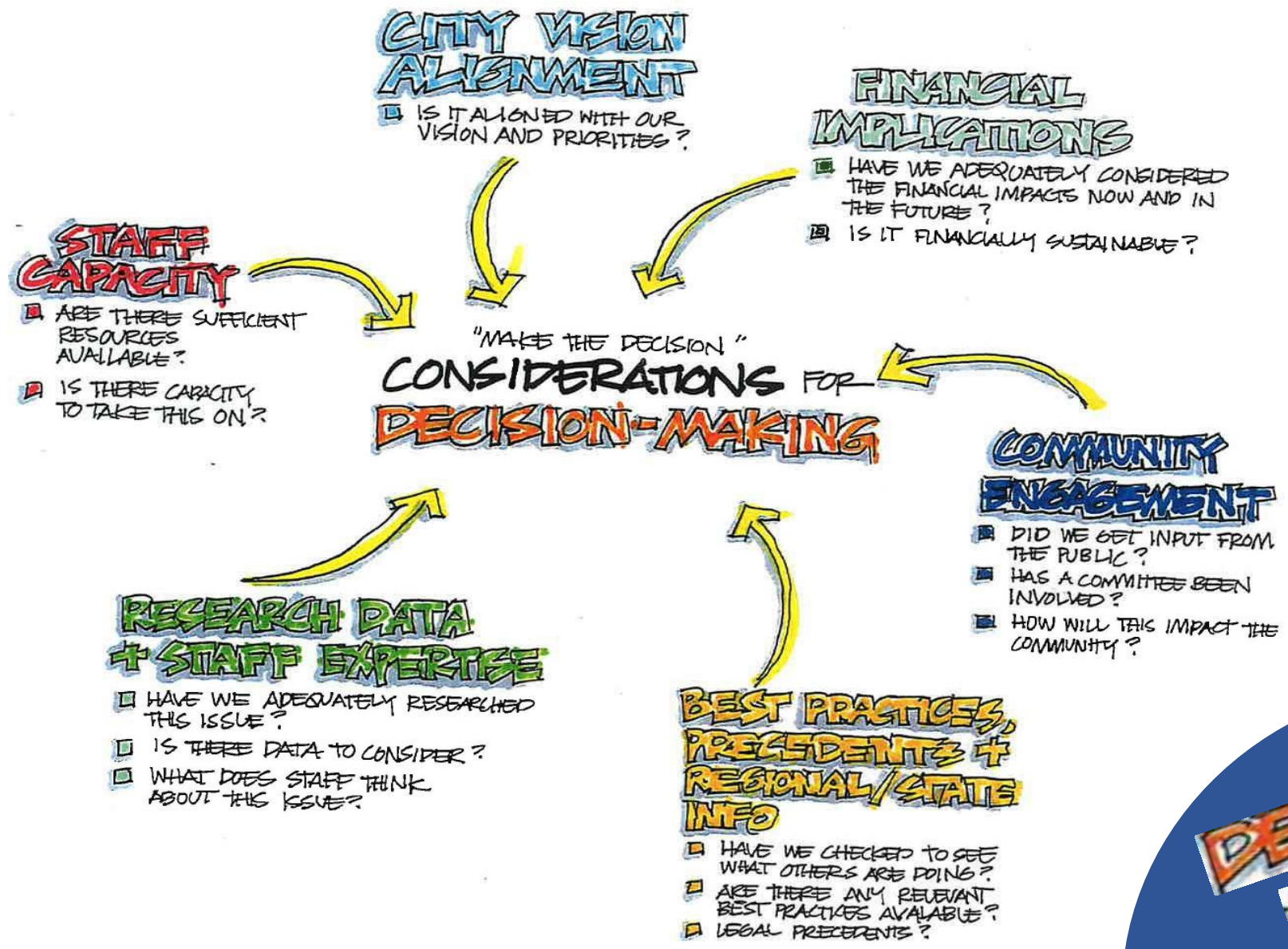


Common Standard Requirements

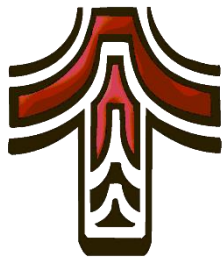
- No house player, house bank, house odds, or house income
- Administrative Inspection Process
- Notice to be clearly posted
- Application required



Social Gaming



DECISION MAKING



**Social
Gaming**

Should Social Gaming be allowed in Tualatin?



City of Tualatin



Next Steps

Staff will draft an ordinance which includes:

- Appropriate Regulations
- Required License, including Background Checks
- License Fees

Appropriate Community Input or Involvement?



Questions?



July 8, 2019

Tualatin Youth Advisory Council

Youth Participating in Governance

Teen Summer Kick-Off



- Friday, June 14
- Tualatin Community Park
- Game Truck, henna tattoos, nerf, and foam machine for 6th-12 graders
- Partnership with Teen Library Committee

July 13

The Incredibles 2

July 20

Jurassic World Fallen Kingdom

July 27

Spider Man: Into the Spider-Verse

August 10

Dumbo (2019)

August 17

Ralph Breaks the Internet

August 24

Avengers Infinity War



Congratulations Seniors!





City of Tualatin

**CITY OF TUALATIN
Staff Report**

TO: Honorable Mayor and Members of the City Council
THROUGH: Sherilyn Lombos, City Manager
FROM: Nicole Morris, Deputy City Recorder
DATE: July 8, 2019

SUBJECT:
Consideration of Approval of the Minutes for the Work Session and Regular Meeting of June 10, 2019

RECOMMENDATION:
Staff respectfully recommends the Council adopt the attached minutes.

ATTACHMENTS:

- City Council Work Session Minutes of June 10, 2019
- City Council Regular Meeting Minutes of June 10, 2019



Present: Mayor Frank Bubenik; Councilor Nancy Grimes; Councilor Paul Morrison; Councilor Robert Kellogg; Councilor Maria Reyes; Councilor Bridget Brooks

Absent: Council President Joelle Davis

Staff Present: City Manager Sherilyn Lombos; City Attorney Sean Brady; Police Chief Bill Steele; Planning Manager Aquilla Hurd-Ravich; Deputy City Recorder Nicole Morris; Assistant to the City Manager Tanya Williams; IS Director Bates Russell; Management Analyst II Gareth Prior

CALL TO ORDER

Mayor Bubenik called the meeting to order at 5:32 p.m.

1. *Regional Transportation Policy Update: Quarter 2.*

Community Development Director Aquilla Hurd-Ravich and Management Analyst Gareth Prior presented a regional land use and transportation update. Analyst Prior presented updates on TriMet's Southwest Corridor Plan that will bring light rail and other amenities from downtown Portland to Bridgeport Village. He stated the project was originally scoped at \$2.375 billion dollars and recent estimates now bring the project total to \$2.733 billion dollars, a difference of \$358 million. He stated the committee has been looking at projects to cut in order to assure the line comes to Bridgeport. To date the committee has cut approximately \$100 million and continue to evaluate projects to be eliminated. Analyst Prior stated the Final Environment Impact Statement (FEIS) which includes the bare minimum for projects will be prepared by late summer 2019 for review. In addition, TriMet staff is working to complete the Conceptual Design Report (CDR) which will be available early 2020. The CDR contains the total vision for the project including items that are not funded. The Tualatin staff provided comments on the current draft FEIS and CDR that included a footprint with room for bus movement, safety, transit oriented redevelopment, and preservation of the Village Inn. Additional comments in regards to safety improvements included a pedestrian bridge, structured park-and-ride that accommodates a maximum number of vehicles, and bike-pedestrian improvements to 72nd Avenue. It was also noted agreements should be in place with TriMet for increased services and a study for an at grade-separated option at Upper Boones Ferry Road.

Councilor Kellogg stated a proponent for this project is ODOT as they want to work to get cars off of I5 and onto transit. He noted there is a lot of work that will need to be done to establish park and ride structures along the route. The committee has heard from many jurisdictions that due to infrastructure needs and traffic they don't want them. That leaves Bridgeport as a good park and ride point for cars outside of the county and the metro area. Councilor Kellogg stated another point of discussion at the meeting was how to get passengers from Gibson Street to OHSU. In the

baseline project they had factored in an elevator, but a group of committee members requested that be replaced with a funicular (an inclined elevator) which will cost twice as much. He stated the addition would add \$25-30 million to the budget when they are already cutting projects to ensure the line makes it to Bridgeport. He stated he will continue to fight to ensure the project makes it to Bridgeport.

Council President Grimes stated she is surprised other communities don't want park and rides. She stated Tualatin can't accommodate everyone and would be crushed by the increased car traffic.

Council President Grimes asked if money is already built in for an elevated crossing. Analyst Prior stated the elevated crossing is already built into the project. He noted they will continue to fight to have this not removed.

Councilor Morrison stated he attended the meeting and heard from many people who testified they do want large park and rides to incentive people to use public transit. He added there has to be an elevated crossing at this location due to safety and traffic concerns. Councilor Morrison stated he wants to know what the funding sources are for this project. He stated it makes no sense that the committee is working on cutting projects when no funding sources have been identified.

Council President Grimes asked if the 30% of users coming to the area on foot is based on current housing in the area or future projects. Analyst Prior stated that number is based on nearby employment and future land use projections.

Mayor Bubenik asked about the comments in relation to agreements with TriMet for increased services. He would like to see them address a park and ride on 124th and Hwy 99 that would shuttle people instead of traffic flooding into town. Mayor Bubenik asked if there is funding for improvements to the intersection at 72nd to help traffic flow. Additionally, Mayor Bubenik asked if there has been decisions made on where the roundabout for the buses would be, he would prefer to see it on the south side. Analyst Prior stated it hasn't been decided and he can communicate the preference. He spoke to some of the improvements at the 72nd intersection that includes upgrades to signals and the addition of lanes to alleviate congestion.

Analyst Prior presented an update on the ODOT and Clackamas County project for the 1-205 widening and Abernathy Bridge. He stated the key piece of this project currently is funding. It was noted the project is widely supported throughout the region. Currently there is a bill in the house, HB 3209, that calls for full funding of the project but doesn't have revenues attached to it. Analyst Prior stated this project is important because the City has a desire to connect transit to Oregon City and due to current congestion TriMet won't but there buses along I205. This project would open up that option.

Mayor Bubenik stated if there isn't funding in the next couple of weeks it is likely this project will die. He noted the Mayors Association will keep putting pressure on the legislator for funding

Analyst Prior presented information on Metro's Transportation 2020 measure. He stated they are currently forming local engagement teams to develop corridor projects. The larger task force will be looking at region wide program investments.

Analyst Prior stated the task force team has identified three tiers of projects. The tier one projects in the western half include Tualatin Valley Hwy, SW 185th, and the SW Corridor. The task force will work at identifying projects in those three corridors. Analyst Prior stated the local investment teams will include one team per county that is comprised of 8-10 community members that is supported by jurisdiction staff and will be working on identifying local projects.

Councilor Kellogg asked when the anticipated formation of the local task forces will take place. Analyst Prior stated names will be announced in the next two weeks. Councilor Kellogg asked if they are accepting applications. Analyst Prior stated there was a silent call for applications a few months ago.

Mayor Bubenik asked when the Tualatin-Sherwood Road project became a middle tier project. Garet Prior stated projects were shifted at the last task force meeting. Mayor Bubenik stated there is now nothing in this for Washington County as all the projects land in Multnomah County.

Councilor Morrison stated Washington County funded the project on Tualatin-Sherwood Road and wanted to swap it for projects on Hwy 99 but that project wasn't high enough on the list to make it happen.

Mayor Bubenik stated Metro will have a hard time selling this to the voters since there is nothing in Washington County.

Management Prior asked if there was additional projects the Council would like to hear about at future meetings. Mayor Bubenik stated he would like to hear more about the transit study that would connect Tualatin and Oregon City.

Councilor Kellogg stated there is an open house for Basalt Creek tomorrow and asked if there is a preview available on the options. Analyst Prior stated they don't have any information yet as it expected to be on their website after the open house.

2. *Council Meeting Agenda Review, Communications & Roundtable.*

Councilor Kellogg stated he attended the Blender Dash and Pioneer Days. He participated in the SW Corridor Committee meeting where he continues to put pressure on the group to get the line to Tualatin. He noted updated cost estimates for the project will be available in July.

Councilor Reyes stated she gave a presentation to Tualatin High School students on gun violence.

Councilor Morrison stated he attended the TVFR Award Ceremony. He thanked Chief Steele for providing the Council with trends on traffic stops. Councilor Morrison stated he will be attending the upcoming Basalt Creek Open House and Clackamas C4 meeting.

Councilor Brooks stated she attended the quarterly Water Consortium meeting.

Mayor Bubenik stated he attended the Aging Task Force meeting and the Chamber of Commerce Board Meeting. He will be attending the upcoming Washington County Policy Advisory Board meeting.

ADJOURNMENT

The work session adjourned at 6:39 p.m.

Sherilyn Lombos, City Manager

_____ / Nicole Morris, Recording Secretary

_____ / Frank Bubenik, Mayor



OFFICIAL MINUTES OF THE TUALATIN CITY COUNCIL MEETING FOR JUNE 10, 2019

Present: Mayor Frank Bubenik; Councilor Nancy Grimes; Councilor Paul Morrison; Councilor Robert Kellogg; Councilor Maria Reyes; Councilor Bridget Brooks

Staff Present: City Manager Sherilyn Lombos; City Attorney Sean Brady; Police Chief Bill Steele; Assistant City Manager/Finance Director Don Hudson; Planning Manager Aquilla Hurd-Ravich; Deputy City Recorder Nicole Morris; Teen Program Specialist Julie Ludemann; Assistant to the City Manager Tanya Williams; Library Manager Jerianne Thompson; Parks and Recreation Manager Rich Mueller; IS Director Bates Russell; Parks and Recreation Director Ross Hoover; Planning Manager Steve Koper

A. CALL TO ORDER

Pledge of Allegiance

Mayor Bubenik called the meeting to order at 7:01 p.m.

B. ANNOUNCEMENTS

1. Science & Technology Scholarship Winners

Council President Reyes introduced and presented certificates to the winners Eric Watt and Valentina Single.

2. Proclamation Honoring Tualatin High School Boys Track and Field Championship

Councilor Morrison read the proclamation honoring the Tualatin High School Boys Track and Field Championship. The Tualatin High School Boys Track and Field Team accepted the proclamation.

3. Update on the Tualatin Youth Advisory Council's activities for June 2019

Members of the Youth Advisory Committee (YAC) presents a PowerPoint on their latest activities and upcoming events. Project FRIENDS was held on May 17 and 350 fifth grade students participated this year. Blender Dash was held on June 1 at Tualatin Community Park. Over 900 kids between the ages of 6-15 participated. The committee will be hosting Movies on the Commons this summer and will be selling concessions as a fundraiser for members to attend the NLC Conference.

4. Ibach Ribbon Cutting

Parks Development Manager Rich Mueller announced the ribbon cutting for the opening of the Ibach Park playground and the Ibach Street crosswalk to be held on June 22 at 11a.m.

C. PUBLIC COMMENT

This section of the agenda allows anyone to address the Council regarding any issue not on the agenda, or to request to have an item removed from the consent agenda. The duration for each individual speaking is limited to 3 minutes. Matters requiring further investigation or detailed answers will be referred to City staff for follow-up and report at a future meeting.

Chamber of Commerce Director Linda Moholt stated it is incredibly important to Tualatin's workforce that the light rail line makes it all the way to Bridgeport Village.

D. CONSENT AGENDA

The Consent Agenda will be enacted with one vote. The Mayor will ask Councilors if there is anyone who wishes to remove any item from the Consent Agenda for discussion and consideration. If you wish to request an item to be removed from the consent agenda you should do so during the Citizen Comment section of the agenda. The matters removed from the Consent Agenda will be considered individually at the end of this Agenda under, Items Removed from the Consent Agenda. The entire Consent Agenda, with the exception of items removed from the Consent Agenda to be discussed, is then voted upon by roll call under one motion.

MOTION by Councilor Nancy Grimes, SECONDED by Councilor Robert Kellogg to adopt the consent agenda.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

1. Consideration of Approval of the Minutes for the Work Session and Regular Meeting of May 13, 2019
2. Consideration of **Resolution No. 5441-19** Certifying City of Tualatin Municipal Services
3. Consideration of **Resolution No. 5442-19** Amending Water, Sewer, Surface Water Management, and Road Utility Fee Rates Inside the City of Tualatin and Rescinding Resolutions 5374-18, 5400-18 and 5371-18
4. Consideration of **Resolution No. 5448-19** Endorsing the Annexation into Clean Water Services Service District and any other Special District Necessary for the Provision of Urban Services to the Property Annexed to the City through Ordinance No. 1417-19

E. SPECIAL REPORTS

1. Update on Summer Programs and Activities Offered by the City of Tualatin and Partners

Recreation Manager Julie Ludeman and Public Services Supervisor Sarah Jesudason presented the City of Tualatin 2019 Summer Programs. Programs include: the Summer Reading Program, Youth Summer Camps, Concerts and Movies on the Commons, Teen Volunteer Programs, National Night Out, and the Gang Resistance Education and Training (GREAT) Summer Program. Manager Ludemann stated there will also be many ongoing activities at the Juanita Pohl Center. Manager Ludeman thanked all the summer recreation partners including the Tualatin Crawfish Festival, Tualatin Heritage Center, Browns Ferry Park rentals, Willowbrook Arts Camp, Tigard-Tualatin Summer Lunch program, the YMCA, Skyhawks, and the Code to the Future Camps.

Councilor Morrison asked about extended hours at the Tualatin Library for weather advisories. Supervisor Jesudason spoke to the Library serving as a cooling shelter.

F. PUBLIC HEARINGS – *Legislative or Other*

1. Consideration of **Resolution No. 5443-19** Declaring the City's Election to Receive State Revenue Sharing Funds During Fiscal Year 2019-20

Finance Director Hudson stated the intent for the public hearing is to receive state shared revenues. He gave a brief report on the state shared revenues the City receives. He noted the City is estimated to receive \$380,040 in the FY 19/20 budget. The revenue is not restricted and is used for general city operations. Cigarette, gas, marijuana, and remaining liquor taxes are not covered in the public hearing.

PUBLIC COMMENT

None.

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes Resolution No. 5443-19 declaring the city's election to receive state revenue sharing funds during fiscal year 2019-20.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

G. PUBLIC HEARINGS – *Quasi-Judicial*

1. Consideration of **Ordinance No. 1421-19** Annexing Territory Located at 10325 SW Jurgens Lane and 10511 SW Hazelbrook Road into the City of Tualatin and Withdrawing the Territory from the Washington County Enhanced Sheriff Patrol District and the County Urban Road Maintenance District (Tax Map: 2S114BC Lots: 1900, 1901 and Tax Lot: 2S115DA00100) (File No. ANN-19-0001)

Mayor Bubenik opened the hearing for consideration of annexing territory at 10325 SW Jurgens Lane into the City of Tualatin. He read the rules of the hearing in accordance with ORS 197.763(5) and (6) and ORS 197.796(3)(b).

Planning Manager Steve Koper and Assistant Planner Tabitha Boschetti presented the Jurgens Parkland annexation. Planner Boschetti stated the application is to annex three tax lots owned by the city that were purchased for park land. She noted the area is designate Low-Density Residential (RL) and is inside the Urban Growth Boundary. Planner Boschetti stated the proposed annexation complies with applicable Oregon Revised Statues, Metro Code, and the Tualatin Development Code.

COUNCIL QUESTIONS

None.

PUBLIC COMMENT

None.

COUNCIL DISCUSSION

Councilor Morrison stated there has been conversations to use part of the area as a potential dog run.

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes for first reading by title only.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes for second reading by title only.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes to adopt Ordinance No. 1421-19 annexing territory located at 10325 SW Jurgens Lane and 10511 SW Hazelbrook Road into the City of Tualatin and withdrawing the territory from the Washington County Enhanced Sheriff Patrol District and the County Urban Road Maintenance District (Tax Map: 2S114BC Lots: 1900, 1901 and Tax Lot: 2S115DA00100) (File No. ANN-19-0001).

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

2. Consideration of the Tualatin Service Center Plan Text Amendment (PTA 19-0002) and Plan Map Amendment (PMA 19-0002)

Mayor Bubenik opened the hearing for consideration of Tualatin Service Center Plan Text Amendment (PTA 19-0002) and Plan Map Amendment (PMA 19-0002). He read the rules of the hearing in accordance with ORS 197.763(5) and (6) and ORS 197.796(3)(b).

Planning Manager Steve Koper requested the Council continue the hearing to the meeting of July 8, 2019.

Councilor Morrison asked why staff is requesting the continuance. Manager Koper stated staff is working on refining the ordinance and needs additional time for review.

MOTION by Councilor Nancy Grimes, SECONDED by Councilor Bridget Brooks to continue the hearing until July 8, 2019.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

H. GENERAL BUSINESS

If you wish to speak on a general business item please fill out a Speaker Request Form and you will be called forward during the appropriate item. The duration for each individual speaking is limited to 3 minutes. Matters requiring further investigation or detailed answers will be referred to City staff for follow-up and report at a future meeting.

1. Consideration of **Ordinance No. 1423-19** Establishing an Annual Core Area Parking District (CAPD) Tax Rate of \$170.88 for Fiscal Year 2019-20

Maintenance Services Manager Clay Reynolds stated the Core Area Parking District Board and staff are recommending the tax rate remain the same at \$170.88 for the upcoming Fiscal Year 2019/20.

Councilor Kellogg stated the CAPD is well ran and has a great ADA plan in place.

PUBLIC COMMENT

None.

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes for first reading by title only.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes for second reading by title only.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

MOTION by Councilor Robert Kellogg, SECONDED by Councilor Nancy Grimes to adopt Ordinance No. 1423-19 establishing an Annual Core Area Parking District (CAPD) tax rate of \$170.88 for fiscal year 2019-20.

Aye: Mayor Frank Bubenik, Councilor Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison, Councilor Robert Kellogg

MOTION CARRIED

2. Consideration of **Resolution No. 5449-19, or 5450-19, or 5451-19** Establishing the Parks System Development Charges for the City Of Tualatin

Parks and Recreation Director Ross Hoover and Parks Development Manager Rich Mueller presented on Parks System Development Charges (SDC). Director Hoover addressed why you put SDC in place. He stated they are revenue to fund public parks and recreation facilities, ensure growth pays a portion of costs, and facilities keep up with the demands caused by growth. Director Hoover explained a SDC is a onetime charge for new development only and funds the capital cost of facilities. He noted the fee is assessed upon a development application and issued with the building permit. Director Hoover state ORS Chapter 223 allows the city to charge a proportionate share for transportation, water, sewer, stormwater, and parks growth but not deficiencies that are proportionate to the impact. Uses are restricted for capital projects to support new or increased use. Manager Mueller recapped the extensive community outreach and engagement conducted during this process.

Director Hoover presented rates as discussed at the last meeting. He shared maximum allowable rates at 30%, 40%, and 50% levels in comparison to surrounding cities for office buildings, retail buildings, warehouses, single-family housing, and multi-family housing. Project revenue totals for 50% of the maximum allowable for residential and 30%, 40%, and 50% of the maximum allowable for nonresidential rates was shared. Director Hoover stated SDC revenue would be the primary funding source for 53 projects that are outlined in the master plan.

Director Hoover stated the SDC fee provides many benefits to the business community as outlined in goal six that helps promote Tualatin's unique identity, economic vitality, and tourism through parks, natural resources, historic preservation, events, programs, and placemaking. He highlighted projects in the master plan that could be funded including Basalt Creek Park, new greenways and multi-use paths, and a central sports park.

COUNCIL QUESTIONS

Councilor Morrison stated the City is already successfully managing parks without having to fund them by using SDCs. He stated he wants to keep housing affordable in Tualatin so the 40% of the maximum allowable rate would allow that to continue to happen. Councilor Morrison stated if he were to ever be in favor of a nonresidential SDC rate he would need to see a project list that would show the value to do that.

Councilor Kellogg clarified 50% of the residential rate as proposed is 4% less than

the current multifamily rate.

PUBLIC COMMENT

Valerie Pratt stated the current funding for parks is needed to continue to maintain the parks system. She stated the SDC would help to develop new spaces.

Brett Hamilton advocated for funding for arts in the city. He stated SDCs are one mechanism to fund new art programs. He encouraged the Council to adopt both rates at 50% of the maximum allowable.

Susan Novack spoke in opposition of not setting an SDC rate. She stated she feels the city is operating efficiently as it stands. Ms. Novack added if the Council must set a rate to start small at 30%.

Ezra Hammer, Home Builders Association, stated they ideologically understand the need for SDCs. He stated they would like to see a phased approach with a more robust vesting of the rates. In addition, they would like to see the fee collected later in the process.

Chamber of Commerce Director Linda Moholt submitted a letter for the record. She stated she wants to keep Tualatin competitive with rates and would like the Council to look at the entire region and not just neighboring cities.

Kevin Johnson reminded the Council of the vision for the downtown core. He encouraged the Council to continue to dream big and follow through with the vision.

Kate Johnson noted 15 businesses in the community signed onto the Chamber of Commerce letter.

COUNCIL DISCUSSION

Councilor Morrison stated he would like to explore what art programs could be funded using SDC fees.

Councilor Brooks stated at 60% of the maximum allowable rate the city would still be competitive for commercial facilities. She stated the city currently has the lowest rates in comparison to surrounding cities. She would like to see a 50% maximum allowable rate for both residential and nonresidential rates.

Councilor Reyes agreed the City needs to be competitive with its rates. She wants to set a standard and stick to the rate for a long period of time.

Councilor Kellogg stated all businesses benefit from the city having parks so not setting a rate is off the table for him. He suggested a three year phased approach to the rate setting starting at 30%. Councilor Kellogg stated this approach allows for price certainty in the business community. He noted the difference that would be collected over the three years is \$208,000.

Council President Grimes asked when the new fee would go into place. City Manager Lombos stated the new methodology goes into effect on July 1, 2019.

Council President Grimes asked if existing projects would be grandfathered into the

old rates. City Attorney Brady stated it is hard to determine as fees are not collected until projects are connected to the system or at the time building permits are issued.

Council President Grimes stated she wants to incentives growth. She asked if the Council has the ability to adjust fees via rebates. City Manager Lombos stated the appropriate place to have that conversations would be during the Tualatin 2040 project discussions. Those discussions will address housing in Tualatin and how to incentives different uses.

Councilor Brooks wanted to make it clear the rate is a 50% discount from the maximum and not a 50% increase in rates. She stated 50% off the maximum rate is both customary and reasonable.

Councilor Reyes asked if the rate increase would affect projects already underway. City Manager Lombos stated projects would have to pull permits by July 1, 2019 before the new rates would take effect.

Mayor Bubenik asked people to imagine what our parks could look like if we would have collected fees over the last 30 years. He doesn't think the argument that we haven't in the past is a good reason to not. Mayor Bubenik wants to see these fees be used to build parks in commercial areas. He stated amenities like these are attractive to employees. Mayor Bubenik would like to have the discussion on the residential rate on how to incentive housing developments after the housing analysis comes back from the Tualatin 2040 project.

MOTION by Councilor Bridget Brooks, SECONDED by Councilor Maria Reyes to adopt Resolution 5449-19 establishing the Parks System Development Charges (SDC); repealing and replace the existing Park SDC charge schedule.

Aye: Mayor Frank Bubenik, Councilor Bridget Brooks, Councilor Maria Reyes
Nay: Council President Nancy Grimes, Councilor Paul Morrison, Councilor Robert Kellogg
MOTION FAILED

MOTION by Council President Nancy Grimes, SECONDED by Councilor Robert Kellogg to adopt Resolution 5451-19 establishing the Parks System Development Charges (SDC); repealing and replace the existing Park SDC charge schedule.

MOTION TO AMEND by Councilor Robert Kellogg, SECONDED by Council President Nancy Grimes, to set the Parks SDC nonresidential rate at 30% of the maximum allowable rate in Fiscal Year 2019-2020, 40% of the maximum allowable rate in Fiscal Year 2020-2021, and 50% of the maximum allowable rate in Fiscal Year 2021-2022 and 50% residential rate across all three years.

DISCUSSION ON THE MOTION

Councilor Kellogg stated the purpose of his amendment is set fee certainty.

AYE: Council President Grimes, Councilor Robert Kellogg
NAY: Mayor Frank Bubenik, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Paul Morrison

MOTION FAILED

COUNCIL DISCUSSION

Councilor Morrison is in support of a 40% residential rate and a 0% rate for nonresidential. He would like to see a plan in place before he begins charging businesses a rate.

Mayor Bubenik asked if there was interest in starting the nonresidential rate at 40% this fiscal year and then 50% the following year.

Councilor Brooks stated that would be a compromise. She stated at the 30% rate the City is a complete outlier and that is hard for her to grapple with.

Council President Grimes stated she is open to compromise at a reasonable rate. She is not interested in any scenario with a 0% rate. She is amenable at starting at 40% and going to 50% the next fiscal year.

Councilor Reyes agreed.

MOTION by Council President Nancy Grimes, SECONDED by Councilor Bridget Brooks, to adopt Resolution 5450-19 establishing the Parks System Development Charges (SDC); repealing and replace the existing Park SDC charge schedule.

MOTION TO AMEND (1) by Councilor Bridget Brooks, SECONDED by Council President Nancy Grimes, to raise the nonresidential portion of Resolution 5450-19 to 50% of the maximum allowable rate effective July 1, 2020.

AYE: Councilor Bridget Brooks, Councilor Robert Kellogg, Councilor Maria Reyes, Council President Nancy Grimes, Mayor Frank Bubenik

NAY: Council Paul Morrison

MOTION CARRIED

DISCUSSION ON MOTION

Councilor Kellogg stated he doesn't feel one year is sufficient time for projects that are shovel ready.

MOTION TO AMEND (2) AMMENDMENT (1) by Councilor Kellogg, SECONDED by Councilor Reyes, to set the Parks SDC nonresidential rate at 40% the maximum allowable rate in Fiscal Year 2019-2020 and 2020-2021, and 50% in Fiscal Year 2021-2022.

AYE: Council President Nancy Grimes, Councilor Bridget Brooks, Councilor Maria Reyes, Councilor Robert Kellogg

NAY: Councilor Paul Morrison, Councilor Bridget Brooks, Mayor Frank Bubenik,

MOTION TO AMEND (2) FAILED

I. COMMUNICATIONS FROM COUNCILORS

Councilor Brooks will be attending the Ibach Park opening and the Basalt Creek Open House.

Councilor Kellogg reminded everyone of the upcoming Chamber of Commerce Key Leaders Breakfast where they will be discussing PERS.

Councilor Reyes stated she met with Tualatin High School Students to discuss gun violence.

Council President Grimes attended the Tualatin High School graduation ceremony.

Mayor Bubenik encouraged everyone to attend the upcoming Coffee with the Mayor on Saturday, June 15, 7:30 a.m., at New Seasons.

J. ADJOURNMENT

Mayor Bubenik adjourned the meeting at 10:01 p.m.

Sherilyn Lombos, City Manager

_____ / Nicole Morris, Recording Secretary

_____ / Frank Bubenik, Mayor



City of Tualatin

CITY OF TUALATIN Staff Report

TO: Honorable Mayor and Members of the City Council

THROUGH: Sherilyn Lombos, City Manager

FROM: Erin Engman, Associate Planner
Steve Koper, Planning Manager

DATE: 07/08/2019

SUBJECT:

Consideration of PTA 19-0002 to amend the Tualatin Development Code Chapters 49 and 73F and PMA 19-0002 to rezone the City Operations Center property from Light Manufacturing (ML) to Institutional (IN).

RECOMMENDATION:

Staff respectfully recommends approval of the Tualatin Service Center Plan Text Amendment (PTA 19-0002) and Plan Map Amendment (PMA 19-002).

EXECUTIVE SUMMARY:

Proposal

- The subject proposal includes a Plan Text Amendment (PTA 19-0002) and Plan Map Amendment (PMA 19-0002), which are quasi-judicial amendments.
- The proposed amendments would update the Development Code (Chapters 49 and 73F) and Tualatin Comprehensive Plan (Map 9-1).
- The applicant requests approval of a Comprehensive Plan Text Amendment (PTA 19-0002) to Chapter 49 that would add Government Offices and Public Works Storage Yard and Shop as Permitted uses in the Institutional Zone (IN) and to Chapter 73F to modify the maximum structure height standard of wireless communication facilities in the Institutional Zone.
- The applicant also requests approval of a Plan Map Amendment (PMA 19-0002) to change the zoning on an approximately 8.73 acre site that is located on the northeast corner of Herman Road and 108th Avenue (10699 SW Herman Road) from Light Manufacturing (ML) to Institutional (IN).
- The subject site is presently developed with approximately four buildings, surface parking areas, and landscaping. Access is provided via one driveway located on Herman Road and two gated access points on 108th Avenue. The site is presently the home of the City's Public Works Department (Street/Sewer/Storm, Water, and portions of the Engineering Division), as well as Parks Maintenance, Fleet, and Facility Maintenance, in addition to some other administrative functions. The proposed amendments would facilitate future development of a government office building which would allow for the siting of a unified permitting and development services center on City-owned property. The building could house approximately 65 staff members and could also be the future home of the City's Community Development Department (Planning and Building Divisions), Engineering Division, and potentially Municipal Court. Future structural and site development would be reviewed under a subsequent Architectural Review application.

Transportation Planning Rule (TPR) Compliance

- Application of the Institutional Zone (IN) to the subject property has the theoretical potential to result in a "significant" impact as defined by Oregon Administrative Rules Chapter 660 Division 12 Section 0060, also known as the "Transportation Planning Rule" or TPR. The applicant proposes the addition of a "trip cap" which would limit future site development to not more than 80 additional PM "peak hour" trips, thereby satisfying the TPR by providing a mitigating measure that would result in the proposed amendments not having a "significant" impact. This trip cap provides more than enough trip generation for the site to accommodate the proposed service center addition.

Compliance with Applicable Criteria

- As demonstrated within the attached Findings and Analysis, the proposed amendments comply with the applicable criteria of: the Oregon Statewide Planning Goals; Oregon Administrative Rules; Metro Code; the Tualatin Comprehensive Plan; and the Tualatin Development Code.

Public Notice

- Notice of the proposed amendments was provided to the Oregon Department of Land Conservation and Development (DLCD), the required 35 days prior to the City Council public hearing. Notification of the upcoming City Council hearing was made consistent with Tualatin Development Code Section 32.240, which included mailed notices to adjacent property owners, and published and posted notices.

OUTCOMES OF DECISION:

Approval of PTA-19-0002 and PMA-19-0002 would support:

- An amendment to Tualatin Development Code Chapter 49 (Institutional Zone) to add Government Offices and Public Works Storage Yard and Shop as Permitted uses, a revision to locational standards relative to Wireless Telecommunication Facilities (a permitted use), and revisions to minimum setback standards and Chapter 73F (Wireless Communication Facilities) to revise the maximum structure height standard in the Institutional Zone.
- An amendment to Map 9-1 of the Tualatin Comprehensive Plan to apply the Institutional Zone (IN) designation to the subject site.
- Future development of a unified permitting and development services center on City-owned property.

ALTERNATIVES TO RECOMMENDATION:

The Council may alternatively:

- Approve PTA 19-0002 and/ or PMA 19-0002 with further amendments;
- Deny PTA 19-0002 and/ or PMA 19-0002; or
- Continue the public hearing to later hearing date.

FINANCIAL IMPLICATIONS:

These amendments do not impact the budget for the Service Center.

ATTACHMENTS:

- Presentation
- Exhibit 1 - Findings and Analysis
- Exhibit 2 – Proposed Amended Map 9-1 – Community Plan Map
- Exhibit 3 - Transportation Impact Analysis
- Exhibit 4 - Transportation Planning Rule Analysis
- Exhibit 5 - Metro Title 4 Map
- Exhibit 6 - Metro Regional Freight Network Map
- Proposed Amended TDC Chapter 49 and 73F



**Tualatin Services Center
PTA 19-0002 / PMA 19-0002**

**CITY COUNCIL HEARING
JULY 8, 2019**



PRESENTATION

- Background
- Why Rezone?
- Proposal
 - Text Amendment
 - Zone Change
- Criteria
- Conclusion



BACKGROUND





WHY REZONE?

Why the Light Manufacturing (ML) Zone can't Accommodate Government Offices:

- Purpose of ML zone is to allow industrial uses with a limited amount of commercial uses and services.
- Government offices are explicitly listed as a Prohibited Use.
- All office uses limited to 25% of the gross floor area of all buildings on the site (Metro Code).
- Government offices do not support industrial uses and the square footage limitation is likely problematic for this site.



WHY REZONE? (CONTINUED)

Why the Institutional (IN) District can Accommodate Government Offices:

- Purpose of IN zone is to support lands/facilities that are owned/operated by governmental/nonprofit entities and that benefit the community.
- Government offices are consistent with the purpose statement.
- A square footage limitation on government offices is not required to comply with Metro Code.
- The proposed amendment and rezone recognizes that the site and uses are not industrial.



PROPOSAL

Plan Text Amendment:

- Add “Government Offices” and “Public Works Storage Yard and Shop” as permitted uses in the Institutional Zone (IN); minor revisions to Wireless Facility locational standards and height standards; and revisions to minimum setback standards.

Plan Map Amendment:

- Rezone the subject site from Light Industrial (ML) to Institutional (IN).



TEXT AMENDMENT

TDC 49: Institutional Zone (IN)

Development Code:

Chapter 49: Institutional Zone (IN)

Details

Section 49.100 – Purpose. The purpose of the Institutional (IN) Zone is to provide areas of the City that are suitable for **public**, educational, religious, recreational, and incidental support facilities to serve the community. The Zone is intended to:

- (1) Be consistent with the Institutional land use designation in the Tualatin Community Plan;
- (2) Support lands and facilities that are owned and operated by governmental or nonprofit entities and that serve and benefit the community; and
- (3) Provide for location and development of permitted and conditionally permitted uses in a manner that is harmonious with adjacent and nearby residential, commercial, or manufacturing planning zones and uses; and protects the health, safety, and general welfare of adjacent residential, commercial, and manufacturing uses.

Section 49.200 – Use Categories.

(1) **Use Categories.** Table 49-1 lists use categories Permitted Outright (P) or Conditionally Permitted (C) in the IN zone. Use categories may also be designated as Limited (L) and subject to the limitations listed in Table 49-1 and restrictions identified in TDC 49.210. Limitations may restrict the specific type of use, location, size, or other characteristics of the use category. Use categories which are not listed are prohibited within the zone, except for uses which are found by the City Manager or appointee to be of a similar character and to meet the purpose of this zone, as provided in TDC 31.070.

(2) **Overlay Zones.** Additional uses may be allowed in a particular overlay zone. See the overlay zone Chapters for additional uses.

**Table 49-1
Use Categories in the IN Zone**

USE CATEGORY	STATUS	LIMITATIONS AND CODE REFERENCES
INSTITUTIONAL USE CATEGORIES		
Assembly Facilities	P (L)	Permitted uses limited to places of religious worship.
Community Services	P/C (L)	Permitted uses limited to public recreation buildings and facilities: <ul style="list-style-type: none"> o Community recreation building; o Indoor community aquatic centers. Conditional uses limited to outdoor public community aquatic centers

USE CATEGORY	STATUS	LIMITATIONS AND CODE REFERENCES
Schools	P	--
Offices	P (L)	Permitted uses limited to government offices.
INFRASTRUCTURE AND UTILITIES USE CATEGORIES		
Public Safety and Utility Facilities	P (L)	Permitted uses limited to public works storage yard and shop.
Basic Utilities	P/C (L)	Permitted uses limited to water or sewage pump stations and pressure reading stations. Conditional uses limited to: <ul style="list-style-type: none"> o Water reservoirs; o Electrical substation; and o Natural gas pumping station.
Greenways and Natural Areas	P	--
Parks and Open Space	P (L)	Permitted uses limited to: <ul style="list-style-type: none"> o Government-owned parks; and o Sports fields and tennis courts.
Transportation Facilities	P	--
Wireless Communication Facility	P (L)	Must be located within 300 feet of the centerline of Interstate 5 and subject to maximum height and minimum setback standards defined by TDC Chapter 73F.

Section 49.210 – Additional Limitations on Uses.

(1) **Accessory Uses Conditionally Permitted.** The following uses may be permitted as a conditional use when incidental and subordinate to a permitted or conditionally permitted primary use:

- (a) Child day care center;
- (b) Exterior lighting, if the height of the fixture or standard is greater than the tallest permitted building on the site; **and**
- (c) Outdoor public address or audio amplification system; ~~and~~
- (d) ~~Wireless Communication Facility.~~



TEXT AMENDMENT (CONTINUED)

Section 49.300 – Development Standards. Development standards in the IN zone are listed in Table 49-2. Additional standards may apply to some uses and situations, see TDC 49.310.

**Table 49-2
Development Standards in the IN Zone**

STANDARD	REQUIREMENT	LIMITATIONS AND CODE REFERENCES
MINIMUM LOT SIZE		
All Uses	1.5 acres	
MINIMUM LOT WIDTH		
Minimum Average Lot Width	100 feet	When lot has frontage on public street, minimum lot width is 40 feet.
Infrastructure and Utilities Uses	--	As determined through the Subdivision, Partition, or Lot Line Adjustment process
Flag Lots	--	Must be sufficient to comply with minimum access requirements of TDC 73C.
MINIMUM SETBACKS		
Front	25 feet	No fence is to be constructed within 5 feet of a public right-of-way.
Side	0-25 feet	As determined through the Architectural Review process.
Rear	25 feet	
Corner Lots	--	On corner lots, the setback is the same as the front yard setback on any side facing a street other than an alley.
Parking and Vehicle Circulation Areas	5 feet	
e. From any property	10 feet	
e. From public right-of-way	30 feet	
Fences	5 feet from public right-of-way.	
Conditional Uses	--	As determined through Conditional Use Permit and Architectural Review process. No minimum setback must be greater than 50 feet.
MAXIMUM STRUCTURE HEIGHT		
All Uses	50 feet	

[...]



TEXT AMENDMENT

Chapter 73F - Wireless Communications Facilities

Development Code:

Chapter 73F: Wireless Communications Facilities

Details

[...]

Section 73F.020 - Maximum Height. The maximum height for a wireless communication facilities, support structures, and antennas is as follows:

PLANNING DISTRICT	MAXIMUM STRUCTURE HEIGHT
(6) Institutional (IN)	<ul style="list-style-type: none">• 50 feet 100 feet• 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5

[...]



MAP AMENDMENT





CRITERIA

Amendments Comply with Applicable Criteria:

- Oregon Statewide Planning Goals
- Oregon Administrative Rules, Divisions 9 and 12
- Metro's Title 4
- Tualatin Comprehensive Plan, including Development Code Section 33.070



CRITERIA (CONTINUED)

Transportation Planning Rule (TPR) Compliance

Oregon Administrative Rules, Chapter 660, Division 12

- Ensures that change of allowable land uses does not adversely impact transportation system.
- The use with the most adverse impact for the IN zone is a Recreation Center.
- A “trip cap” is proposed to limit future site development to proposed and anticipated uses, which do not have adverse or “significant” transportation impact.



CONCLUSION

Approval of the Proposal Supports:

- Amendment to Chapter 49 (Institutional) Zone to add “Government Offices” and “Public Works Storage Yard and Shop” as permitted uses and minor revisions to minimum setback standards;
- Amendment to Chapter 73F (Wireless Facilities) to revise the maximum height standard of wireless facilities in the Institutional Zone;
- Amendment to Map 9-1 to apply Institutional (IN) designation to the subject site; and
- Future development of a unified permitting and development services center on City-owned property.



QUESTIONS ?



City of Tualatin

www.tualatinoregon.gov

July 08, 2019

Analysis and Findings for PTA 19-0002 and PMA 19-0002

Case #:	PTA 19-0002 and PMA 19-0002
Project:	Tualatin Services Center
Location:	10699 SW Herman Road; Tax lots: 2S1 22AD 200 and 300
Applicant:	Clayton Reynolds, Maintenance Services Manager
Owner:	City of Tualatin

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I. INTRODUCTION

A. Applicable Criteria

Applicable Statewide Planning Goals; Divisions 9 and 12 of the Oregon Administrative Rules; Title 4 of Metro Chapter 3.07 (Urban Growth Management Functional Plan); applicable Goals and Policies from the City of Tualatin Comprehensive Plan; applicable Sections of the City of Tualatin Development Code, including Section 33.070 (Plan Amendments).

B. Project Description

The applicant requests approval of a Comprehensive Plan Text Amendment (PTA 19-0002) that would add government offices and public works storage yard and shop as Permitted uses in the Institutional Zone (IN). The applicant also requests approval of a Plan Map Amendment (PMA 19-0002) to change the zoning on an approximately 8.73 acre site that is located on the northeast corner of Herman Road and 108th Avenue (10699 SW Herman Road) from Light Manufacturing (ML) to Institutional (IN).

The subject site is presently developed with approximately four buildings, surface parking areas, and landscaping. Access is provided via one driveway located on Herman Road and two gated access points on 108th Avenue. The site is presently the home of the City's Public Works Department, and also supports the Street/Sewer/Storm, Water, and portions of the Engineering Division.

The proposed amendments would facilitate future development of a government office building which would allow for the siting of a unified permitting and development services center on City-owned property. The building would house approximately 65 staff members and would also be the future home of the City's Community Development Department (Planning and Building Divisions), Engineering Division, and potentially Municipal Court. Future structural and site development would be reviewed under a subsequent Architectural Review application.

C. Site Description and Surrounding Uses

Surrounding uses include a variety of industrial uses:

North: Light Manufacturing (ML)

- DOT Storage
- Ascentec Engineering

South: General Manufacturing (MG)

- Herman Road
- CFN Cardlock

West: Light Manufacturing (ML)

- 108th Avenue
- NW Metal Fab

East: Light Manufacturing (ML)

- Pacific Foods

Figure 1: Aerial view of subject site (highlighted)



D. Exhibit List

- 2 - Amended Map 9-1 – Community Plan Map
- 3 - Transportation Impact Analysis (TIA)
- 4 - Transportation Planning Rule (TPR) Analysis
- 5- Metro Title 4 – Industrial and Other Employment Areas Map
- 6- Metro Regional Freight Map

II. FINDINGS

A. The following Oregon Statewide Planning Goals are applicable to the proposed amendments:

Goal 1 – Citizen Involvement

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Finding:

Notice of the proposed amendments has been provided pursuant to Sections 32.240 and 33.070. The Tualatin Planning Commission will hold a public meeting on May 16, 2019, and the City Council will hold a public hearing on the proposed amendments on June 10, 2019. The proposed amendments conform to Goal 1.

Goal 2 – Land Use Planning

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

[...]

Finding:

The proposed amendments have been reviewed pursuant to the City's established land use planning process and procedures. The proposed amendments conform to Goal 2.

Goal 5 – Open Spaces, Scenic and Historic Area, and Natural Resource

Finding:

Applicability of Goal 5 to post-acknowledgment plan amendments is governed by OAR 660- 023-0250. The proposed map amendments do not modify the acknowledged Goal 5 resource list, or a policy that addresses specific requirements of Goal 5. The proposed amendments do not allow uses that would conflict with a particular Goal 5 resource site on an acknowledged resource list. The proposed amendments conform to Goal 5.

Goal 6 – Air, Water and Land Resources Quality

Finding:

The proposal does not affect policies associated with Goal 6 established by the Comprehensive Plan. As reported in the previous findings for Goal 5, the proposed Comprehensive Plan/Zoning Map Amendment will continue to preserve environmentally sensitive lands. The Oregon Department of Environmental Quality (DEQ) regulates air, water and land with Clean Water Act (CWA) Section 401 Water Quality, Water Quality Certificate, State 303(d) listed waters, Hazardous Wastes, Clean Air Act (CAA), and Section 402 NPDES Construction and Stormwater Permits. The Oregon Department of State Lands and the U.S. Army Corps of Engineers regulate jurisdictional wetlands and CWA Section 404 water of the state and the country respectively. Clean Water Services (SWC) coordinates storm water

management, water quality and stream enhancement projects throughout the city. Future development will still need to comply with these state, national and regional regulations and protections for air, water and land resources. The proposed amendments conform to Goal 6.

Goal 7 – Areas Subject to Natural Disasters and Hazards

Finding:

The proposed amendments do not affect policies associated with Goal 7 established by the Comprehensive Plan. Approval of the proposed amendments will not eliminate the requirement for future development to meet the requirements of the Chapters 70 and 72 of the Tualatin Development Code. The proposed amendments conform to Goal 7.

Goal 9 – Economy of the State

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

[...]

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, which will increase economic opportunities relative to the existing site development. The proposed amendments conform to Goal 9.

Goal 11 – Public Facilities and Services

Finding:

The subject site is adequately served by public facilities and services. The development that would be facilitated by the proposed amendments is not anticipated to result in a “significant” impact to the transportation system. No amendments to the public facilities plans are necessary in order to accommodate the proposed map amendment. The proposed amendments conform to Goal 12.

Goal 12 – Transportation

To provide and encourage a safe, convenient and economic transportation system.

[...]

Goal 12 requires the provision and encouragement of a safe, convenient, multimodal and economic transportation system. The proposed amendments are consistent with the City’s acknowledged policies and strategies for the provision of transportation facilities and services as required by Goal 12 the Transportation Planning Rule (TPR), the findings for which are found under Oregon Administrative Rules Chapter 660, Division 12. The proposed amendments conform to Goal 12.

B. The following Oregon Administrative Rules (OAR) are applicable to the proposed amendments:

OAR Chapter 660, Division 9 (Economic Development)

660-009-0010

Application

[...]

(4) For a post-acknowledgement plan amendment under OAR chapter 660, division 18, that changes the plan designation of land in excess of two acres within an existing urban growth boundary from an industrial use designation to a non-industrial use designation, or another employment use designation to any other use designation, a city or county must address all applicable planning requirements, and:

(a) Demonstrate that the proposed amendment is consistent with its most recent economic opportunities analysis and the parts of its acknowledged comprehensive plan which address the requirements of this division; or

(b) Amend its comprehensive plan to incorporate the proposed amendment, consistent with the requirements of this division; or

(c) Adopt a combination of the above, consistent with the requirements of this division.

(5) The effort necessary to comply with OAR 660-009-0015 through 660-009-0030 will vary depending upon the size of the jurisdiction, the detail of previous economic development planning efforts, and the extent of new information on national, state, regional, county, and local economic trends. A jurisdiction's planning effort is adequate if it uses the best available or readily collectable information to respond to the requirements of this division.

(6) The amendments to this division are effective January 1, 2007. A city or county may voluntarily follow adopted amendments to this division prior to the effective date of the adopted amendments.

[...]

Finding:

Although the proposed amendment would change the plan designation of land in excess of two acres within an existing urban growth boundary from an industrial use designation (Light Manufacturing Zone (ML)) to a non-industrial use designation (Institutional Zone (IN)), the proposed amendments are otherwise consistent with the City's acknowledged comprehensive plan and would facilitate future development of government offices employing approximately 65 people, which will increase economic opportunities relative to the existing site development. The proposed amendments are consistent with these requirements.

OAR Chapter 660, Division 12 (Transportation Planning)

[...]

660-012-0060

Plan and Land Use Regulation Amendments

(1) If an amendment to a functional plan, an acknowledged comprehensive plan, or a land use regulation (including a zoning map) would significantly affect an existing or planned transportation facility, then the local government must put in place measures as provided in section (2) of this rule, unless the amendment is allowed under section (3), (9) or (10) of this rule. A plan or land use regulation amendment significantly affects a transportation facility if it would:

(a) Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);

(b) Change standards implementing a functional classification system; or

(c) Result in any of the effects listed in paragraphs (A) through (C) of this subsection based on projected conditions measured at the end of the planning period identified in the adopted TSP. As part of evaluating projected conditions, the amount of traffic projected to be generated within the area of the amendment may be reduced if the amendment includes an enforceable, ongoing requirement that would demonstrably limit traffic generation, including, but not limited to, transportation demand management. This reduction may diminish or completely eliminate the significant effect of the amendment.

(A) Types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

(B) Degrade the performance of an existing or planned transportation facility such that it would not meet the performance standards identified in the TSP or comprehensive plan; or

(C) Degrade the performance of an existing or planned transportation facility that is otherwise projected to not meet the performance standards identified in the TSP or comprehensive plan.

(2) If a local government determines that there would be a significant effect, then the local government must ensure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility measured at the end of the planning period identified in the adopted TSP through one or a combination of the remedies listed in (a) through (e) below, unless the amendment meets the balancing test in subsection (2)(e) of this section or qualifies for partial mitigation in section (11) of this rule. A local government using subsection (2)(e), section (3), section (10) or section (11) to approve an amendment recognizes that additional motor vehicle traffic congestion may result and that other facility providers would not be expected to provide additional capacity for motor vehicles in response to this congestion.

(a) Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

(b) Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of this division; such amendments shall include a funding plan or mechanism consistent with section (4) or include an amendment to the transportation finance plan so that the facility, improvement, or service will be provided by the end of the planning period.

(c) Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

(d) Providing other measures as a condition of development or through a development agreement or similar funding method, including, but not limited to, transportation system management measures or minor transportation improvements. Local governments shall, as part of the amendment, specify when measures or improvements provided pursuant to this subsection will be provided.

(e) Providing improvements that would benefit modes other than the significantly affected mode, improvements to facilities other than the significantly affected facility, or improvements at other locations, if:

(A) The provider of the significantly affected facility provides a written statement that the system-wide benefits are sufficient to balance the significant effect, even though the improvements would not result in consistency for all performance standards;

(B) The providers of facilities being improved at other locations provide written statements of approval; and

(C) The local jurisdictions where facilities are being improved provide written statements of approval.

(3) Notwithstanding sections (1) and (2) of this rule, a local government may approve an amendment that would significantly affect an existing transportation facility without assuring that the allowed land uses are consistent with the function, capacity and performance standards of the facility where:

(a) In the absence of the amendment, planned transportation facilities, improvements and services as set forth in section (4) of this rule would not be adequate to achieve consistency with the identified function, capacity or performance standard for that facility by the end of the planning period identified in the adopted TSP;

(b) Development resulting from the amendment will, at a minimum, mitigate the impacts of the amendment in a manner that avoids further degradation to the performance of the facility by the time of the development through one or a combination of transportation improvements or measures;

(c) The amendment does not involve property located in an interchange area as defined in paragraph (4)(d)(C); and

(d) For affected state highways, ODOT provides a written statement that the proposed funding and timing for the identified mitigation improvements or measures are, at a minimum, sufficient to avoid further degradation to the performance of the affected state highway. However, if a local government provides the appropriate ODOT regional office with written notice of a proposed amendment in a manner that provides ODOT reasonable opportunity to submit a written statement into the record of the local government proceeding, and ODOT does not provide a written statement, then the local government may proceed with applying subsections (a) through (c) of this section.

(4) Determinations under sections (1)–(3) of this rule shall be coordinated with affected transportation facility and service providers and other affected local governments.

(a) In determining whether an amendment has a significant effect on an existing or planned transportation facility under subsection (1)(c) of this rule, local governments shall rely on existing transportation facilities and services and on the planned transportation facilities, improvements and services set forth in subsections (b) and (c) below.

(b) Outside of interstate interchange areas, the following are considered planned facilities, improvements and services:

(A) Transportation facilities, improvements or services that are funded for construction or implementation in the Statewide Transportation Improvement Program or a locally or regionally adopted transportation improvement program or capital improvement plan or program of a transportation service provider.

(B) Transportation facilities, improvements or services that are authorized in a local transportation system plan and for which a funding plan or mechanism is in place or approved. These include, but are not limited to, transportation facilities, improvements or services for which: transportation systems development charge revenues are being collected; a local improvement district or reimbursement district has been established or will be established prior to development; a development agreement has been adopted; or conditions of approval to fund the improvement have been adopted.

(C) Transportation facilities, improvements or services in a metropolitan planning organization (MPO) area that are part of the area's federally-approved, financially constrained regional transportation system plan.

(D) Improvements to state highways that are included as planned improvements in a regional or local transportation system plan or comprehensive plan when ODOT provides a written statement that the improvements are reasonably likely to be provided by the end of the planning period.

(E) Improvements to regional and local roads, streets or other transportation facilities or services that are included as planned improvements in a regional or local transportation system plan or comprehensive plan when the local government(s) or transportation service provider(s) responsible for the facility, improvement or service provides a written statement that the facility, improvement or service is reasonably likely to be provided by the end of the planning period.

(c) Within interstate interchange areas, the improvements included in (b)(A)–(C) are considered planned facilities, improvements and services, except where:

(A) ODOT provides a written statement that the proposed funding and timing of mitigation measures are sufficient to avoid a significant adverse impact on the Interstate Highway system, then local governments may also rely on the improvements identified in paragraphs (b)(D) and (E) of this section; or

(B) There is an adopted interchange area management plan, then local governments may also rely on the improvements identified in that plan and which are also identified in paragraphs (b)(D) and (E) of this section.

(d) As used in this section and section (3):

(A) Planned interchange means new interchanges and relocation of existing interchanges that are authorized in an adopted transportation system plan or comprehensive plan;

(B) Interstate highway means Interstates 5, 82, 84, 105, 205 and 405; and

(C) Interstate interchange area means:

(i) Property within one-quarter mile of the ramp terminal intersection of an existing or planned interchange on an Interstate Highway; or

(ii) The interchange area as defined in the Interchange Area Management Plan adopted as an amendment to the Oregon Highway Plan.

(e) For purposes of this section, a written statement provided pursuant to paragraphs (b)(D), (b)(E) or (c)(A) provided by ODOT, a local government or transportation facility provider, as appropriate, shall be conclusive in determining whether a transportation facility, improvement or service is a planned transportation facility, improvement or service. In the absence of a written statement, a local government can only rely upon planned transportation facilities, improvements and services identified in paragraphs (b)(A)–(C) to determine whether there is a significant effect that requires application of the remedies in section (2).

(5) The presence of a transportation facility or improvement shall not be a basis for an exception to allow residential, commercial, institutional or industrial development on rural lands under this division or OAR 660-004-0022 and 660-004-0028.

(6) In determining whether proposed land uses would affect or be consistent with planned transportation facilities as provided in sections (1) and (2), local governments shall give full credit for potential reduction in vehicle trips for uses located in mixed-use, pedestrian-friendly centers, and neighborhoods as provided in subsections (a)–(d) below;

(a) Absent adopted local standards or detailed information about the vehicle trip reduction benefits of mixed-use, pedestrian-friendly development, local governments shall assume that uses located within a mixed-use, pedestrian-friendly center, or neighborhood, will generate 10% fewer daily and peak hour trips than are specified in available published estimates, such as those provided by the Institute of Transportation Engineers (ITE) Trip Generation Manual that do not specifically account for the effects of mixed-use, pedestrian-friendly development. The 10% reduction allowed for by this section shall be available only if uses which rely solely on auto trips, such as gas stations, car washes, storage facilities, and motels are prohibited;

(b) Local governments shall use detailed or local information about the trip reduction benefits of mixed-use, pedestrian-friendly development where such information is available and presented to the local government. Local governments may, based on such information, allow reductions greater than the 10% reduction required in subsection (a) above;

(c) Where a local government assumes or estimates lower vehicle trip generation as provided in subsection (a) or (b) above, it shall assure through conditions of approval, site plans, or approval standards that subsequent development approvals support the development of a mixed-use, pedestrian-friendly center or neighborhood and provide for on-site bike and pedestrian connectivity and access to transit as provided for in OAR 660-012-0045(3) and (4). The provision of on-site bike and pedestrian connectivity and access to transit may be accomplished through application of acknowledged ordinance provisions which comply with 660-012-0045(3) and (4) or through conditions of approval or findings adopted with the plan amendment that assure compliance with these rule requirements at the time of development approval; and

(d) The purpose of this section is to provide an incentive for the designation and implementation of pedestrian-friendly, mixed-use centers and neighborhoods by lowering the regulatory barriers to plan amendments which accomplish this type of development. The actual trip reduction benefits of mixed-use, pedestrian-friendly development will vary from case to case and may be somewhat higher or lower than presumed pursuant to subsection (a) above. The Commission concludes that this assumption is warranted given general information about the expected effects of mixed-use, pedestrian-friendly development and its intent to encourage changes to plans and development

patterns. Nothing in this section is intended to affect the application of provisions in local plans or ordinances which provide for the calculation or assessment of systems development charges or in preparing conformity determinations required under the federal Clean Air Act.

(7) Amendments to acknowledged comprehensive plans and land use regulations which meet all of the criteria listed in subsections (a)–(c) below shall include an amendment to the comprehensive plan, transportation system plan the adoption of a local street plan, access management plan, future street plan or other binding local transportation plan to provide for on-site alignment of streets or accessways with existing and planned arterial, collector, and local streets surrounding the site as necessary to implement the requirements in OAR 660-012-0020(2)(b) and 660-012-0045(3):

(a) The plan or land use regulation amendment results in designation of two or more acres of land for commercial use;

(b) The local government has not adopted a TSP or local street plan which complies with OAR 660-012-0020(2)(b) or, in the Portland Metropolitan Area, has not complied with Metro's requirement for street connectivity as contained in Title 6, Section 3 of the Urban Growth Management Functional Plan; and

(c) The proposed amendment would significantly affect a transportation facility as provided in section (1).

(8) A "mixed-use, pedestrian-friendly center or neighborhood" for the purposes of this rule, means:

(a) Any one of the following:

(A) An existing central business district or downtown;

(B) An area designated as a central city, regional center, town center or main street in the Portland Metro 2040 Regional Growth Concept;

(C) An area designated in an acknowledged comprehensive plan as a transit oriented development or a pedestrian district; or

(D) An area designated as a special transportation area as provided for in the Oregon Highway Plan.

(b) An area other than those listed in subsection (a) above which includes or is planned to include the following characteristics:

(A) A concentration of a variety of land uses in a well-defined area, including the following:

(i) Medium to high density residential development (12 or more units per acre);

(ii) Offices or office buildings;

(iii) Retail stores and services;

(iv) Restaurants; and

(v) Public open space or private open space which is available for public use, such as a park or plaza.

(B) Generally include civic or cultural uses;

(C) A core commercial area where multi-story buildings are permitted;

(D) Buildings and building entrances oriented to streets;

(E) Street connections and crossings that make the center safe and conveniently accessible from adjacent areas;

(F) A network of streets and, where appropriate, accessways and major driveways that make it attractive and highly convenient for people to walk between uses within the center or neighborhood, including streets and major driveways within the center with wide sidewalks and other features, including pedestrian-oriented street crossings, street trees, pedestrian-scale lighting and on-street parking;

(G) One or more transit stops (in urban areas with fixed route transit service); and

(H) Limit or do not allow low-intensity or land extensive uses, such as most industrial uses, automobile sales and services, and drive-through services.

(9) Notwithstanding section (1) of this rule, a local government may find that an amendment to a zoning map does not significantly affect an existing or planned transportation facility if all of the following requirements are met.

(a) The proposed zoning is consistent with the existing comprehensive plan map designation and the amendment does not change the comprehensive plan map;

(b) The local government has an acknowledged TSP and the proposed zoning is consistent with the TSP; and

(c) The area subject to the zoning map amendment was not exempted from this rule at the time of an urban growth boundary amendment as permitted in OAR 660-024-0020(1)(d), or the area was exempted from this rule but the local government has a subsequently acknowledged TSP amendment that accounted for urbanization of the area.

(10) Notwithstanding sections (1) and (2) of this rule, a local government may amend a functional plan, a comprehensive plan or a land use regulation without applying performance standards related to motor vehicle traffic congestion (e.g. volume to capacity ratio or V/C), delay or travel time if the amendment meets the requirements of subsection (a) of this section. This section does not exempt a proposed amendment from other transportation performance standards or policies that may apply including, but not limited to, safety for all modes, network connectivity for all modes (e.g. sidewalks, bicycle lanes) and accessibility for freight vehicles of a size and frequency required by the development.

(a) A proposed amendment qualifies for this section if it:

(A) Is a map or text amendment affecting only land entirely within a multimodal mixed-use area (MMA); and

(B) Is consistent with the definition of an MMA and consistent with the function of the MMA as described in the findings designating the MMA.

(b) For the purpose of this rule, “multimodal mixed-use area” or “MMA” means an area:

(A) With a boundary adopted by a local government as provided in subsection (d) or (e) of this section and that has been acknowledged;

(B) Entirely within an urban growth boundary;

(C) With adopted plans and development regulations that allow the uses listed in paragraphs (8)(b)(A) through (C) of this rule and that require new development to be consistent with the characteristics listed in paragraphs (8)(b)(D) through (H) of this rule;

(D) With land use regulations that do not require the provision of off-street parking, or regulations that require lower levels of off-street parking than required in other areas and allow flexibility to meet the parking requirements (e.g. count on-street parking, allow long-term leases, allow shared parking); and

(E) Located in one or more of the categories below:

(i) At least one-quarter mile from any ramp terminal intersection of existing or planned interchanges;

(ii) Within the area of an adopted Interchange Area Management Plan (IAMP) and consistent with the IAMP; or

(iii) Within one-quarter mile of a ramp terminal intersection of an existing or planned interchange if the mainline facility provider has provided written concurrence with the MMA designation as provided in subsection (c) of this section.

(c) When a mainline facility provider reviews an MMA designation as provided in subparagraph (b)(E)(iii) of this section, the provider must consider the factors listed in paragraph (A) of this subsection.

(A) The potential for operational or safety effects to the interchange area and the mainline highway, specifically considering:

(i) Whether the interchange area has a crash rate that is higher than the statewide crash rate for similar facilities;

(ii) Whether the interchange area is in the top ten percent of locations identified by the safety priority index system (SPIS) developed by ODOT; and

(iii) Whether existing or potential future traffic queues on the interchange exit ramps extend onto the mainline highway or the portion of the ramp needed to safely accommodate deceleration.

(B) If there are operational or safety effects as described in paragraph (A) of this subsection, the effects may be addressed by an agreement between the local government and the facility provider regarding traffic management plans favoring traffic movements away from the interchange, particularly those facilitating clearing traffic queues on the interchange exit ramps.

(d) A local government may designate an MMA by adopting an amendment to the comprehensive plan or land use regulations to delineate the boundary following an existing zone, multiple existing zones, an urban renewal area, other existing boundary, or establishing a new boundary. The designation must be accompanied by findings showing how the area meets the definition of an MMA. Designation of an MMA is not subject to the requirements in sections (1) and (2) of this rule.

(e) A local government may designate an MMA on an area where comprehensive plan map designations or land use regulations do not meet the definition, if all of the other elements meet the definition, by concurrently adopting comprehensive plan or land use regulation amendments necessary to meet the definition. Such amendments are not subject to performance standards related to motor vehicle traffic congestion, delay or travel time.

(11) A local government may approve an amendment with partial mitigation as provided in section (2) of this rule if the amendment complies with subsection (a) of this section, the amendment meets the balancing test in subsection (b) of this section, and the local government coordinates as provided in subsection (c) of this section.

(a) The amendment must meet paragraphs (A) and (B) of this subsection or meet paragraph (D) of this subsection.

(A) Create direct benefits in terms of industrial or traded-sector jobs created or retained by limiting uses to industrial or traded-sector industries.

(B) Not allow retail uses, except limited retail incidental to industrial or traded sector development, not to exceed five percent of the net developable area.

(C) For the purpose of this section:

(i) “Industrial” means employment activities generating income from the production, handling or distribution of goods including, but not limited to, manufacturing, assembly, fabrication, processing, storage, logistics, warehousing, importation, distribution and transshipment and research and development.

(ii) “Traded-sector” means industries in which member firms sell their goods or services into markets for which national or international competition exists.

(D) Notwithstanding paragraphs (A) and (B) of this subsection, an amendment complies with subsection (a) if all of the following conditions are met:

(i) The amendment is within a city with a population less than 10,000 and outside of a Metropolitan Planning Organization.

(ii) The amendment would provide land for “Other Employment Use” or “Prime Industrial Land” as those terms are defined in OAR 660-009-0005.

(iii) The amendment is located outside of the Willamette Valley as defined in ORS 215.010.

(E) The provisions of paragraph (D) of this subsection are repealed on January 1, 2017.

(b) A local government may accept partial mitigation only if the local government determines that the benefits outweigh the negative effects on local transportation facilities and the local government receives from the provider of any transportation facility that would be significantly affected written concurrence that the benefits outweigh the negative effects on their transportation facilities. If the amendment significantly affects a state highway, then ODOT must coordinate with the Oregon Business Development Department regarding the economic and job creation benefits of the proposed amendment as defined in subsection (a) of this section. The requirement to obtain concurrence from a provider is satisfied if the local government provides notice as required by subsection (c) of this section and the provider does not respond in writing (either concurring or non-concurring) within forty-five days.

(c) A local government that proposes to use this section must coordinate with Oregon Business Development Department, Department of Land Conservation and Development, area commission on transportation, metropolitan planning organization, and transportation providers and local governments directly impacted by the proposal to allow opportunities for comments on whether the

proposed amendment meets the definition of economic development, how it would affect transportation facilities and the adequacy of proposed mitigation. Informal consultation is encouraged throughout the process starting with pre-application meetings. Coordination has the meaning given in ORS 197.015 and Goal 2 and must include notice at least 45 days before the first evidentiary hearing. Notice must include the following:

(A) Proposed amendment.

(B) Proposed mitigating actions from section (2) of this rule.

(C) Analysis and projections of the extent to which the proposed amendment in combination with proposed mitigating actions would fall short of being consistent with the function, capacity, and performance standards of transportation facilities.

(D) Findings showing how the proposed amendment meets the requirements of subsection (a) of this section.

(E) Findings showing that the benefits of the proposed amendment outweigh the negative effects on transportation facilities.

[...]

Finding:

As identified in the provided Transportation Planning Rule (TPR) analysis Exhibits 3 and 4, the trip generation potential for the existing zoning (ML) and proposed zoning (IN) was calculated using site redevelopment assumptions for a reasonable worst-case use and ITE trip generation rates. Applying the reasonable worst case scenario to the subject site, the proposed Plan Map Amendment (from ML to IN) would have the potential to add an increase of approximately 155 (219-64) p.m. peak hour vehicle trips, which would potentially create a significant effect on the transportation system.

In order to mitigate for this potential effect, the applicant proposes a trip cap with the amendments that would limit site trips and not further degrade the transportation system. The provided TPR analysis indicates that a trip cap of 80 p.m. peak hour trips would result in the proposed amendment not having a significant effect on the transportation system. Subject to imposition of the aforementioned trip cap, these criteria are met.

C. The following Chapter and Titles of Metro Code are applicable to the proposed amendments:

Chapter 3.07, Urban Growth Management Functional Plan

[...]

Title 4: Industrial and Other Employment Areas

[...]

3.07.450 Employment and Industrial Areas Map

(a) The Employment and Industrial Areas Map is the official depiction of the boundaries of Regionally Significant Industrial Areas, Industrial Areas and Employment Areas.

[...]

(c) A city or county may amend its comprehensive plan or zoning regulations to change its designation of land on the Employment and Industrial Areas Map in order to allow uses not allowed by this title upon a demonstration that:

(1) The property is not surrounded by land designated on the map as Industrial Area, Regionally Significant Industrial Area or a combination of the two;

Finding:

The subject site is adjacent to Herman Road to the south, south of which is railroad right-of-way, and 108th Avenue to the west and is therefore not “surrounding” by properties designated as Industrial or Regionally Significant Industrial Area. This criterion is met.

(2) The amendment will not reduce the employment capacity of the city or county;

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, which will increase the employment capacity of the subject site and the City overall. This criterion is met.

(3) If the map designates the property as Regionally Significant Industrial Area, the subject property does not have access to specialized services, such as redundant electrical power or industrial gases, and is not proximate to freight loading and unloading facilities, such as trans-shipment facilities;

Finding:

The site is designated as Industrial not Regionally Significant Industrial Area. This criterion is not applicable.

(4) The amendment would not allow uses that would reduce off-peak performance on Main Roadway Routes and Roadway Connectors shown on the Regional Freight Network Map in the RTP below volume-to capacity standards in the plan, unless mitigating action is taken that will restore performance to RTP standards within two years after approval of uses;

[...]

Finding:

Herman Road and 108th Avenue are not designated as Main Roadway Routes or Roadway Connectors on the Regional Freight Network Map. This criterion is not applicable.

(6) If the map designates the property as Regionally Significant Industrial Area, the property subject to the amendment is ten acres or less; if designated Industrial Area, the property subject to the amendment is 20 acres or less; if designated Employment Area, the property subject to the amendment is 40 acres or less.

[...]

Finding:

The subject site is a less than 20 acre site, designated as Industrial on the Employment and Industrial Areas Map. This criterion is met.

D. The following Chapters of the Tualatin Comprehensive Plan are applicable to the proposed amendments:

Chapter 9. Plan Map

Finding:

The proposed amendments would apply the IN designation to the subject site and amend Community Plan Map 9-1. This objective is met.

Chapter 11. Transportation

Section 11.610. Transportation Goals and Objectives

(2) Goal 1: Mobility and access

Maintain and enhance the transportation system to reduce travel times, provide travel-time reliability, provide a functional and smooth transportation system, and promote access for all users.

Finding:

The proposed amendments have been determined to be in compliance with OAR Chapter 660 Division 12 and therefore, comply with the above goal. This objective is met.

(3) Goal 2: Safety, improve safety for all users, all modes, all ages, and all abilities within the City of Tualatin.

Finding:

The proposed amendments would not impact safety relative to the transportation system. The provided transportation analysis demonstrates that the government office use would not negatively impact road users in the vicinity of the subject site. This objective is met.

(4) Goal 3: Vibrant Community. Allow for a variety of alternative transportation choices for citizens of and visitors to Tualatin to support a high quality of life and community livability.

Finding:

The proposed amendments would facilitate development of a government office on the subject site, which would support alternative transportation options by providing bicycle parking areas and spaces for vanpools. This objective is met.

(5) Goal 4: Equity. Consider the distribution of benefits and impacts from potential transportation options, and work towards fair access to transportation facilities for all users, all ages, and all abilities.

Finding:

The proposed amendments do not reflect a significant change to the existing transportation system and rather have been determined to be in compliance with the City's existing TSP, which is reflective of this

goal. Further, all transportation and pedestrian facilities will comply with accessibility requirements upon construction. This objective is met.

(6) Goal 5: Economy. Support local employment, local businesses, and a prosperous community while recognizing Tualatin’s role in the regional economy.

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, which will increase the employment capacity of the subject site and the City overall. These employees will support local businesses as well as provide permitting services to local businesses helping to support the overall prosperity of the community. This objective is met.

(7) Goal 6: Health/Environment. Provide active transportation options to improve the health of citizens in Tualatin. Ensure that transportation does not adversely affect public health or the environment.

Finding:

The proposed amendments identify a transportation system, including streets, pedestrian and bicycle facilities. Herman Road and 108th Avenue both have both sidewalks and bike lanes. This objective is met.

(8) Goal 7: Ability to Be Implemented. Promote potential options that are able to be implemented because they have community and political support and are likely to be funded.

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, for which a plan and budget have been developed. This objective is met.

E. The following Chapters of the Tualatin Development Code are applicable to the proposed amendments:

Chapter 33: Applications and Approval Criteria

Section 33.070 Plan Amendments

[...]

(2) Applicability. Quasi-judicial amendments may be initiated by the City Council, the City staff, or by a property owner or person authorized in writing by the property owner. Legislative amendments may only be initiated by the City Council.

Finding:

A Plan Text Amendment and Plan Map Amendment are proposed. This proposal is quasi-judicial in nature and therefore has been processed consistent with the Type IV-A procedures in Chapter 32. This criterion is met.

[...]

(5) Approval Criteria.

(a) Granting the amendment is in the public interest.

Finding:

The Tualatin Comprehensive Plan and Development Code implement the Oregon Statewide Planning Goals. Statewide Planning Goal 2 requires all parcels in each city and county to be designated with a planning district. The proposed amendment would rezone the subject site from Light Manufacturing (ML) to Institutional (IN) and government offices and public works yard and storage area as Permitted uses in the IN district.

The site is currently functions as the City's Public Works and Operations center. An objective of the Institutional Planning District is to accommodate campus-style development, owned and operated by governmental entities consisting of multiple structures or facilities, which may serve multiple purposes and provide multiple services to the community, per TDC 8.100.

Approval of the proposed amendments would facilitate the development government offices employing approximately 65 people, which will increase economic opportunities relative to the existing site development and provide permitting and development services in one location for the community. The proposed Plan Map Amendment to rezone the property from ML to IN and the proposed Plan Text Amendment to add government offices as a Permitted use in the Institutional District is therefore consistent with the public interest. This criterion is met.

(b) The public interest is best protected by granting the amendment at this time.

Finding:

The Operations center anticipates future expansion to provide community development operations in addition to the existing public works operations. Chapter 8 addresses these semi-public and miscellaneous uses as not neatly fitting into traditional use categories, such as Industrial. The proposed Plan Map Amendment to IN provides clarity that the site provides community services. Chapter 8 of the Community Plan recognizes government offices as a use that is compatible with the Institutional Planning District objectives. This criterion is met.

(c) The proposed amendment is in conformity with the applicable objectives of the Tualatin Community Plan.

Finding:

The City's Operations Center is recognized as a government service, in Chapter 8: Public Land Use, Section 8.020 of the Tualatin Community Plan. Additionally, the Institutional Planning District objectives of 8.100 state that, "The district may be applied to land that is able to accommodate large-scale campus-style development and operation of related uses, as follows: (a) Contiguous land one and one-half acre in size or greater; (b) Access to a collector or arterial street; and (c) Adequate public facilities are available to the property. The operations center is (a) approximately 8.73 acres in size, (b) served by two major arterial streets: Herman Road and 108th Avenue, and (c) is served by public utilities. This criterion is met.

(d) The following factors were consciously considered:

(i) The various characteristics of the areas in the City;

Finding:

The site is bordered by Light Manufacturing uses to the west, north, and east; and General Manufacturing uses to the south. The existing public works functions and operations are compatible with surrounding industrial uses. The proposed amendments would facilitate development of a government office building on the site which would be the future home to permitting and development review services for the City, which is a use that is compatible with the uses presently on the subject site as well as those on neighboring properties. This criterion is met.

(ii) The suitability of the areas for particular land uses and improvements in the areas;

Finding:

The subject site is located in Neighborhood Planning Area 7 as shown on Map 9-2. This area comprises the majority of the City's industrial land. The site is located in area designated light industrial to buffer residential uses to the north. Rezoning the land from ML to IN will preserve the campus-style development needs of the Operations Center while remaining harmonious with surround land uses. This criterion is met.

(iii) Trends in land improvement and development;

Finding:

The subject site is located in an area designated as Industrial Area by Metro's Urban Growth Management Functional Plan (TDC Map 9-4). The proposed zone change will comply with Metro's Title 4. The IN zone does not permit retail or professional services uses. This criterion is met.

(iv) Property values;

Finding:

The subject site is a City-owned property. The proposed amendments would accommodate future development of government offices on the subject site, a proposal which would be reviewed through further Architectural Review for a demonstration of compliance with applicable development standards. Overall, the nature of the existing and proposed site development are harmonious with the subject site as well as surrounding properties. This criterion is met.

(v) The needs of economic enterprises and the future development of the area; needed right-of-way and access for and to particular sites in the area;

Finding:

Rezoning the land to IN will benefit the City in capturing a more accurate Industrial land inventory. Impacts to the transportation system are addressed in (f) and (h). This criterion is met.

(vi) Natural resources of the City and the protection and conservation of said resources;

Finding:

Natural resources are identified and protected through applicable regulations of the TDC, and protection and conservation of said resources is implemented by Clean Water Services. No amendments are proposed that would affect the protection and conservation of natural resources. This criterion is not applicable.

(vii) Prospective requirements for the development of natural resources in the City;

Finding:

No development of natural resources is proposed as part of the proposed amendments. This criterion is not applicable.

(viii) The public need for healthful, safe, esthetic surroundings and conditions; and

Finding:

The proposed amendments satisfy the public need for healthful, safe, esthetic surroundings and conditions by applying a land use designation that ensures compatibility with adjoining industrial lands, implement transportation improvements, prescribe required infrastructure to serve the area and address environmental protection requirements. Further, Oregon Statewide Planning Goal 2 requires all parcels in each city and county to be designated with a planning district. Therefore, the public need for healthful, safe, aesthetic surroundings and conditions will best be served by granting the amendments at this time. This criterion is met.

(ix) Proof of change in a neighborhood or area, or a mistake in the Plan Text or Plan Map for the property under consideration are additional relevant factors to consider.

Finding:

The proposed Plan Map amendment to IN provides clarity that the City Operations site provides community services. The proposed Plan Text amendment would correct a Scribner's error, in which public buildings, facilities, and operations were unintentionally omitted from the permitted use categories in the IN zone- Chapter 49, Table 49-1. Chapter 8 of the Community Plan recognizes government offices as a use that is compatible with the Institutional Planning District objectives. This criterion is met.

(e) If the amendment involves residential uses, then the appropriate school district or districts must be able to reasonably accommodate additional residential capacity by means determined by any affected school district.

Finding:

The amendment does not involve residential uses. This criterion is not applicable.

(f) Granting the amendment is consistent with the applicable State of Oregon Planning Goals and applicable Oregon Administrative Rules, including compliance with the Transportation Planning Rule TPR (OAR 660-012-0060).

Finding:

Findings addressing the applicable Oregon Statewide Planning Goals and TPR have been addressed above. This criterion is met.

(g) Granting the amendment is consistent with the Metropolitan Service District's Urban Growth Management Functional Plan.

Finding:

Findings addressing the applicable Titles of the Metro Urban Growth Management Functional Plan have been addressed above. This criterion is met.

(h) Granting the amendment is consistent with Level of Service F for the p.m. peak hour and E for the one-half hour before and after the p.m. peak hour for the Town Center 2040 Design Type (TDC Map 9-4), and E/E for the rest of the 2040 Design Types in the City's planning area.

Finding:

The subject site is outside of the Town Center 2040 Design Type area. As identified Table 7 of the Transportation Impact Analysis (Exhibit 3), the proposed amendment would facilitate future development of a government office building on the site. The additional trip generation from this use would result in a LOS of D or greater for the weekday PM peak hour, at the nearby study intersections. This criterion is met.

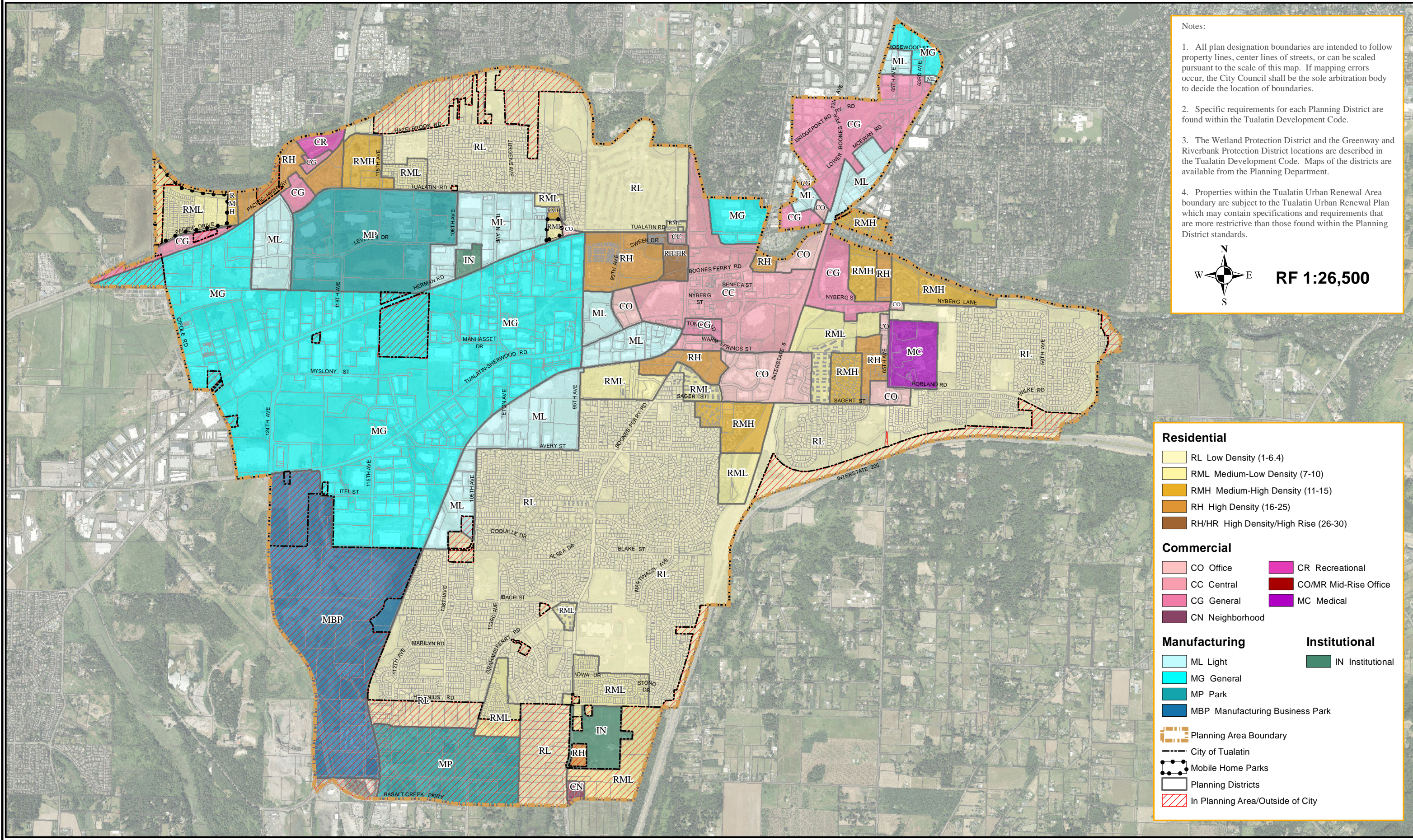
- (i) Granting the amendment is consistent with the objectives and policies regarding potable water, sanitary sewer, and surface water management pursuant to TDC 12.020, water management issues are adequately addressed during development or redevelopment anticipated to follow the granting of a plan amendment.**

[...]

Finding:

The subject site is presently served with utilities such as potable water, sanitary sewer, and stormwater management. Future structure development on the site will require approval of an Architectural Review land use application, at which time these issues will be addressed in greater detail. This criterion is met.

Map 9-1 Community Plan Map



Notes:

1. All plan designation boundaries are intended to follow property lines, center lines of streets, or can be scaled pursuant to the scale of this map. If mapping errors occur, the City Council shall be the sole arbitration body to decide the location of boundaries.
2. Specific requirements for each Planning District are found within the Tualatin Development Code.
3. The Wetland Protection District and the Greenway and Riverbank Protection District locations are described in the Tualatin Development Code. Maps of the districts are available from the Planning Department.
4. Properties within the Tualatin Urban Renewal Area boundary are subject to the Tualatin Urban Renewal Plan which may contain specifications and requirements that are more restrictive than those found within the Planning District standards.



Residential

- RL Low Density (1-6.4)
- RML Medium-Low Density (7-10)
- RMH Medium-High Density (11-15)
- RH High Density (16-25)
- RH/HR High Density/High Rise (26-30)

Commercial

- CO Office
- CC Central
- CG General
- CN Neighborhood
- CR Recreational
- CO/MR Mid-Rise Office
- MC Medical

Manufacturing

- ML Light
- MG General
- MP Park
- MBP Manufacturing Business Park

Institutional

- IN Institutional

Planning Area Boundary
 City of Tualatin
 Mobile Home Parks
 Planning Districts
 In Planning Area/Outside of City

Tualatin City Operations Site Traffic Impact Analysis

Prepared for:

SRG Partnership, Inc.

Prepared by:

DKS Associates

December 2018



EXPIRES: 12/31/19



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Introduction

The purpose of this study is to identify potential transportation system impacts and mitigations needed to support a proposed city operations site for the City of Tualatin. The proposed site is located at the northeast corner of Herman Road and 108th Avenue in Tualatin, Oregon. The current zoning of the site is Light Manufacturing (ML)¹, and the proposed land use is a government office building, which is similar to the existing use of the site but may vary in operational function with inclusion of visits from individuals that are not employed at the site.

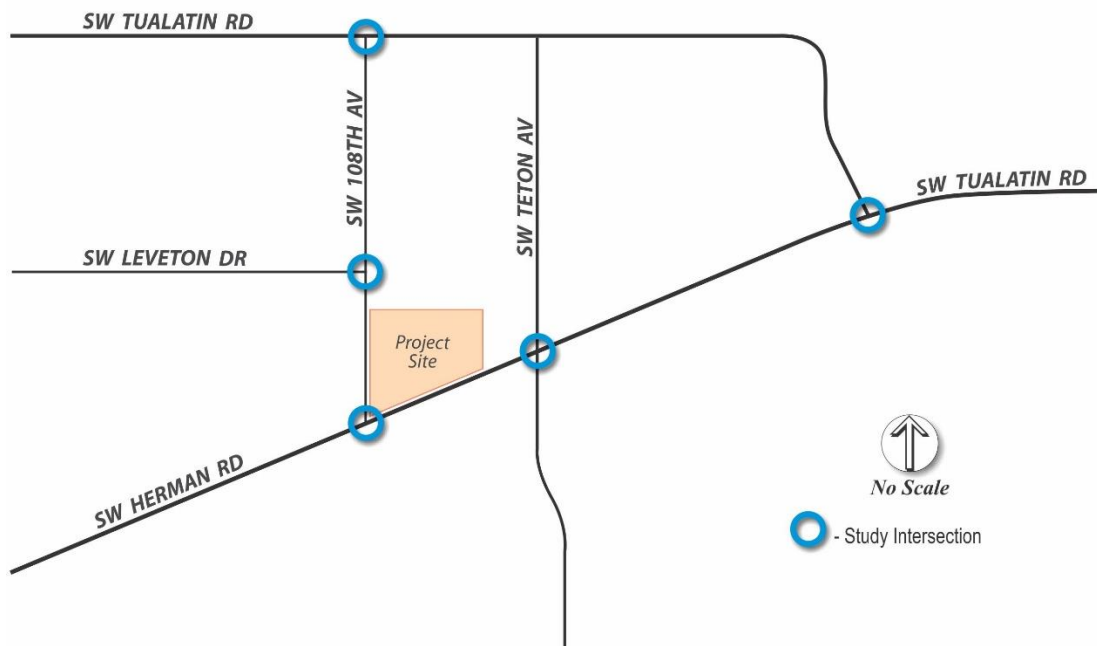
While general office buildings is allowed under the existing zoning, a government office building is not directly allowed and would ultimately require findings to address Transportation Planning Rule (TPR) requirements. The specific analysis required to address TPR requirements would vary based on the proposed action (minor modification to zoning, significant map change, or significant text change) and is not included in this analysis. The traffic analysis summarized in this TIA focuses on the direct impacts to the transportation system related to the proposed site development.

Assumptions related to the proposed site (relative to conservative vehicle trip generation assumptions) include:

- The building will have up to 20,000 square feet of gross floor area.
- The building will accommodate up to 60 employees in addition to the current employees.

Study Area

FIGURE 1: STUDY AREA



¹ Tualatin Development Code, City of Tualatin.

The study area (Figure 1) for traffic analysis was defined by reviewing the City of Tualatin Traffic Study Requirements², coordination with City staff, and identifying intersections that may be significantly impacted by the development of the proposed site. These intersections include:

1. SW Tualatin Road/SW 108th Avenue
2. SW Leveton Drive/SW 108th Avenue
3. SW Herman Road/SW 108th Avenue
4. SW Herman Road/SW Teton Avenue
5. SW Herman Road/SW Tualatin Road

Existing Conditions

This section summarizes current (year 2018) transportation conditions in the study area, including an inventory of the existing roadway network, identification of transit, pedestrian, and bicycle facilities, an analysis of recent study area collision history, and an operational analysis of study intersections.

Roadway Network

Table 1 summarizes the characteristics of the study area streets including functional classification, cross-section, posted speed, and presence of parking, sidewalks, and bike lanes.

TABLE 1: EXISTING ROADWAY NETWORK CHARACTERISTICS

Roadway	Functional Classification	Travel Lanes	Posted Speed (mph)	On-Street Parking	Sidewalks	Bike Lanes
SW Tualatin Road	Major Collector	3 Lanes	35	No	Yes	Yes
SW 108th Avenue¹	Major/Minor Collector	2 Lanes	35	No	Yes	Yes
SW Leveton Drive²	Major Arterial	2 Lanes	40	No	Yes	Yes
SW Herman Road³	Major Arterial/ Major Collector	3 Lanes	45	No	Partial	Yes
SW Teton Avenue	Major Collector	2 Lanes	35	No	Partial	Yes

¹SW 108th Avenue is classified as a minor collector between Tualatin Road and Leveton Drive, and a major collector between Leveton Drive and Herman Road.

²SW Leveton Drive is classified as a major arterial between 108th Avenue and 118th Avenues.

³SW Herman Road is classified as a major arterial between Teton Avenue and 108th Avenue, and a major collector elsewhere.

Public Transit

Currently there is one public transit line that operates in the study area. Tualatin Shuttle Blue Line provides fixed-route service linking WES Station to employment destinations along SW 124th Avenue, SW Leveton Drive, SW 108th Avenue, SW Herman Road, SW Teton Avenue, and SW Boones Ferry Road. Tualatin WES station provides commuter connections to Wilsonville Transit Center, Tigard Transit Center, and Beaverton Transit Center which provides regional connections to TriMet and SMART’s transit systems in the Portland Metropolitan Area.

² City of Tualatin Traffic Study Requirements, 2016.

Pedestrian Environment

Sidewalks are generally available on both sides of the streets within the study area and provide connectivity for pedestrians. One larger gap in sidewalk availability exists along the south side of SW Herman Road due to the proximity to the railroad tracks. In addition, there is a lack of sidewalk for approximately 440 feet on the west side of SW Teton Avenue south of Herman Road. Sidewalks are available elsewhere within the study area.

Pedestrian crosswalks exist on all legs at the unsignalized intersections within the study area. All signalized intersections have striped pedestrian crosswalks with push button controls and pedestrian signal heads to indicate “Walk” and “Don’t Walk” periods of time, with the exceptions at the following locations where crosswalks are closed with the indication of “Crosswalk Closed” signs:

- The west and east legs of SW Herman Road/SW 108th Avenue (no sidewalk present on south side of SW Herman Road due to rail proximity)
- The west and east legs of SW Herman Road/SW Tualatin Road (no sidewalk present on south side of SW Herman Road due to rail proximity)

Pedestrian activity counts for each of the legs of the study area intersections were collected during the weekday AM and PM peak hour. The heaviest utilized intersection (in aggregated pedestrian activity) was at Teton Avenue/Herman Road (4 total pedestrians during the AM peak hour).

Bicycle Environment

There are dedicated on-street bicycle facilities within most of the study area. Bicycle activity counts for each approach at study area intersections were collected during the weekday AM and PM peak hour. The heaviest utilized intersection (in aggregated bicycle activity) was at Tualatin Road/Herman Road (11 total bikes during the weekday PM peak hour), with the heaviest approach activity on the west leg (5 bikes).

Safety Analysis

Crash rates at study intersections were analyzed to identify potential safety issues. Collision history at study area intersections was obtained from ODOT spanning the most recent five-year period from October 2012 to September 2017. Table 2 summarizes the crash history at study intersections. There was a total of 17 crashes in the study area over the five years.

Crash rates at study intersections were also calculated to identify problem areas in need of further investigation. The total number of crashes experienced at an intersection is often proportional to the number of vehicles entering it. Therefore, a crash rate describing the frequency of crashes per million entering vehicles (MEV) is used to evaluate the intersection.

The observed crash rate at each site is compared to the critical crash rate, which is unique to each intersection and based on the critical crash rate procedure in the Highway Safety Manual (HSM)³. However, due to the small study area, there is an insufficient reference population of comparison

³2010 Highway Safety Manual (HSM), Chapter 4, Page 4-11: The critical crash rate is a threshold value that allows for relative comparison among sites with similar characteristics. The critical crash rate depends on the average crash rate at similar sites, traffic volume, and a statistical constant that represents a desired level of significance.

intersections from which to calculate a critical crash rate. Therefore, to broaden the field of comparison, study area crash rates were compared to 90th percentile crash rates for similar intersections in a statewide database provided in ODOT’s Analysis Procedures Manual (Table 4-1). An observed crash rate greater than the 90th percentile crash rate is an indication that further investigation may be warranted. As listed in Table 2, all the study intersections have an observed crash rate less than the 90th percentile crash rates, indicating that the number of crashes experienced would be no more than expected.

TABLE 2: STUDY AREA INTERSECTION COLLISIONS (OCTOBER 2012 – SEPTEMBER 2017)

Intersection	Total Collisions	Collision Severity			Observed Crash Rate (per MEV)	90 th Percentile Crash Rate (per MEV)
		Fatal	Injury	Property Damage Only		
SW Tualatin Road/ SW 108 th Avenue	5	0	4	1	0.20	0.293
SW Leveton Drive/ SW 108 th Avenue	1	0	0	1	0.14	0.293
SW Herman Road/ SW 108 th Avenue	2	0	1	1	0.09	0.509
SW Herman Road/ SW Teton Avenue	1	0	1	0	0.03	0.860
SW Herman Road/ SW Tualatin Road	8	0	7	1	0.23	0.509

SOURCE: Oregon Department of Transportation

Intersection Operations

This section describes the existing intersection operating conditions in the study area.

Intersection Performance Measures

All the study intersections fall under the jurisdiction of the City of Tualatin. Level of service (LOS) and volume-to-capacity (V/C) ratio are the two performance measures utilized in this analysis for determining intersection operations. A description of each is outlined below.

Level of Service

An intersection's level of service is similar to a "report card" rating (A through F), based on average vehicle delay. LOS A, B, and C indicate conditions where vehicles can move freely. LOS D and E are progressively worse. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.

V/C Ratio

A volume-to-capacity (v/c) ratio is a measure of effectiveness that takes into account the total volume entering an intersection and compares it to the overall capacity at that intersection to determine a ratio on a scale of 0.0 to 1.0 for the intersection. As an intersection’s v/c ratio becomes closer to 1.0, the intersection becomes more congested and performance is reduced. If the ratio is greater than 1.00, this indicates that demand is greater than the available capacity and the turn movement, approach leg, or intersection is oversaturated and typically experiences excessive queues and long delays.

Jurisdictional Operational Standards

The City of Tualatin has adopted a level-of-service (LOS) standard that is based on the average delay calculated at intersections. The operating standard is LOS D for signalized intersections and LOS E for unsignalized intersections⁴.

Existing Traffic Volumes

Intersection turn movement counts were collected in August and September of 2018 during the weekday morning peak period (7:00 to 9:00 AM) and evening peak period (4:00 to 6:00 PM). Morning counts were collected when schools were in session. Figure 2 shows the balanced existing AM and PM hour traffic volumes.

Existing Operating Conditions

The existing traffic operating conditions at the study intersections were determined for the weekday AM and PM peak hour based on the 2000 Highway Capacity Manual (HCM) methodology for all signalized intersections and based on the 2010 HCM methodologies for intersections that are unsignalized. As listed in Table 3, all study intersections are currently operating in LOS D or better. However, the intersection of SW Herman Road/SW Teton Avenue is currently approaching LOS E (achieved at 55 seconds delay) during the AM peak hour.

TABLE 3: 2018 EXISTING WEEKDAY AM AND PM PEAK HOUR INTERSECTION PERFORMANCE

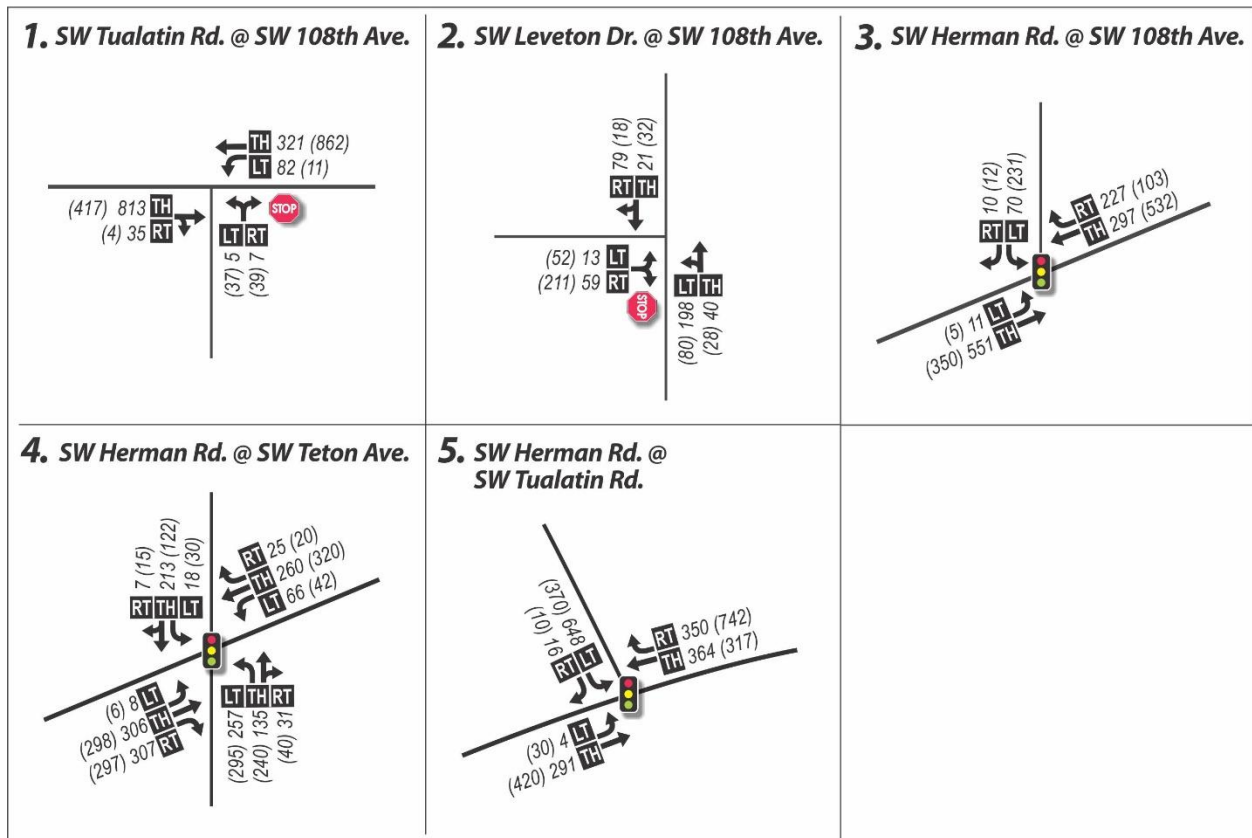
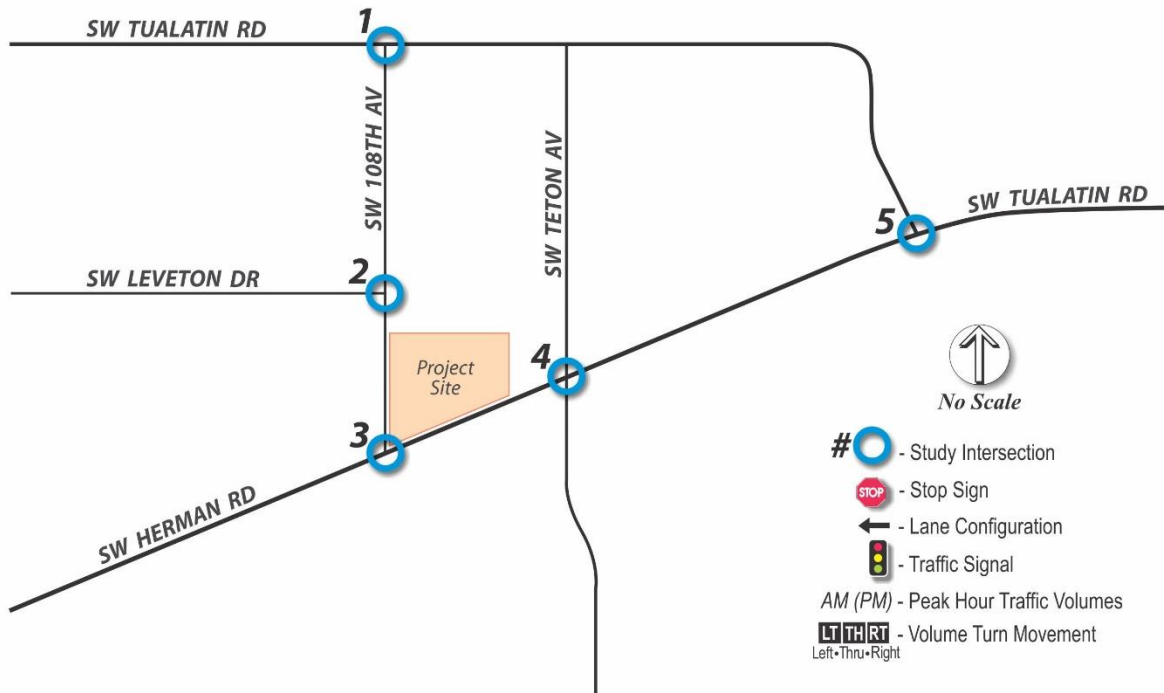
Intersection	Control Type	Intersection Performance					
		AM Peak			PM Peak		
		Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS
SW Tualatin Road/ SW 108th Avenue	Two-way stop control	30.7	0.14	D	25.6	0.32	D
SW 108th Avenue/ SW Leveton Drive	Two-way stop control	10.2	0.15	B	10.5	0.31	B
SW Herman Road/ SW 108th Avenue	Signal	8.6	0.62	A	18.4	0.79	B
SW Herman Road/ SW Teton Avenue	Signal	53.8	0.93	D	33.4	0.84	C
SW Herman/ SW Tualatin Road	Signal	25.8	0.87	C	15.1	0.66	B
Site driveway on SW Herman Road	Two-way stop control	17.7	0.05	C	24.8	0.19	C

Delay and volume-to-capacity ratio for two-way stop intersections reported for the worst movement.

LOS for two-way stop control intersection reported for the worst major street/worst minor street movements.

⁴ Tualatin Development Code 74.420 (17)

FIGURE 2: 2018 EXISTING WEEKDAY AM AND PM PEAK HOUR TRAFFIC VOLUMES



The HCM methodologies used to estimate intersection delay do not account for the interaction between adjacent intersections and the potential impact of queue spillbacks. Therefore, it is necessary to evaluate how the traffic moves between intersections. Queuing analysis was conducted for the study area to provide further information regarding transportation operations. SimTraffic microsimulation analysis was used to estimate the 95th percentile vehicle queues for each of the study area intersection approach movements under the existing conditions scenario. Table 4 indicates that queues in the study area during both the weekday AM and PM peak hours generally do not spill back into adjacent intersections or through travel lanes, with single exception of the southbound approach of SW Herman Road/SW 108th Avenue. Detailed queuing reports are included in the Appendix.

TABLE 4: 2018 EXISTING WEEKDAY AM AND PM PEAK HOUR MOTOR VEHICLE 95TH PERCENTILE QUEUEING

Intersection	Movement	Available Storage Length (ft.)	95th Percentile Queue (ft)*	
			AM Peak	PM Peak
SW Tualatin Road/ SW 108 th Avenue	Westbound L	350	75	25
	Northbound L/R	>1000	50	75
SW Leveton Drive/ SW 108 th Avenue	Eastbound L/R	>1000	75	100
	Northbound L/T	800	75	50
SW Herman Road/ SW 108 th Avenue	Eastbound L	660	50	25
	Southbound L	170	75	175
SW Herman Road/ SW Teton Avenue	Westbound L	150	150	100
	Southbound L	140	50	75
SW Herman Road/ SW Tualatin Road	Eastbound L	140	50	100
	Westbound R	250	200	100
	Southbound L	>700	400	225

Note: This table only contains the movements in the study area that have potential queuing issues.

*The 95th percentile queue lengths are rounded up to the closest multiples of 25 feet.

Growth and Development Assumptions

The following section documents assumptions describing background traffic growth in future years and trip growth related to the proposed redevelopment.

Background Traffic

The amount of local and regional traffic growth independent of the project site is referred to as background traffic growth. Based on the historical traffic counts used in City of Tualatin’s Transportation System Plan, the annual growth rates on the streets within the study area are in the range of 1 percent to 2 percent. The higher end of the range, a 2 percent annual growth rate, was applied to all intersection volumes within the study area to determine background traffic conditions for the 2021 future year scenarios.

There are no “in-process” trips assumed in the vicinity of the proposed site (related to approved but not yet built developments) that may impact the traffic conditions within the study area⁵. The background traffic growth was added to the 2018 existing traffic volumes to create 2021 “No Build” scenarios representing conditions that would exist if the project area did not develop as proposed. The 2021 No Build traffic volumes used in the traffic analysis are provided in Figure 3.

Trip Generation

The following section describes motor vehicle trip generations estimates for the proposed site. The trip estimate assumes the addition of a government office building with up to 20,000 square feet of gross floor area. The two access driveways to the site are assumed to be located on SW Herman Road and SW 108th Avenue.

The number of vehicle trips generated by a proposed land use is typically estimated using trip rates published in Institute of Transportation Engineers (ITE) *Trip Generation*. The ITE trip rates for Government Office (ITE land use code 730) were used to calculate the expected number of daily vehicle trips and AM peak hour vehicle trips generated with full buildout of the proposed site. The daily trip generation for the project is 452 vehicle trips. The AM peak hour trip generation is 67 vehicle trips.

In addition, a custom vehicle trip generation rate was also used to estimate the vehicle trips to and from the proposed City office during the PM peak hour. After consultation with the City of Tualatin staff, it was determined that applying the ITE trip rate alone may result in underestimating the motor vehicle trip generation potential of the site. The ITE trip rate for Government Office Building was used to calculate the baseline for expected number of vehicle trips generated with full buildout of 20,000 square feet of office space. On-site visitor (customer) arrival data was previously collected by City staff and used to supplement the ITE trip generation estimate. The custom rate adds additional ‘customer’ trips (based on the site survey) to ‘employee’ trips (based on the published ITE rate). The result is a higher vehicle trip generation estimate for the PM peak hour due to potential for “double counting” (customer trips included in the base ITE rate), which provides a conservative estimate for the potential traffic impacts at the proposed site. The estimated daily and peak hour trip generation is listed in Table 5.

⁵ Per email communications with Tony Doran, Engineering Associate at City of Tualatin on August 24th, 2018.

TABLE 5: DAILY AND PEAK HOUR TRIP GENERATION ESTIMATES

Description	Land Use	Quantity	Units	Average Trips									
				Daily		AM Peak Hour				PM Peak Hour			
				Rate	Total	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
City of Tualatin Operations Site Custom Trip Generation Estimates	ITE Code 730 (Government Office Building)	20	KSF	22.59	452	3.34	50	17	67	1.71	9	26	35
	Customer Trips (based on site survey; 12 customer trips for 30 employees)	60	# of Added Employees	-	-	-	-	-	-	0.4	12	12	24
Total Trips				-	452	-	50	17	67	-	21	38	59

Source: ITE Trip Generations Manual, 10th Edition

Trip Distribution

Trip distribution reflects how site generated traffic will arrive and leave the proposed site and what roads those trips will use. The trip distribution for the proposed project was estimated based on a review of the regional travel demand model, existing traffic flows, and consideration for potential employees and customers. Rounding adjustments (within 5%) were applied based on existing travel patterns and likely travel paths of expected users. The site traffic was assigned to the street network using the trip distribution patterns shown in Figure 4. These trips, also illustrated in Figure 4, were added to the base “No Build” traffic volumes to develop the “Build” scenarios for the year of 2021. The Build scenario represents conditions that would exist with the proposed development in place. The Build scenario traffic volumes are shown in Figures 5.

FIGURE 3: 2021 NO BUILD WEEKDAY AM AND PM PEAK HOUR TRAFFIC VOLUMES

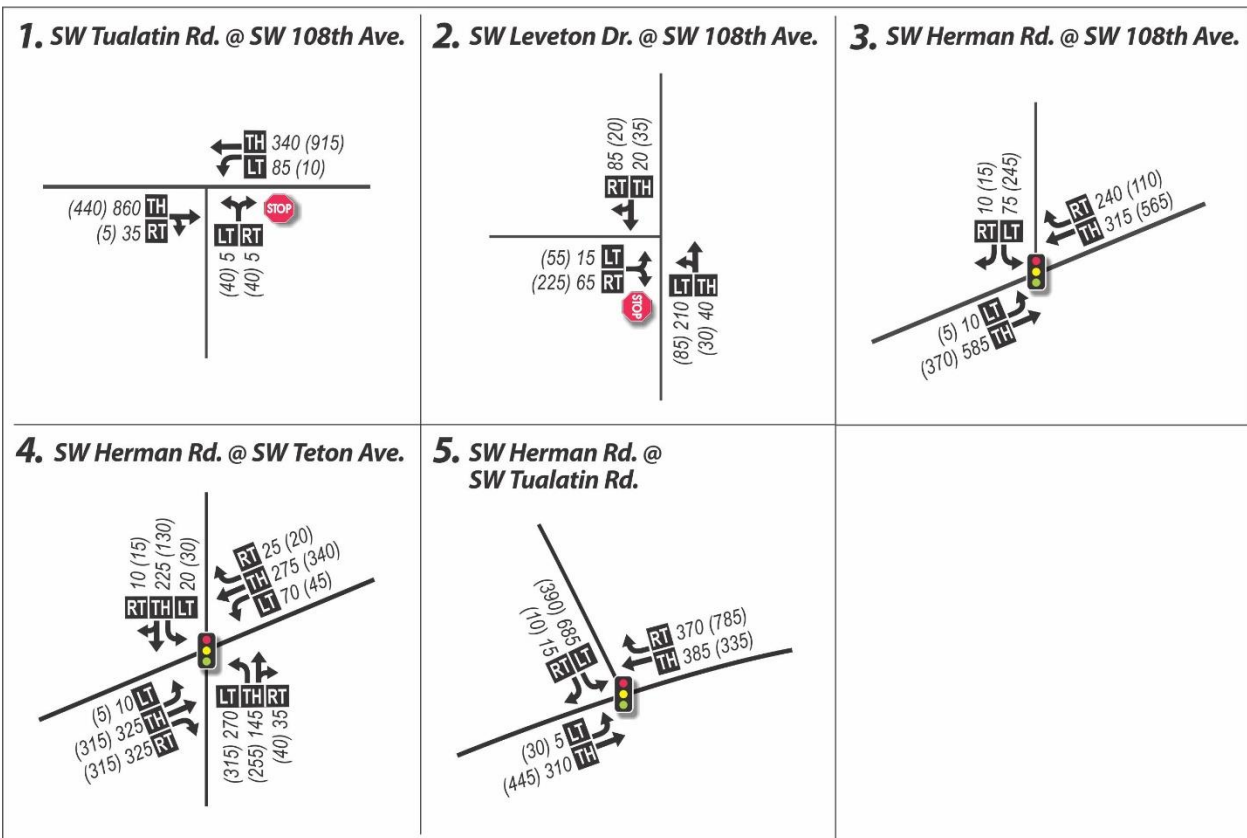
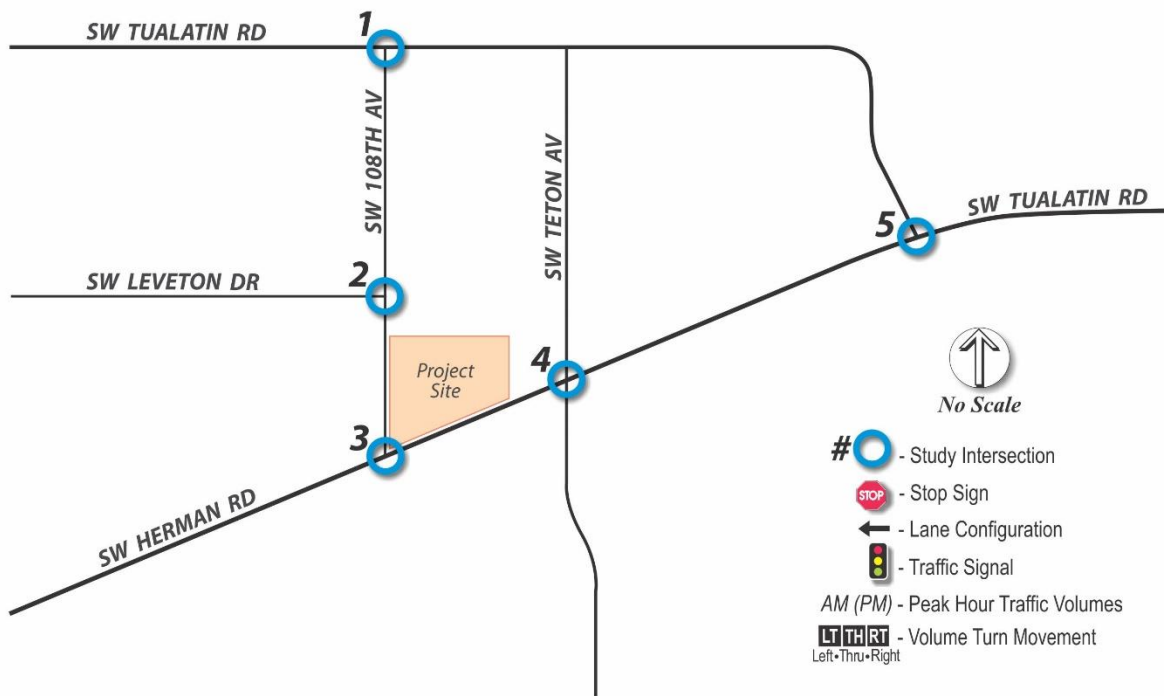


FIGURE 4: WEEKDAY AM AND PM PEAK HOUR TRIP DISTRIBUTION AND PROJECT ADDED TRIPS

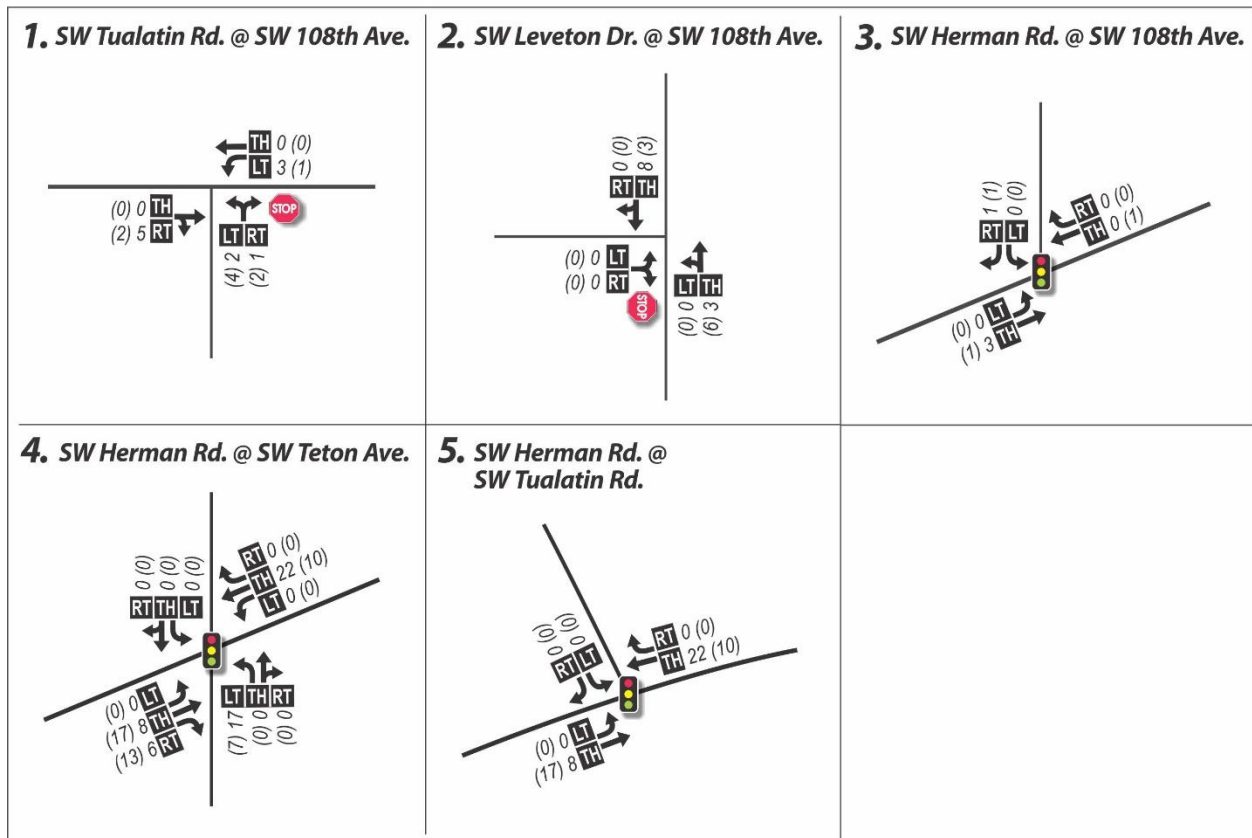
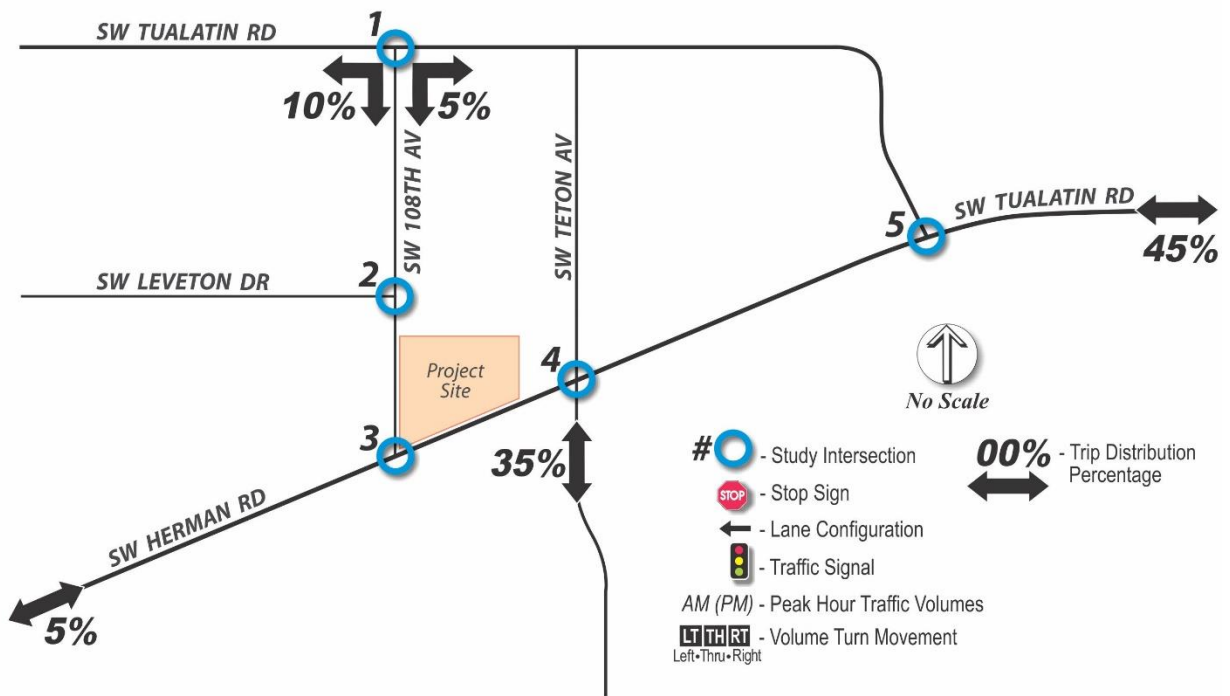
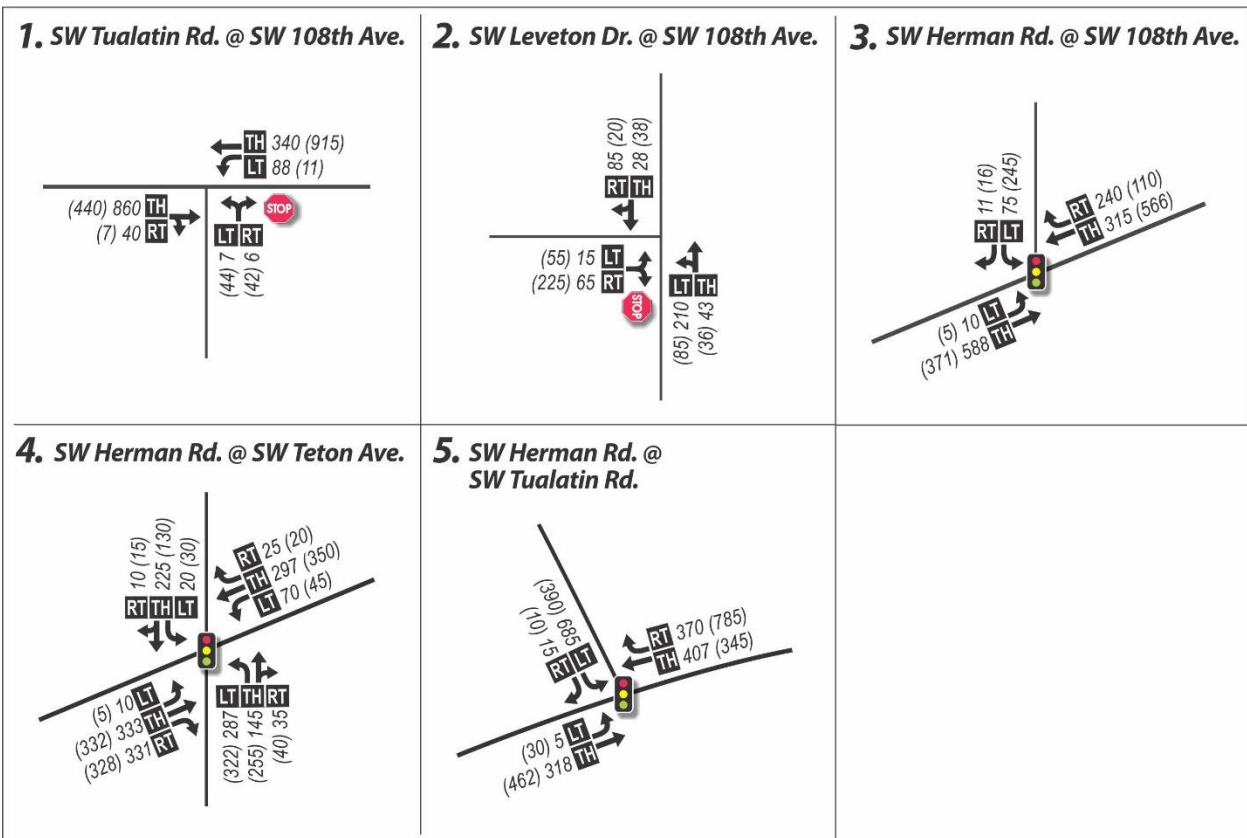
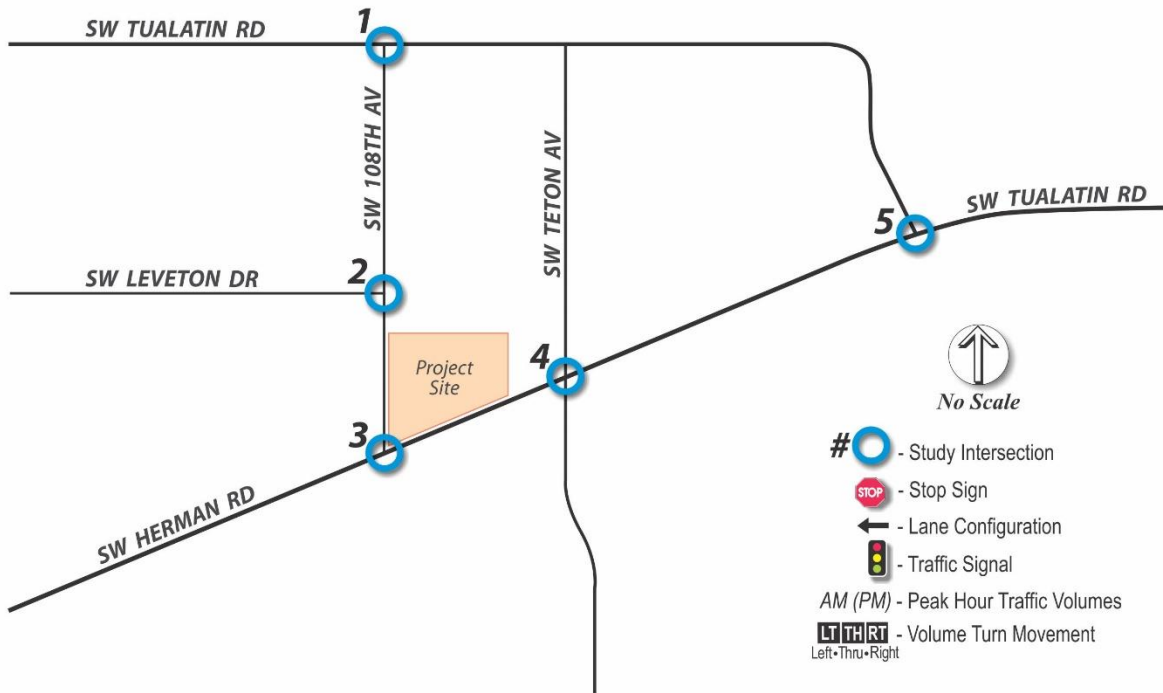


FIGURE 5: 2021 BUILD WEEKDAY AM AND PM PEAK HOUR TRAFFIC VOLUMES



Future Conditions

The following section summarizes the future weekday AM and PM peak hour traffic operating conditions for the expected year of opening (2021). Future traffic operating conditions were analyzed at the study intersections, as well as the site driveways, to determine if the transportation network can support traffic generated by the proposed development. The study area intersection operations were evaluated for both No Build and Build scenarios to determine if the proposed redevelopment would cause any intersections to not meet jurisdictional standards.

Intersection Operations

Table 6 and Table 7 list the future 2021 No Build and Build intersection performance, for the AM and PM peak hour, respectively. As listed, all intersections would operate within the acceptable mobility standards of City of Tualatin, except for the intersection of Herman Road/Teton Avenue. Under both 2021 No Build and Build scenarios, the intersection would operate at LOS E during AM peak hour and exceed the LOS D standard with existing signal timing parameters.

The intersection of Herman Road/Teton Avenue was analyzed to determine potential improvements to address performance standards. The intersection is currently approaching the performance standard⁶ and would be exceeded in the 2021 No Build condition without project traffic. Based on projected traffic flows and the intersection configuration, adding an eastbound right turn lane would directly address the capacity needs at the intersection. However, this improvement would require significant cost and impact to adjacent properties to achieve given the proximity to the rail and reconfiguration required to construct the right turn lane. Therefore, this turn lane is not a recommended solution. A review of the current signal timing parameters indicated that minor adjustments to the signal timing (extending maximum duration of the eastbound phase) will help this intersection continue to meet performance standards with or without the proposed project. Given that the intersection is currently approaching the performance threshold, it is recommended that the performance continue to be monitored and signal timing adjustments made, regardless of project development.

⁶ Table 4 indicates that the current intersection delay is 53.8 seconds during the AM peak hour, narrowly under the threshold of 55 seconds to maintain LOS D.

TABLE 6: 2021 WEEKDAY AM PEAK HOUR INTERSECTION PERFORMANCE

Intersection	Intersection Control	2021 No Build (AM)			2021 Build (AM)		
		Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS
SW Tualatin Road/ SW 108 th Avenue	Two-way stop control	36.4	0.15	E	39.5	0.15	E
SW Leveton Drive/ SW 108 th Avenue	Two-way stop control	10.4	0.16	B	10.5	0.16	B
SW Herman Road/ SW 108 th Avenue	Signal	8.9	0.65	A	9.0	0.65	A
SW Herman Road/ SW Teton Avenue*	Signal	59.1 (51.6)	0.96 (0.95)	E (D)	57.3 (51.4)	0.97 (0.96)	E (D)
SW Herman Road/ SW Tualatin Road	Signal	28.7	0.91	C	30.1	0.92	C
Site driveway on SW Herman Road	Two-way stop control	20.6	0.09	C	26.2	0.18	D
Site driveway on SW 108 th Avenue	Two-way stop control	-	-	-	10.0	0.01	B

Delay and volume-to-capacity ratio for two-way stop intersections reported for the worst movement.

LOS for two-way stop control intersection reported for the worst major street/worst minor street movements.

*The performance measures in parenthesis are under mitigated conditions with adjusted east/west max green.

TABLE 7: 2021 WEEKDAY PM PEAK HOUR INTERSECTION PERFORMANCE

Intersection	Intersection Control	2021 No Build (PM)			2021 Build (PM)		
		Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS
SW Tualatin Road/ SW 108 th Avenue	Two-way stop control	30.1	0.37	D	31.8	0.41	D
SW Leveton Drive/ SW 108 th Avenue	Two-way stop control	10.8	0.33	B	10.9	0.33	B
SW Herman Road/ SW 108 th Avenue	Signal	19.8	0.81	B	19.8	0.81	B
SW Herman Road/ SW Teton Avenue	Signal	39.5	0.90	D	45.0	0.93	D
SW Herman Road/ SW Tualatin Road	Signal	16.0	0.69	B	16.1	0.70	B
Site driveway on SW Herman Road	Two-way stop control	27.4	0.21	D	39.9	0.43	E
Site driveway on SW 108 th Avenue	Two-way stop control	-	-	-	9.2	0.01	A

Delay and volume-to-capacity ratio for two-way stop intersections reported for the worst movement.

LOS for two-way stop control intersection reported for the worst major street/worst minor street movements.

Queuing analysis was also conducted for the study area, with detailed reports included in the Appendix.

Table 8 lists the 95th-percentile vehicle queue lengths for the study intersections. Vehicle queuing at

most locations under the No Build scenario is not substantially different than existing conditions. Build conditions also do not change significantly compared to No Build conditions, with the queue lengths generally increasing by less than two-car length (approximately 50 feet). The only location with a queue that is projected to exceed storage (by approximately one vehicle length) is the southbound left turn at the Herman Road/108th Avenue intersection. This location would experience the same 95th-percentile queue for both the No Build and Build condition and the project would not add any trips to this movement. This indicates that the proposed site does not have significant impact on the traffic conditions within the study area.

TABLE 8: 2021 WEEKDAY AM AND PM PEAK HOUR MOTOR VEHICLE 95TH PERCENTILE QUEUEING

Intersection	Movement	Available Storage (ft.)	95th Percentile Queue (ft)*			
			2021 AM Peak		2021 PM Peak	
			No Build	Build	No Build	Build
SW Tualatin Road/ SW 108th Avenue	Westbound L	350	75	100	25	25
	Northbound L/R	>1000	50	50	125	100
SW Leveton Drive/ SW 108th Avenue	Eastbound L/R	>1000	75	75	100	100
	Northbound L/T	800	75	75	50	50
SW Herman Road/ SW 108th Avenue	Eastbound L	660	100	75	50	50
	Southbound L	170	100	125	200	200
SW Herman Road/ SW Teton Avenue	Westbound L	150	150	150	125	100
	Southbound L	140	50	75	75	75
SW Herman Road/ SW Tualatin Road	Eastbound L	140	75	50	100	100
	Westbound R	250	200	250	100	125
	Southbound L	>700	400	425	250	250

Note: *The 95th percentile queue lengths are rounded up to the closest multiples of 25 feet.

Driveway Interaction

The site is assumed to continue using the existing driveways on both Herman Road and 108th Avenue. The southern site driveway located on the east side of SW 108th Avenue is within 100 feet of the closest opposing driveway on the west side of 108th Avenue. The proximity and configuration of these driveways have the potential to create vehicle interaction between the opposing driveways if there are left turning vehicles exiting from each driveway simultaneously. However, the existing site driveways on 108th Avenue are gated and during the data collection on weekday AM and PM peak hours, no driveway use was observed. Assuming the driveways on 108th Avenue remain gated and the access remain unchanged after the proposed city operations building is completed, the potential interaction with opposing driveways on 108th Avenue will remain minimal. Further, if the gate is removed from the driveway on 108th, the vehicle activity (and potential for conflicts) is anticipated to remain minimal due to the distribution of site trips and minimal use of the driveway (primarily entry/exit to/from the north on 108th Avenue).

Findings and Recommendations

Based on the analysis of existing transportation conditions and potential site traffic, no improvements were identified to mitigate the site development impacts. However, one traffic mobility need was noted

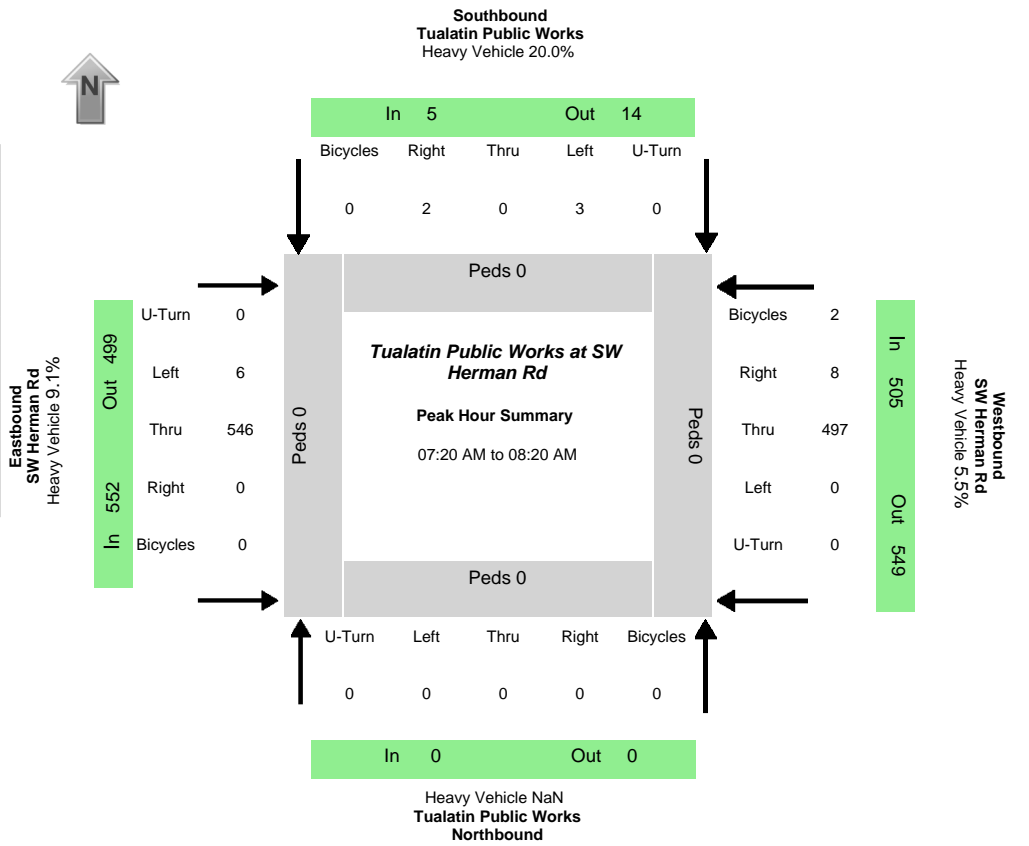
at the intersection of SW Herman Road/SW Teton Avenue. This traffic mobility item is not related to site development and should be monitored/addressed separately (regardless) of the proposed development. The intersection of SW 108th Avenue/SW Teton Avenue is currently approaching intersection performance standards during the AM peak hour and is projected to exceed standards by the 2021 No Build condition with minimal added growth. Continue to monitor the operations of the intersection and consider optimizing the existing signal timing parameters to reduce delay for the eastbound approach. Increasing the maximum green duration for these approaches would likely address performance needs at this intersection.

Appendix

The following items are included in the Appendix:

- Traffic Counts
- Intersection Operations Worksheets
- Intersection Queuing Worksheets

Data Provided by K-D-N.com 503-594-4224	
N/S street	Tualatin Public Works
E/W street	SW Herman Rd
City, State	Tualatin OR
Site Notes	
Location	45.384202 - -122.786072
Start Date	Wednesday, October 10, 2018
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:20:00 AM
Peak 15 Min Start	07:45:00 AM
PHF (15-Min Int)	0.89



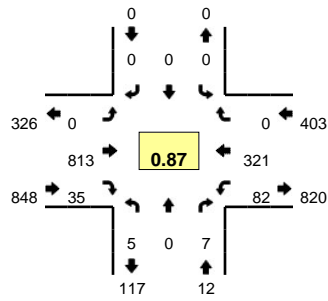
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	3	0	2	0	6	546	0	0	0	497	8	0	0	5	552	505	0	14	499	549
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	9.2%	0.0%	0.0%	0.0%	5.6%	0.0%	0.0%	NaN	20.0%	9.1%	5.5%	NaN	0.0%	5.8%	9.1%

PHV - Bicycles												PHV - Pedestrians									
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0

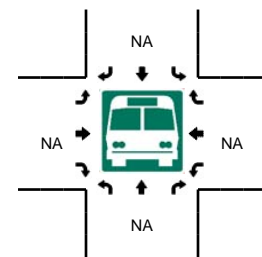
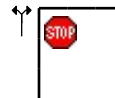
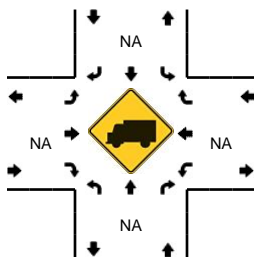
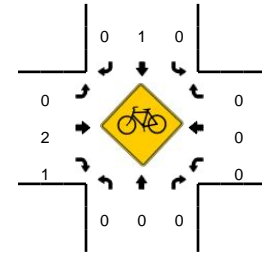
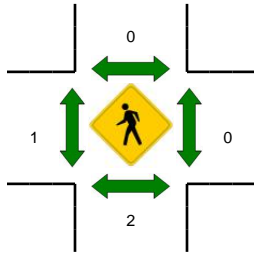
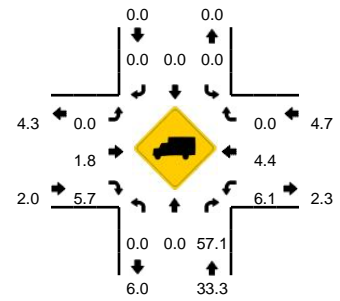
All Vehicle Volumes																			
Time	Northbound Tualatin Public Works				Southbound Tualatin Public Works				Eastbound SW Herman Rd				Westbound SW Herman Rd				15 Min Sum	1 HR Sum	
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn			
07:00:00 AM	0	0	0	0	0	0	0	0	0	0	32	0	0	0	49	0	0		
07:05:00 AM	0	0	0	0	2	0	0	0	1	42	0	0	0	46	2	0			
07:10:00 AM	0	0	0	0	0	0	0	0	1	20	0	0	0	23	1	0	219		
07:15:00 AM	0	0	0	0	0	0	0	0	1	44	0	0	0	35	3	0	221		
07:20:00 AM	0	0	0	0	1	0	0	0	1	52	0	0	0	32	1	0	215		
07:25:00 AM	0	0	0	0	0	0	0	0	2	40	0	0	0	44	1	0	257		
07:30:00 AM	0	0	0	0	0	0	0	0	1	66	0	0	0	38	0	0	279		
07:35:00 AM	0	0	0	0	0	0	0	0	1	56	0	0	0	39	0	0	288		
07:40:00 AM	0	0	0	0	0	0	0	0	0	46	0	0	0	36	0	0	283		
07:45:00 AM	0	0	0	0	0	0	0	0	0	55	0	0	0	43	0	0	276		
07:50:00 AM	0	0	0	0	0	0	0	0	0	44	0	0	0	56	0	0	280		
07:55:00 AM	0	0	0	0	0	0	0	0	0	47	0	0	0	52	1	0	298	1057	
08:00:00 AM	0	0	0	0	0	0	0	0	1	29	0	0	0	26	1	0	257	1033	
08:05:00 AM	0	0	0	0	0	0	1	0	0	43	0	0	0	50	4	0	255	1038	
08:10:00 AM	0	0	0	0	0	0	1	0	0	24	0	0	0	38	0	0	218	1056	
08:15:00 AM	0	0	0	0	2	0	0	0	0	44	0	0	0	43	0	0	250	1062	
08:20:00 AM	0	0	0	0	0	0	0	0	0	24	0	0	0	32	2	0	210	1033	
08:25:00 AM	0	0	0	0	4	0	0	0	0	37	0	0	0	47	0	0	235	1034	
08:30:00 AM	0	0	0	0	2	0	0	0	0	21	0	0	0	17	0	0	186	969	
08:35:00 AM	0	0	0	0	4	0	0	0	1	26	0	0	0	35	1	0	195	940	
08:40:00 AM	0	0	0	0	1	0	0	0	1	35	0	0	0	35	0	0	179	930	
08:45:00 AM	0	0	0	0	1	0	0	0	0	19	0	0	0	26	0	0	185	878	
08:50:00 AM	0	0	0	0	0	0	0	0	0	14	0	0	0	42	0	0	174	834	
08:55:00 AM	0	0	0	0	2	0	0	0	0	18	0	0	0	28	0	0	150	782	

LOCATION: SW 108th Ave -- SW Tualatin Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768943
DATE: Tue, Sep 11 2018



Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

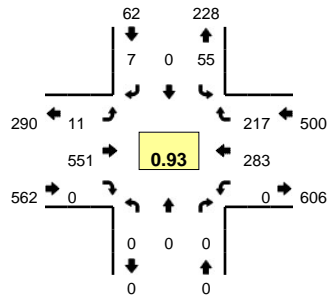


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Tualatin Rd (Eastbound)				SW Tualatin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	2	0	0	0	0	0	0	49	4	0	4	13	0	0	72	
7:05 AM	1	0	1	0	0	0	0	0	0	57	1	0	2	12	0	0	74	
7:10 AM	0	0	0	0	0	0	0	0	0	50	3	0	4	17	0	0	74	
7:15 AM	1	0	0	0	0	0	0	0	0	59	2	0	1	14	0	0	77	
7:20 AM	1	0	1	0	0	0	0	0	0	50	3	0	5	22	0	0	82	
7:25 AM	0	0	1	0	0	0	0	0	0	61	2	0	7	26	0	0	97	
7:30 AM	1	0	1	0	0	0	0	0	0	78	4	0	1	21	0	0	106	
7:35 AM	0	0	1	0	0	0	0	0	0	74	1	0	6	28	0	0	110	
7:40 AM	0	0	0	0	0	0	0	0	0	78	1	0	6	19	0	0	104	
7:45 AM	0	0	0	0	0	0	0	0	0	94	2	0	10	20	0	0	126	
7:50 AM	2	0	1	0	0	0	0	0	0	73	4	0	10	35	0	0	125	
7:55 AM	1	0	0	0	0	0	0	0	0	75	2	0	10	26	0	0	114	1161
8:00 AM	0	0	0	0	0	0	0	0	0	58	3	0	7	37	0	0	105	1194
8:05 AM	0	0	1	0	0	0	0	0	0	63	7	0	9	30	0	0	110	1230
8:10 AM	0	0	1	0	0	0	0	0	0	52	4	0	4	28	0	0	89	1245
8:15 AM	1	0	0	0	0	0	0	0	0	55	2	0	5	19	0	0	82	1250
8:20 AM	0	0	1	0	0	0	0	0	0	52	3	0	7	32	0	0	95	1263
8:25 AM	0	0	2	0	0	0	0	0	0	50	3	0	5	19	0	0	79	1245
8:30 AM	0	0	1	0	0	0	0	0	0	48	1	0	4	17	0	0	71	1210
8:35 AM	2	0	0	0	0	0	0	0	0	38	3	0	13	30	0	0	86	1186
8:40 AM	3	0	1	0	0	0	0	0	0	30	3	0	6	29	0	0	72	1154
8:45 AM	0	0	1	0	0	0	0	0	0	42	2	0	4	26	0	0	75	1103
8:50 AM	1	0	0	0	0	0	0	0	0	40	1	0	5	36	0	0	83	1061
8:55 AM	0	0	2	0	0	0	0	0	0	23	0	0	5	29	0	0	59	1006
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	12	0	4	0	0	0	0	0	0	968	32	0	120	324	0	0	1460	
Heavy Trucks	0	0	0	0	0	0	0	0	0	20	0	0	4	8	0	0	32	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
Railroad																		
Stopped Buses																		

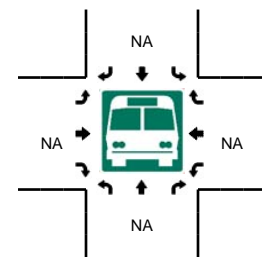
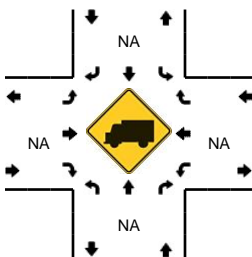
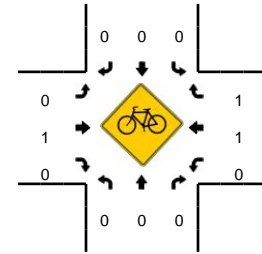
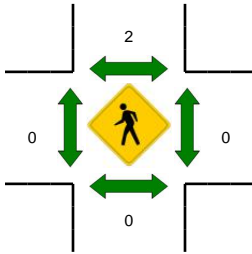
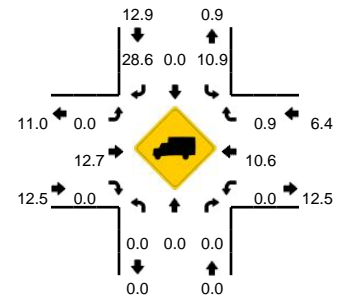
Comments:

LOCATION: SW 108th Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768944
DATE: Tue, Sep 11 2018



Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

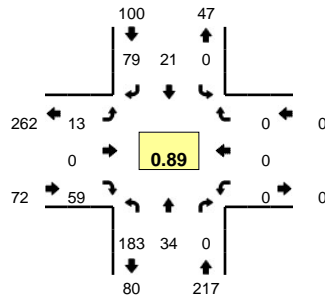


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	3	0	0	0	1	37	0	0	0	29	6	0	76	
7:05 AM	0	0	0	0	4	0	1	0	0	38	0	0	0	32	18	0	93	
7:10 AM	0	0	0	0	6	0	1	0	1	29	0	0	0	22	12	0	71	
7:15 AM	0	0	0	0	2	0	0	0	0	34	0	0	0	21	13	0	70	
7:20 AM	0	0	0	0	7	0	1	0	0	44	0	0	0	20	14	0	86	
7:25 AM	0	0	0	0	6	0	1	0	0	50	0	0	0	34	17	0	108	
7:30 AM	0	0	0	0	8	0	0	0	1	39	0	0	0	18	14	0	80	
7:35 AM	0	0	0	0	5	0	0	0	1	62	0	0	0	20	20	0	108	
7:40 AM	0	0	0	0	3	0	1	0	0	37	0	0	0	19	24	0	84	
7:45 AM	0	0	0	0	7	0	0	0	3	55	0	0	0	18	16	0	99	
7:50 AM	0	0	0	0	6	0	1	0	3	59	0	0	0	27	15	0	111	
7:55 AM	0	0	0	0	3	0	0	0	0	35	0	0	0	32	17	0	87	1073
8:00 AM	0	0	0	0	3	0	0	0	0	50	0	0	0	25	25	0	103	1100
8:05 AM	0	0	0	0	1	0	0	0	3	41	0	0	0	27	24	0	96	1103
8:10 AM	0	0	0	0	4	0	3	0	0	45	0	0	0	22	18	0	92	1124
8:15 AM	0	0	0	0	4	0	0	0	0	19	0	0	0	27	9	0	59	1113
8:20 AM	0	0	0	0	6	0	1	0	1	37	0	0	0	16	22	0	83	1110
8:25 AM	0	0	0	0	4	0	0	0	1	30	0	0	0	13	22	0	70	1072
8:30 AM	0	0	0	0	6	0	0	0	0	26	0	0	0	17	24	0	73	1065
8:35 AM	0	0	0	0	2	0	0	0	0	17	0	0	0	14	22	0	55	1012
8:40 AM	0	0	0	0	2	0	1	0	3	16	0	0	0	21	20	0	63	991
8:45 AM	0	0	0	0	2	0	1	0	1	18	0	0	0	20	19	0	61	953
8:50 AM	0	0	0	0	0	0	0	0	5	12	0	0	0	22	17	0	56	898
8:55 AM	0	0	0	0	0	0	0	0	1	23	0	0	0	20	21	0	65	876
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	48	0	4	0	12	576	0	0	0	336	228	0	1204	
Heavy Trucks	0	0	0	0	8	0	0	0	0	60	0	0	0	28	4	0	100	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

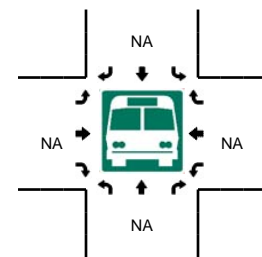
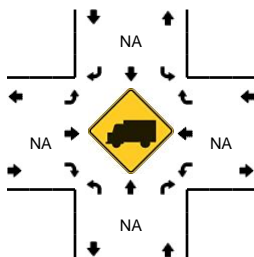
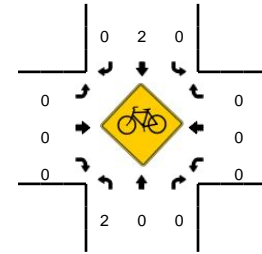
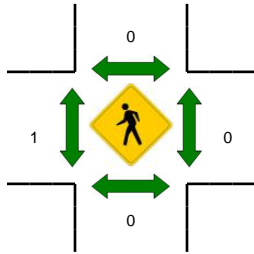
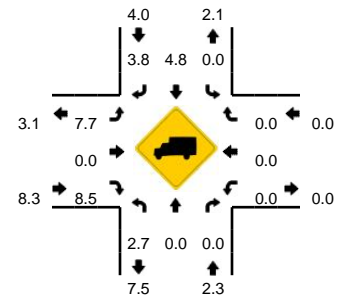
Comments:

LOCATION: SW 108th Ave -- Leveton Dr
CITY/STATE: Tualatin, OR

QC JOB #: 14768945
DATE: Tue, Sep 11 2018



Peak-Hour: 7:40 AM -- 8:40 AM
Peak 15-Min: 8:25 AM -- 8:40 AM

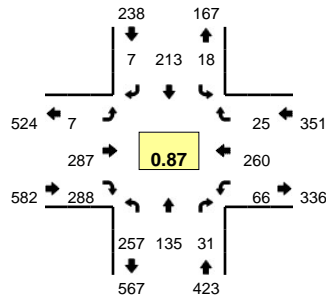


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				Leveton Dr (Eastbound)				Leveton Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	4	2	0	0	0	1	2	0	4	0	3	0	0	0	0	0	16	
7:05 AM	11	5	0	0	0	1	2	0	1	0	3	0	0	0	0	0	23	
7:10 AM	7	5	0	0	0	2	2	0	0	0	4	0	0	0	0	0	20	
7:15 AM	10	3	0	0	0	1	2	0	1	0	3	0	0	0	0	0	20	
7:20 AM	7	0	0	0	0	2	6	0	3	0	6	0	0	0	0	0	24	
7:25 AM	10	6	0	0	0	2	4	0	0	0	9	0	0	0	0	0	31	
7:30 AM	8	0	0	0	0	1	2	0	2	0	7	0	0	0	0	0	20	
7:35 AM	16	1	0	0	0	3	2	0	2	0	4	0	0	0	0	0	28	
7:40 AM	19	3	0	0	0	1	3	0	0	0	8	0	0	0	0	0	34	
7:45 AM	11	3	0	0	0	2	7	0	1	0	7	0	0	0	0	0	31	
7:50 AM	8	4	0	0	0	0	10	0	1	0	13	0	0	0	0	0	36	
7:55 AM	13	2	0	0	0	2	10	0	6	0	3	0	0	0	0	0	36	319
8:00 AM	12	7	0	0	0	1	7	0	2	0	6	0	0	0	0	0	35	338
8:05 AM	20	3	0	0	0	2	5	0	0	0	1	0	0	0	0	0	31	346
8:10 AM	13	1	0	0	0	1	4	0	1	0	6	0	0	0	0	0	26	352
8:15 AM	12	1	0	0	0	0	6	0	0	0	4	0	0	0	0	0	23	355
8:20 AM	15	1	0	0	0	2	6	0	0	0	4	0	0	0	0	0	28	359
8:25 AM	22	2	0	0	0	7	6	0	2	0	2	0	0	0	0	0	41	369
8:30 AM	20	4	0	0	0	2	2	0	0	0	3	0	0	0	0	0	31	380
8:35 AM	18	3	0	0	0	1	13	0	0	0	2	0	0	0	0	0	37	389
8:40 AM	10	4	0	0	0	1	8	0	1	0	2	0	0	0	0	0	26	381
8:45 AM	17	5	0	0	0	2	6	0	1	0	1	0	0	0	0	0	32	382
8:50 AM	15	1	0	0	0	0	4	0	1	0	4	0	0	0	0	0	25	371
8:55 AM	15	2	0	0	0	0	4	0	0	0	1	0	0	0	0	0	22	357
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	240	36	0	0	0	40	84	0	8	0	28	0	0	0	0	0	436	
Heavy Trucks	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	
Pedestrians		0				0				0				0			0	
Bicycles	1	0	0		0	0	0		0	0	0		0	0	0		1	
Railroad																		
Stopped Buses																		

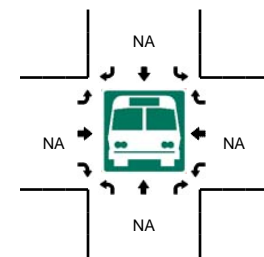
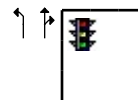
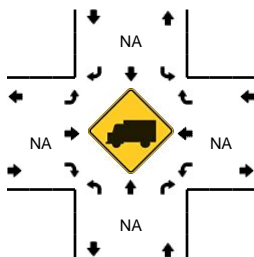
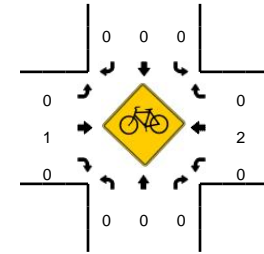
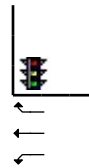
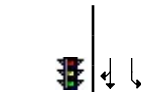
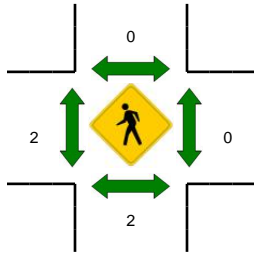
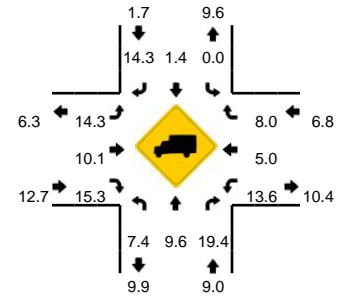
Comments:

LOCATION: SW Teton Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768946
DATE: Tue, Sep 11 2018



Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

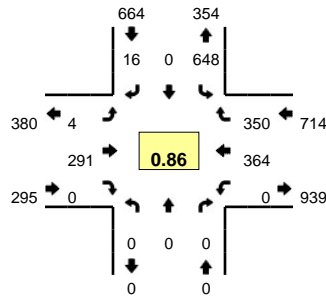


5-Min Count Period Beginning At	SW Teton Ave (Northbound)				SW Teton Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	23	6	0	0	2	8	0	0	0	19	21	0	1	17	1	0	98	
7:05 AM	29	5	3	0	0	13	0	0	0	25	20	0	1	24	0	0	120	
7:10 AM	20	5	1	0	1	17	0	0	1	11	12	0	2	17	0	0	87	
7:15 AM	18	9	2	0	1	16	0	0	2	20	22	0	0	18	0	0	108	
7:20 AM	15	9	1	0	0	9	0	0	0	21	23	0	5	26	1	0	110	
7:25 AM	21	11	3	0	3	13	0	0	0	27	26	0	3	27	2	0	136	
7:30 AM	14	6	1	0	1	26	0	0	0	27	22	0	2	17	0	0	116	
7:35 AM	20	12	4	0	3	18	0	0	2	21	33	0	5	27	1	0	146	
7:40 AM	27	7	5	0	1	24	0	0	0	27	20	0	2	18	1	0	132	
7:45 AM	15	10	3	0	0	23	3	0	2	20	26	0	6	16	2	0	126	
7:50 AM	21	16	0	0	1	21	0	0	0	37	35	0	7	21	7	0	166	
7:55 AM	29	12	5	0	4	23	0	0	0	16	19	0	10	25	1	0	144	1489
8:00 AM	26	13	4	0	1	17	0	0	0	23	27	0	10	25	4	0	150	1541
8:05 AM	26	11	3	0	0	18	2	0	1	22	22	0	6	23	3	0	137	1558
8:10 AM	22	11	1	0	3	13	1	0	1	26	20	0	4	17	1	0	120	1591
8:15 AM	21	17	1	0	1	8	1	0	1	20	15	0	6	18	2	0	111	1594
8:20 AM	15	11	0	0	0	13	0	0	1	20	23	0	2	20	2	0	107	1591
8:25 AM	20	17	2	0	0	13	1	0	0	26	16	0	2	15	1	0	113	1568
8:30 AM	24	12	2	0	0	10	0	0	0	25	7	0	3	16	1	0	100	1552
8:35 AM	22	23	5	0	2	7	1	0	0	16	6	0	0	24	0	0	106	1512
8:40 AM	19	31	6	0	0	13	1	0	0	10	4	0	2	17	0	0	103	1483
8:45 AM	16	15	3	0	2	19	0	0	1	13	8	0	4	19	0	0	100	1457
8:50 AM	22	21	2	0	5	15	0	0	0	18	7	0	3	18	0	0	111	1402
8:55 AM	21	6	4	0	1	7	0	0	1	16	8	0	3	22	3	0	92	1350
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	304	164	36	0	24	244	0	0	0	304	324	0	108	284	48	0	1840	
Heavy Trucks	16	4	8		0	4	0		0	24	52		12	20	4		144	
Pedestrians	0	0	0		0	0	0		0	0	0		0	0	0		0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

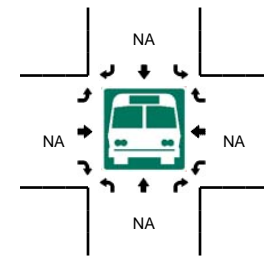
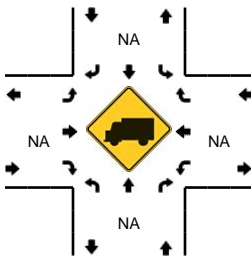
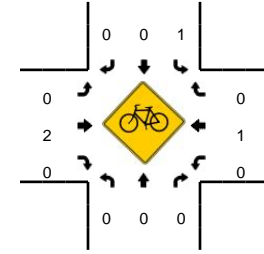
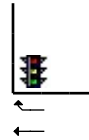
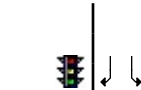
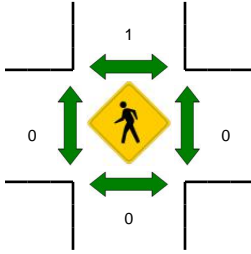
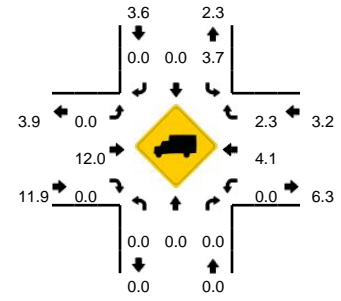
Comments:

LOCATION: SW Tualatin Rd -- SW Herman Rd
CITY/STATE: Washington, OR

QC JOB #: 14768947
DATE: Tue, Sep 11 2018



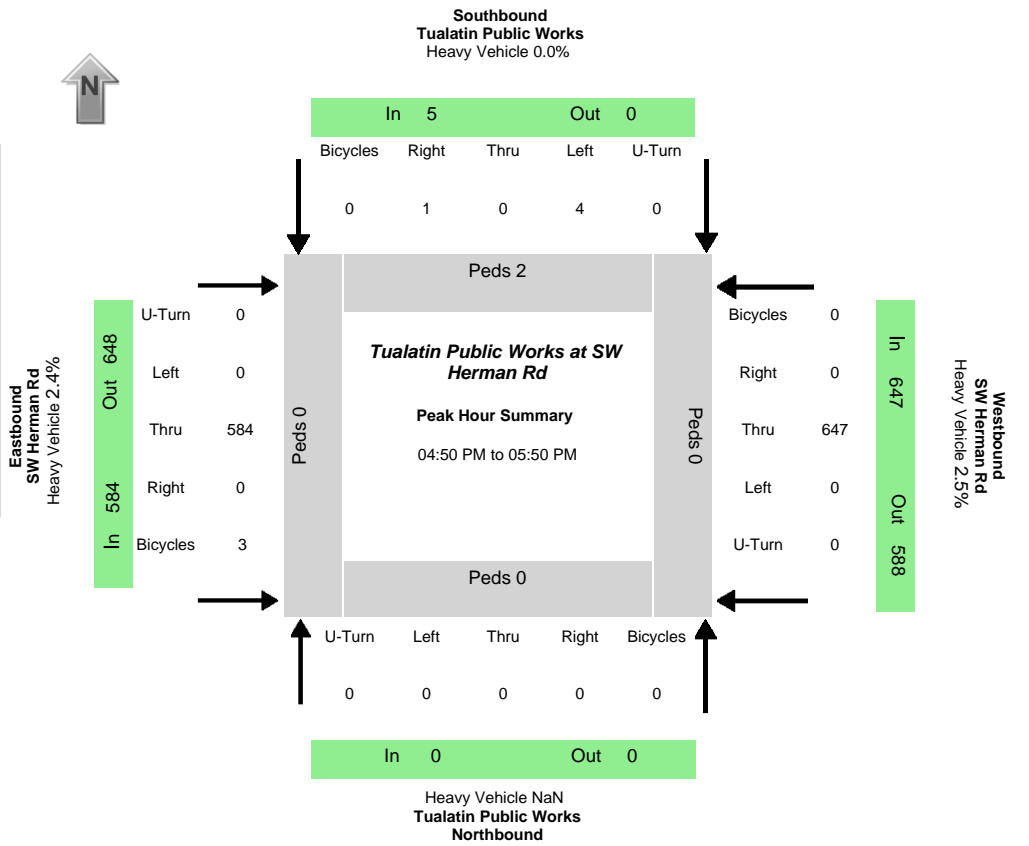
Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 7:55 AM -- 8:10 AM



5-Min Count Period Beginning At	SW Tualatin Rd (Northbound)				SW Tualatin Rd (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
7:00 AM	0	0	0	0	28	0	0	0	0	15	0	0	0	0	22	18	0	83	
7:05 AM	0	0	0	0	47	0	1	0	0	29	0	0	0	0	33	9	0	119	
7:10 AM	0	0	0	0	52	0	0	0	1	18	0	0	0	0	21	16	0	108	
7:15 AM	0	0	0	0	45	0	2	0	1	21	0	0	0	0	18	14	0	101	
7:20 AM	0	0	0	0	37	0	3	0	0	19	0	0	0	0	41	27	0	127	
7:25 AM	0	0	0	0	52	0	0	0	0	23	0	0	0	0	34	19	0	128	
7:30 AM	0	0	0	0	61	0	3	0	2	24	0	0	0	0	19	20	0	129	
7:35 AM	0	0	0	0	65	0	1	0	0	24	0	0	0	0	33	26	0	149	
7:40 AM	0	0	0	0	47	0	1	0	0	19	0	0	0	0	29	16	0	112	
7:45 AM	0	0	0	0	54	0	2	0	1	29	0	0	0	0	29	33	0	148	
7:50 AM	0	0	0	0	61	0	1	0	0	21	0	0	0	0	35	33	0	151	
7:55 AM	0	0	0	0	61	0	3	0	0	23	0	0	0	0	43	39	0	169	1524
8:00 AM	0	0	0	0	55	0	2	0	0	33	0	0	0	0	37	40	0	167	1608
8:05 AM	0	0	0	0	54	0	0	0	0	37	0	0	0	0	26	35	0	152	1641
8:10 AM	0	0	0	0	41	0	3	0	0	24	0	0	0	0	28	32	0	128	1661
8:15 AM	0	0	0	0	47	0	0	0	0	17	0	0	0	0	23	16	0	103	1663
8:20 AM	0	0	0	0	50	0	0	0	1	17	0	0	0	0	28	41	0	137	1673
8:25 AM	0	0	0	0	40	0	0	0	0	34	0	0	0	0	24	23	0	121	1666
8:30 AM	0	0	0	0	58	0	3	0	0	22	0	0	0	0	22	27	0	132	1669
8:35 AM	0	0	0	0	53	0	0	0	0	32	0	0	0	0	28	35	0	148	1668
8:40 AM	0	0	0	0	35	0	0	0	0	20	0	0	0	0	22	36	0	113	1669
8:45 AM	0	0	0	0	48	0	1	0	0	18	0	0	0	0	19	34	0	120	1641
8:50 AM	0	0	0	0	52	0	0	0	0	21	0	0	0	0	19	30	0	122	1612
8:55 AM	0	0	0	0	29	0	2	0	0	18	0	0	0	0	29	28	0	106	1549
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total		
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
All Vehicles	0	0	0	0	680	0	20	0	0	372	0	0	0	0	424	456	0	1952	
Heavy Trucks	0	0	0	0	24	0	0	0	0	44	0	0	0	0	16	12	0	96	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
Railroad																			
Stopped Buses																			

Comments:

Data Provided by K-D-N.com 503-594-4224	
N/S street	Tualatin Public Works
E/W street	SW Herman Rd
City, State	Tualatin OR
Site Notes	
Location	45.384202 - -122.786072
Start Date	Wednesday, October 10, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:50:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.85



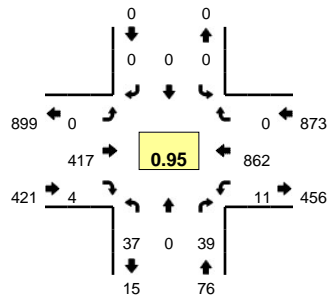
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	4	0	1	0	0	584	0	0	0	647	0	0	0	5	584	647	0	0	648	588
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	NaN	0.0%	2.4%	2.5%	NaN	0.0%	2.5%	2.4%

PHV - Bicycles												PHV - Pedestrians									
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	2	0	0	2

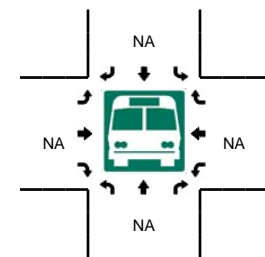
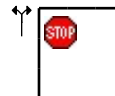
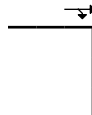
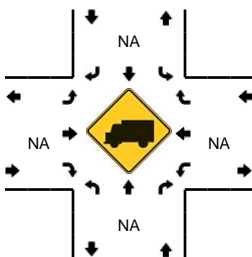
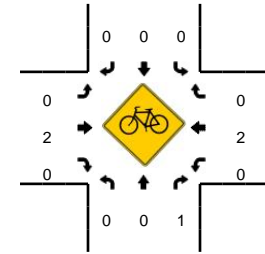
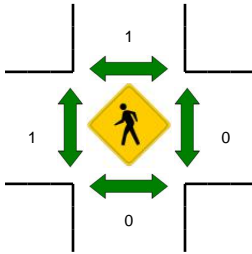
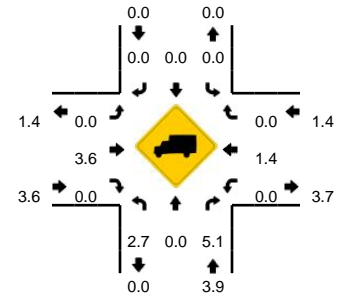
All Vehicle Volumes																		
Time	Northbound Tualatin Public Works				Southbound Tualatin Public Works				Eastbound SW Herman Rd				Westbound SW Herman Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	0	0	0	0	18	0	10	0	1	38	0	0	0	40	1	0		
04:05:00 PM	0	0	0	0	5	0	3	0	0	32	0	0	0	45	1	0		
04:10:00 PM	0	0	0	0	0	0	0	0	0	29	0	0	0	41	1	0	265	
04:15:00 PM	0	0	0	0	0	0	0	0	0	31	0	0	0	38	0	0	226	
04:20:00 PM	0	0	0	0	0	0	1	0	0	48	0	0	0	60	1	0	250	
04:25:00 PM	0	0	0	0	1	0	1	0	0	32	0	0	0	29	0	0	242	
04:30:00 PM	0	0	0	0	0	0	0	0	0	35	0	0	0	37	0	0	245	
04:35:00 PM	0	0	0	0	0	0	0	0	0	53	0	0	0	57	0	0	245	
04:40:00 PM	0	0	0	0	0	0	0	0	0	29	0	0	0	31	0	0	242	
04:45:00 PM	0	0	0	0	0	0	0	0	0	49	0	0	0	40	0	0	259	
04:50:00 PM	0	0	0	0	3	0	0	0	0	45	0	0	0	46	0	0	243	
04:55:00 PM	0	0	0	0	0	0	0	0	0	44	0	0	0	50	0	0	277	1026
05:00:00 PM	0	0	0	0	1	0	0	0	0	50	0	0	0	60	0	0	299	1029
05:05:00 PM	0	0	0	0	0	0	1	0	0	71	0	0	0	55	0	0	332	1070
05:10:00 PM	0	0	0	0	0	0	0	0	0	65	0	0	0	56	0	0	359	1120
05:15:00 PM	0	0	0	0	0	0	0	0	0	52	0	0	0	64	0	0	364	1167
05:20:00 PM	0	0	0	0	0	0	0	0	0	49	0	0	0	55	0	0	341	1161
05:25:00 PM	0	0	0	0	0	0	0	0	0	36	0	0	0	57	0	0	313	1191
05:30:00 PM	0	0	0	0	0	0	0	0	0	41	0	0	0	49	0	0	287	1209
05:35:00 PM	0	0	0	0	0	0	0	0	0	41	0	0	0	56	0	0	280	1196
05:40:00 PM	0	0	0	0	0	0	0	0	0	51	0	0	0	43	0	0	281	1230
05:45:00 PM	0	0	0	0	0	0	0	0	0	39	0	0	0	56	0	0	286	1236
05:50:00 PM	0	0	0	0	0	0	0	0	0	37	0	0	0	35	0	0	261	1214
05:55:00 PM	0	0	0	0	0	0	0	0	0	33	0	0	0	32	0	0	232	1185

LOCATION: SW 108th Ave -- SW Tualatin Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768914
DATE: Thu, Aug 16 2018



Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

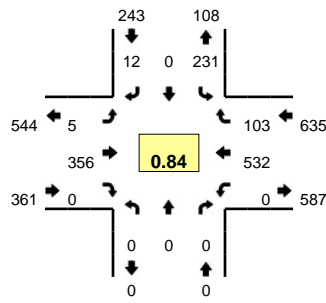


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Tualatin Rd (Eastbound)				SW Tualatin Rd (Westbound)				Total	Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
4:00 PM	8	0	2	0	0	0	0	0	0	0	33	0	0	0	62	0	0	105	
4:05 PM	6	0	4	0	0	0	0	0	0	0	45	0	0	2	60	0	0	117	
4:10 PM	2	0	1	0	0	0	0	0	0	0	24	0	0	0	73	0	0	100	
4:15 PM	0	0	1	0	0	0	0	0	0	0	19	1	0	1	57	0	0	79	
4:20 PM	1	0	3	0	0	0	0	0	0	0	32	1	0	0	67	0	0	104	
4:25 PM	0	0	3	0	0	0	0	0	0	0	35	0	0	0	71	0	0	109	
4:30 PM	3	0	2	0	0	0	0	0	0	0	36	1	0	1	72	0	0	115	
4:35 PM	3	0	3	0	0	0	0	0	0	0	29	0	0	0	77	0	0	112	
4:40 PM	5	0	4	0	0	0	0	0	0	0	32	0	0	2	77	0	0	120	
4:45 PM	3	0	0	0	0	0	0	0	0	0	40	0	0	1	70	0	0	114	
4:50 PM	1	0	6	0	0	0	0	0	0	0	40	0	0	1	68	0	0	116	
4:55 PM	2	0	3	0	0	0	0	0	0	0	42	0	0	2	70	0	0	119	1310
5:00 PM	6	0	4	0	0	0	0	0	0	0	36	0	0	2	77	0	0	125	1330
5:05 PM	6	0	5	0	0	0	0	0	0	0	25	1	0	1	63	0	0	101	1314
5:10 PM	2	0	1	0	0	0	0	0	0	0	38	0	0	0	76	0	0	117	1331
5:15 PM	5	0	5	0	0	0	0	0	0	0	32	1	0	1	74	0	0	118	1370
5:20 PM	3	0	8	0	0	0	0	0	0	0	20	0	0	0	61	0	0	92	1358
5:25 PM	1	0	4	0	0	0	0	0	0	0	24	0	0	1	69	0	0	99	1348
5:30 PM	2	0	4	0	0	0	0	0	0	0	29	0	0	0	61	0	0	96	1329
5:35 PM	2	0	3	0	0	0	0	0	0	0	21	1	0	0	70	0	0	97	1314
5:40 PM	1	0	5	1	0	0	0	0	0	0	34	0	0	0	53	0	0	94	1288
5:45 PM	1	0	3	0	0	0	0	0	0	0	31	1	0	1	44	0	0	81	1255
5:50 PM	4	0	3	0	0	0	0	0	0	0	28	3	0	0	50	0	0	88	1227
5:55 PM	1	0	4	0	0	0	0	0	0	0	28	1	0	1	62	0	0	97	1205
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total		
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
All Vehicles	36	0	52	0	0	0	0	0	0	472	0	0	20	860	0	0	1440		
Heavy Trucks	4	0	4	0	0	0	0	0	0	8	0	0	0	8	0	0	24		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Railroad																			
Stopped Buses																			

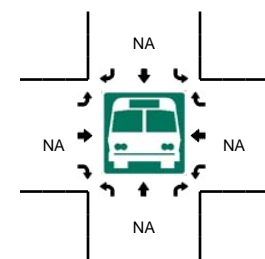
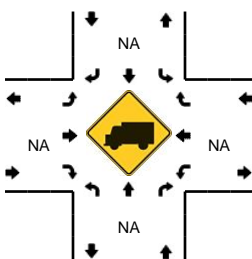
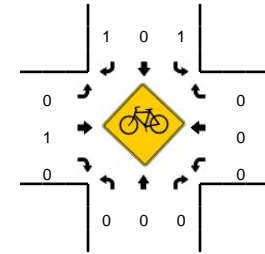
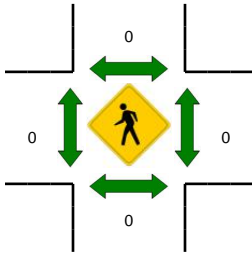
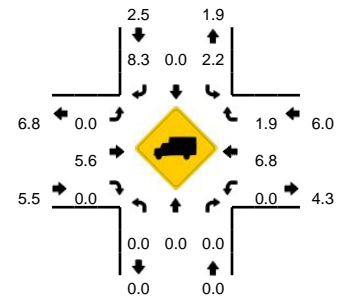
Comments:

LOCATION: SW 108th Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768926
DATE: Thu, Aug 16 2018



Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

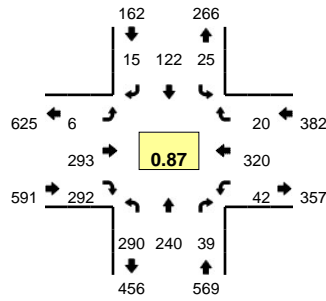


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	9	0	2	0	0	38	0	0	0	32	8	0	89	
4:05 PM	0	0	0	0	12	0	0	0	1	37	0	0	0	35	10	0	95	
4:10 PM	0	0	0	0	15	0	2	0	0	32	0	0	0	53	6	0	108	
4:15 PM	0	0	0	0	10	0	4	0	0	29	0	0	0	37	8	0	88	
4:20 PM	0	0	0	0	5	0	1	0	1	23	0	0	0	42	9	0	81	
4:25 PM	0	0	0	0	21	0	0	0	0	30	0	0	0	31	5	0	87	
4:30 PM	0	0	0	0	19	0	1	0	1	39	0	0	0	54	10	0	124	
4:35 PM	0	0	0	0	19	0	2	0	0	30	0	0	0	58	12	0	121	
4:40 PM	0	0	0	0	34	0	1	0	1	28	0	0	0	51	8	0	123	
4:45 PM	0	0	0	0	13	0	0	0	1	25	0	0	0	24	9	0	72	
4:50 PM	0	0	0	0	8	0	1	0	0	19	0	0	0	52	14	0	94	
4:55 PM	0	0	0	0	15	0	1	0	0	32	0	0	0	47	8	0	103	1185
5:00 PM	0	0	0	0	21	0	1	0	1	26	0	0	0	44	11	0	104	1200
5:05 PM	0	0	0	0	18	0	0	0	0	37	0	0	0	48	8	0	111	1216
5:10 PM	0	0	0	0	14	0	0	0	0	28	0	0	0	46	5	0	93	1201
5:15 PM	0	0	0	0	20	0	3	0	0	35	0	0	0	47	9	0	114	1227
5:20 PM	0	0	0	0	29	0	2	0	1	27	0	0	0	30	4	0	93	1239
5:25 PM	0	0	0	0	19	0	3	0	0	16	0	0	0	38	3	0	79	1231
5:30 PM	0	0	0	0	31	0	2	0	0	17	0	0	0	39	1	0	90	1197
5:35 PM	0	0	0	0	20	0	0	0	0	18	0	0	0	34	1	0	73	1149
5:40 PM	0	0	0	0	23	0	2	0	0	20	0	0	0	32	4	0	81	1107
5:45 PM	0	0	0	0	24	0	2	0	0	18	0	0	0	22	2	0	68	1103
5:50 PM	0	0	0	0	16	0	1	0	0	19	0	0	0	22	5	0	63	1072
5:55 PM	0	0	0	0	17	0	2	0	0	16	0	0	0	29	8	0	72	1041
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	288	0	16	0	8	388	0	0	0	652	120	0	1472	
Heavy Trucks	0	0	0	0	0	0	4	0	0	16	0	0	0	44	0	0	64	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

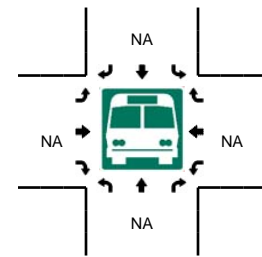
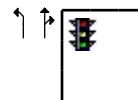
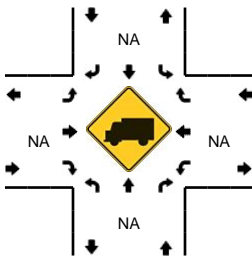
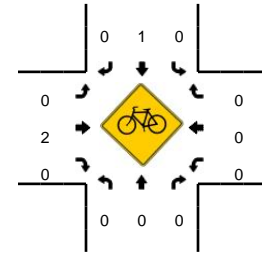
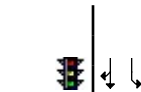
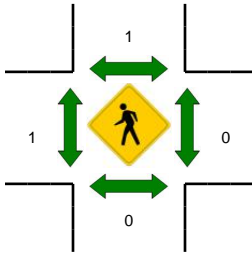
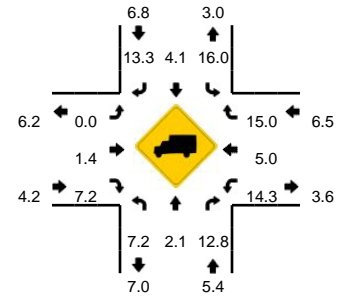
Comments:

LOCATION: SW Teton Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768932
DATE: Thu, Aug 16 2018



Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

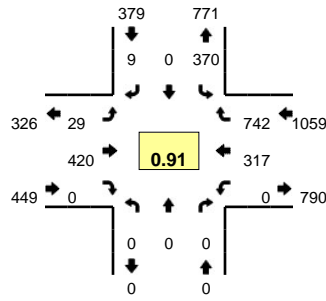


5-Min Count Period Beginning At	SW Teton Ave (Northbound)				SW Teton Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	18	16	3	0	3	7	2	0	0	28	19	0	1	16	1	0	114	
4:05 PM	17	15	1	0	1	16	1	0	2	30	21	0	3	19	0	0	126	
4:10 PM	35	25	3	0	3	9	0	0	1	29	23	0	1	29	6	0	164	
4:15 PM	23	16	3	0	1	2	0	0	0	22	19	0	2	20	0	0	108	
4:20 PM	17	12	5	0	0	4	2	0	1	16	13	0	5	23	1	0	99	
4:25 PM	19	13	5	0	0	7	0	0	2	14	28	0	2	28	0	0	116	
4:30 PM	19	13	2	0	2	6	1	0	0	36	23	0	2	40	2	0	146	
4:35 PM	37	31	8	0	0	17	2	0	1	24	24	0	6	24	6	0	180	
4:40 PM	22	12	3	0	1	9	2	0	2	35	30	0	8	37	1	0	162	
4:45 PM	17	24	1	0	6	15	2	0	0	12	23	0	5	14	1	0	120	
4:50 PM	33	19	6	0	1	10	2	0	1	17	15	0	3	31	1	0	139	
4:55 PM	18	19	5	0	1	13	0	0	1	24	20	0	2	38	0	0	141	1615
5:00 PM	31	22	2	0	5	10	1	0	0	16	23	0	0	23	2	0	135	1636
5:05 PM	31	18	2	0	3	12	4	0	0	30	25	0	5	15	1	0	146	1656
5:10 PM	26	24	2	0	1	6	0	0	0	31	25	0	5	25	1	0	146	1638
5:15 PM	19	23	2	0	3	10	0	0	1	22	27	0	2	32	2	0	143	1673
5:20 PM	18	22	1	0	2	7	1	0	0	32	29	0	2	13	3	0	130	1704
5:25 PM	12	8	2	0	2	4	0	0	0	14	23	0	2	23	0	0	90	1678
5:30 PM	15	20	1	0	1	7	3	0	0	25	22	0	4	20	0	0	118	1650
5:35 PM	14	14	3	0	1	5	3	0	1	23	15	0	0	23	0	0	102	1572
5:40 PM	15	7	5	0	2	9	0	0	1	20	17	0	4	16	0	0	96	1506
5:45 PM	9	13	2	0	2	12	0	0	0	19	23	0	6	19	1	0	106	1492
5:50 PM	9	16	3	0	0	10	0	0	0	17	23	0	2	15	3	0	98	1451
5:55 PM	12	16	1	0	0	3	1	0	0	15	16	0	1	20	1	0	86	1396
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	312	224	52	0	12	128	20	0	12	380	308	0	64	404	36	0	1952	
Heavy Trucks	24	12	12		8	8	4		0	4	8		8	20	4		112	
Pedestrians		0				4				4				0			8	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

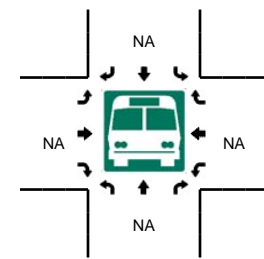
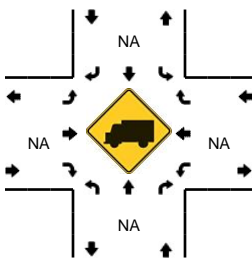
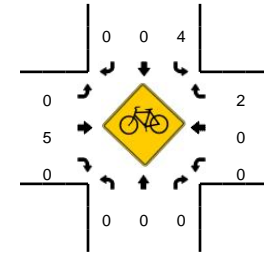
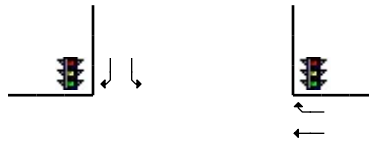
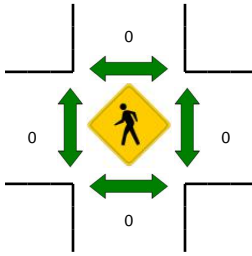
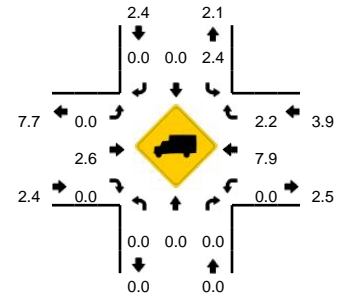
Comments:

LOCATION: SW Tualatin Rd -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768938
DATE: Thu, Aug 16 2018



Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

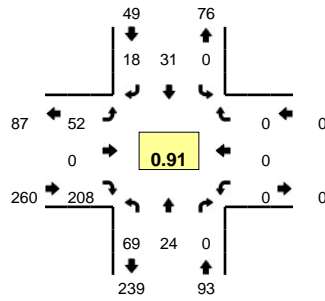


5-Min Count Period Beginning At	SW Tualatin Rd (Northbound)				SW Tualatin Rd (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	26	0	0	0	2	42	0	0	0	22	60	0	152	
4:05 PM	0	0	0	0	44	0	0	0	0	32	0	0	0	18	39	0	133	
4:10 PM	0	0	0	0	21	0	0	0	2	39	0	0	0	33	57	0	152	
4:15 PM	0	0	0	0	24	0	1	0	2	29	0	0	0	20	43	0	119	
4:20 PM	0	0	0	0	30	0	1	0	1	27	0	0	0	19	64	0	142	
4:25 PM	0	0	0	0	31	0	1	0	2	22	0	0	0	32	63	0	151	
4:30 PM	0	0	0	0	29	0	1	0	4	53	0	0	0	33	63	0	183	
4:35 PM	0	0	0	0	24	0	0	0	6	54	0	0	0	30	56	0	170	
4:40 PM	0	0	0	0	24	0	3	0	3	43	0	0	0	25	68	0	166	
4:45 PM	0	0	0	0	31	0	1	0	4	32	0	0	0	17	59	0	144	
4:50 PM	0	0	0	0	29	0	0	0	2	33	0	0	0	31	58	0	153	
4:55 PM	0	0	0	0	37	0	0	0	1	33	0	0	0	38	58	0	167	1832
5:00 PM	0	0	0	0	39	0	0	0	1	22	0	0	0	19	66	0	147	1827
5:05 PM	0	0	0	0	36	0	0	0	3	40	0	0	0	21	58	0	158	1852
5:10 PM	0	0	0	0	24	0	1	0	2	29	0	0	0	27	73	0	156	1856
5:15 PM	0	0	0	0	36	0	1	0	0	32	0	0	0	25	56	0	150	1887
5:20 PM	0	0	0	0	24	0	0	0	2	37	0	0	0	20	54	0	137	1882
5:25 PM	0	0	0	0	29	0	0	0	0	21	0	0	0	19	61	0	130	1861
5:30 PM	0	0	0	0	30	0	0	0	0	26	0	0	0	24	62	0	142	1820
5:35 PM	0	0	0	0	33	0	0	0	1	28	0	0	0	22	66	0	150	1800
5:40 PM	0	0	0	0	20	0	1	0	0	25	0	0	0	18	50	0	114	1748
5:45 PM	0	0	0	0	35	0	0	0	0	26	0	0	0	23	50	0	134	1738
5:50 PM	0	0	0	0	24	0	0	0	0	20	0	0	0	18	44	0	106	1691
5:55 PM	0	0	0	0	28	0	1	0	0	19	0	0	0	22	52	0	122	1646
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	308	0	16	0	52	600	0	0	0	352	748	0	2076	
Heavy Trucks	0	0	0	0	4	0	0	0	0	12	0	0	0	32	28	0	76	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	
Railroad																		
Stopped Buses																		

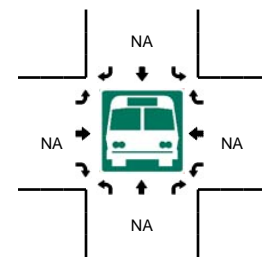
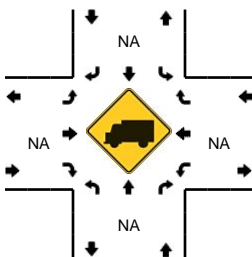
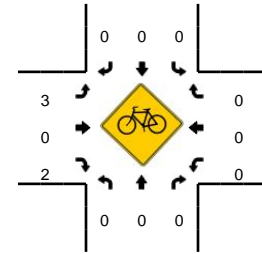
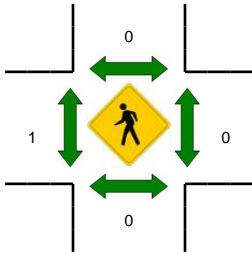
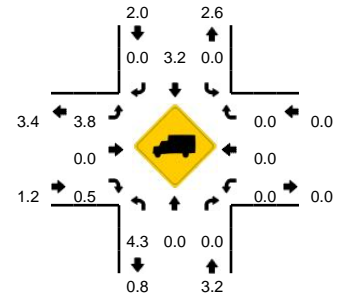
Comments:

LOCATION: SW 108th Ave -- Leveton Dr
CITY/STATE: Tualatin, OR

QC JOB #: 14768948
DATE: Tue, Sep 11 2018



Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:25 PM -- 5:40 PM



5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				Leveton Dr (Eastbound)				Leveton Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	3	0	0	0	2	1	0	8	0	14	0	0	0	0	0	38	
4:05 PM	6	3	0	0	0	4	0	0	3	0	10	0	0	0	0	0	26	
4:10 PM	3	1	0	0	0	4	0	0	3	0	8	0	0	0	0	0	19	
4:15 PM	4	3	0	0	0	1	0	0	0	0	9	0	0	0	0	0	17	
4:20 PM	8	2	0	0	0	3	0	0	5	0	8	0	0	0	0	0	26	
4:25 PM	10	2	0	0	0	3	1	0	2	0	5	0	0	0	0	0	23	
4:30 PM	8	4	0	0	0	4	1	0	1	0	12	0	0	0	0	0	30	
4:35 PM	9	2	0	0	0	5	2	0	3	0	12	0	0	0	0	0	33	
4:40 PM	9	5	0	0	0	4	4	0	7	0	11	0	0	0	0	0	40	
4:45 PM	8	1	0	0	0	6	0	0	2	0	8	0	0	0	0	0	25	
4:50 PM	13	1	0	0	0	0	0	0	3	0	8	0	0	0	0	0	25	
4:55 PM	7	1	0	0	0	3	0	0	4	0	17	0	0	0	0	0	32	334
5:00 PM	13	0	0	0	0	3	2	0	3	0	15	0	0	0	0	0	36	332
5:05 PM	3	2	0	0	0	2	2	0	4	0	19	0	0	0	0	0	32	338
5:10 PM	4	2	0	0	0	2	3	0	3	0	18	0	0	0	0	0	32	351
5:15 PM	2	6	0	0	0	4	3	0	7	0	19	0	0	0	0	0	41	375
5:20 PM	5	1	0	0	0	4	0	0	2	0	16	0	0	0	0	0	28	377
5:25 PM	1	1	0	0	0	0	1	0	8	0	21	0	0	0	0	0	32	386
5:30 PM	2	4	0	0	0	2	0	0	3	0	31	0	0	0	0	0	42	398
5:35 PM	2	0	0	0	0	1	3	0	6	0	25	0	0	0	0	0	37	402
5:40 PM	2	0	0	0	0	1	0	0	3	0	18	0	0	0	0	0	24	386
5:45 PM	4	3	0	0	0	1	2	0	3	0	15	0	0	0	0	0	28	389
5:50 PM	4	1	0	0	0	2	1	0	3	0	15	0	0	0	0	0	26	390
5:55 PM	1	0	0	0	0	2	1	0	5	0	15	0	0	0	0	0	24	382
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	20	20	0	0	0	12	16	0	68	0	308	0	0	0	0	0	444	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4	
Pedestrians		0				0					0			0			0	
Bicycles	0	0	0		0	0	0		2	0	1		0	0	0		3	
Railroad																		
Stopped Buses																		

Comments:

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	813	35	82	321	5	7
Future Vol, veh/h	813	35	82	321	5	7
Conflicting Peds, #/hr	0	2	2	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	5	5	33	33
Mvmt Flow	934	40	94	369	6	8

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	976	0	1514 956
Stage 1	-	-	-	-	956 -
Stage 2	-	-	-	-	558 -
Critical Hdwy	-	-	4.15	-	6.73 6.53
Critical Hdwy Stg 1	-	-	-	-	5.73 -
Critical Hdwy Stg 2	-	-	-	-	5.73 -
Follow-up Hdwy	-	-	2.245	-	3.797 3.597
Pot Cap-1 Maneuver	-	-	695	-	112 274
Stage 1	-	-	-	-	329 -
Stage 2	-	-	-	-	516 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	693	-	96 273
Mov Cap-2 Maneuver	-	-	-	-	96 -
Stage 1	-	-	-	-	328 -
Stage 2	-	-	-	-	445 -

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	30.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	154	-	-	693	-
HCM Lane V/C Ratio	0.09	-	-	0.136	-
HCM Control Delay (s)	30.7	-	-	11	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	13	59	198	40	21	79
Future Vol, veh/h	13	59	198	40	21	79
Conflicting Peds, #/hr	0	0	1	0	0	1
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	89	89	89	89	89	89
Heavy Vehicles, %	8	8	2	2	4	4
Mvmt Flow	15	66	222	45	24	89

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	559	70	114	0	0
Stage 1	70	-	-	-	-
Stage 2	489	-	-	-	-
Critical Hdwy	6.48	6.28	4.12	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.218	-	-
Pot Cap-1 Maneuver	480	976	1475	-	-
Stage 1	938	-	-	-	-
Stage 2	604	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	405	975	1474	-	-
Mov Cap-2 Maneuver	405	-	-	-	-
Stage 1	793	-	-	-	-
Stage 2	603	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	6.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1474	-	777	-	-
HCM Lane V/C Ratio	0.151	-	0.104	-	-
HCM Control Delay (s)	7.9	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.3	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	11	551	297	227	70	10
Future Volume (vph)	11	551	297	227	70	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1702	1792	1566		1597	1429
Flt Permitted	0.38	1.00	1.00		0.95	1.00
Satd. Flow (perm)	675	1792	1566		1597	1429
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	12	592	319	244	75	11
RTOR Reduction (vph)	0	0	22	0	0	10
Lane Group Flow (vph)	12	592	541	0	75	1
Confl. Peds. (#/hr)	2			2		
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	6%	6%	13%	13%	13%	13%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	35.1	35.1	29.0		6.6	6.6
Effective Green, g (s)	35.1	35.1	29.0		6.6	6.6
Actuated g/C Ratio	0.65	0.65	0.54		0.12	0.12
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	455	1173	847		196	175
v/s Ratio Prot	0.00	c0.33	c0.35		c0.05	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.50	0.64		0.38	0.01
Uniform Delay, d1	5.6	4.8	8.6		21.6	20.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.4	1.6		1.0	0.0
Delay (s)	5.6	5.1	10.2		22.6	20.6
Level of Service	A	A	B		C	C
Approach Delay (s)		5.1	10.2		22.4	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	17.3
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	306	307	66	260	25	257	135	31	18	213	7
Future Volume (vph)	8	306	307	66	260	25	257	135	31	18	213	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.92		1.00	0.99		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1533		1687	1749		1655	1694		1770	1852	
Flt Permitted	0.53	1.00		0.08	1.00		0.30	1.00		0.64	1.00	
Satd. Flow (perm)	887	1533		151	1749		531	1694		1187	1852	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	9	352	353	76	299	29	295	155	36	21	245	8
RTOR Reduction (vph)	0	22	0	0	2	0	0	5	0	0	1	0
Lane Group Flow (vph)	9	683	0	76	326	0	295	186	0	21	252	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.2	43.1		52.9	47.8		42.1	36.0		23.8	21.7	
Effective Green, g (s)	44.2	43.1		52.9	47.8		42.1	36.0		23.8	21.7	
Actuated g/C Ratio	0.42	0.41		0.50	0.45		0.40	0.34		0.23	0.21	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	379	626		160	792		386	578		279	380	
v/s Ratio Prot	0.00	c0.45		c0.03	0.19		c0.12	0.11		0.00	0.14	
v/s Ratio Perm	0.01			0.21			c0.19			0.02		
v/c Ratio	0.02	1.09		0.47	0.41		0.76	0.32		0.08	0.66	
Uniform Delay, d1	17.9	31.2		21.5	19.4		24.2	25.7		32.0	38.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	63.3		0.8	0.4		7.9	0.3		0.0	4.4	
Delay (s)	18.0	94.5		22.3	19.8		32.1	26.1		32.1	42.9	
Level of Service	B	F		C	B		C	C		C	D	
Approach Delay (s)		93.6			20.3			29.7			42.1	
Approach LOS		F			C			C			D	

Intersection Summary

HCM 2000 Control Delay	53.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	105.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	4	291	364	350	648	16
Future Volume (vph)	4	291	364	350	648	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1696	1845	1532	1736	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1612	1696	1845	1532	1736	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	338	423	407	753	19
RTOR Reduction (vph)	0	0	0	285	0	10
Lane Group Flow (vph)	5	338	423	122	753	9
Confl. Peds. (#/hr)	1			1		
Confl. Bikes (#/hr)				1		1
Heavy Vehicles (%)	12%	12%	3%	3%	4%	4%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	1.1	28.1	22.0	22.0	35.2	35.2
Effective Green, g (s)	1.1	28.1	22.0	22.0	35.2	35.2
Actuated g/C Ratio	0.02	0.38	0.30	0.30	0.48	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	24	650	553	459	833	745
v/s Ratio Prot	0.00	c0.20	c0.23		c0.43	0.01
v/s Ratio Perm				0.08		
v/c Ratio	0.21	0.52	0.76	0.27	0.90	0.01
Uniform Delay, d1	35.7	17.4	23.3	19.5	17.5	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	0.8	6.2	0.3	13.1	0.0
Delay (s)	40.0	18.2	29.5	19.8	30.6	10.0
Level of Service	D	B	C	B	C	A
Approach Delay (s)		18.5	24.8		30.1	
Approach LOS		B	C		C	

Intersection Summary

HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	73.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 0.3

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations	↙	↑	↘		↙	
Traffic Vol, veh/h	6	615	516	8	6	8
Future Vol, veh/h	6	615	516	8	6	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	668	561	9	7	9

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	570	0	-	0	1248	566
Stage 1	-	-	-	-	566	-
Stage 2	-	-	-	-	682	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1002	-	-	-	191	524
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	502	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1002	-	-	-	190	524
Mov Cap-2 Maneuver	-	-	-	-	190	-
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	502	-

Approach EB WB SB

HCM Control Delay, s	0.1	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1002	-	-	-	299
HCM Lane V/C Ratio	0.007	-	-	-	0.051
HCM Control Delay (s)	8.6	-	-	-	17.7
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↑	↔	
Traffic Vol, veh/h	417	4	11	862	37	39
Future Vol, veh/h	417	4	11	862	37	39
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	439	4	12	907	39	41

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	443	0	1373
Stage 1	-	-	-	-	441
Stage 2	-	-	-	-	932
Critical Hdwy	-	-	4.11	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	-	-	2.209	-	3.536
Pot Cap-1 Maneuver	-	-	1122	-	159
Stage 1	-	-	-	-	644
Stage 2	-	-	-	-	380
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1122	-	157
Mov Cap-2 Maneuver	-	-	-	-	157
Stage 1	-	-	-	-	644
Stage 2	-	-	-	-	375

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	25.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	254	-	-	1122	-
HCM Lane V/C Ratio	0.315	-	-	0.01	-
HCM Control Delay (s)	25.6	-	-	8.2	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.3	-	-	0	-

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	52	211	80	28	32	18
Future Vol, veh/h	52	211	80	28	32	18
Conflicting Peds, #/hr	0	0	0	0	0	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	3	3	2	2
Mvmt Flow	57	232	88	31	35	20

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	253	46	56	0	0
Stage 1	46	-	-	-	-
Stage 2	207	-	-	-	-
Critical Hdwy	6.41	6.21	4.13	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.227	-	-
Pot Cap-1 Maneuver	738	1026	1542	-	-
Stage 1	979	-	-	-	-
Stage 2	830	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	694	1025	1541	-	-
Mov Cap-2 Maneuver	694	-	-	-	-
Stage 1	921	-	-	-	-
Stage 2	829	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	5.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1541	-	937	-	-
HCM Lane V/C Ratio	0.057	-	0.308	-	-
HCM Control Delay (s)	7.5	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.3	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	350	532	103	231	12
Future Volume (vph)	5	350	532	103	231	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1703	1792	1753		1752	1534
Flt Permitted	0.21	1.00	1.00		0.95	1.00
Satd. Flow (perm)	376	1792	1753		1752	1534
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	417	633	123	275	14
RTOR Reduction (vph)	0	0	6	0	0	11
Lane Group Flow (vph)	6	417	750	0	275	3
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	6%	6%	6%	3%	3%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	44.7	44.7	38.6		16.6	16.6
Effective Green, g (s)	44.7	44.7	38.6		16.6	16.6
Actuated g/C Ratio	0.61	0.61	0.53		0.23	0.23
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	242	1094	924		397	347
v/s Ratio Prot	0.00	c0.23	c0.43		c0.16	
v/s Ratio Perm	0.01					0.00
v/c Ratio	0.02	0.38	0.81		0.69	0.01
Uniform Delay, d1	16.0	7.2	14.3		26.0	21.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	5.5		4.8	0.0
Delay (s)	16.0	7.5	19.8		30.8	21.9
Level of Service	B	A	B		C	C
Approach Delay (s)		7.6	19.8		30.4	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	298	297	42	320	20	295	240	40	30	122	15
Future Volume (vph)	6	298	297	42	320	20	295	240	40	30	122	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1672		1687	1758		1719	1771		1687	1742	
Flt Permitted	0.46	1.00		0.12	1.00		0.43	1.00		0.57	1.00	
Satd. Flow (perm)	847	1672		212	1758		772	1771		1004	1742	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	7	343	341	48	368	23	339	276	46	34	140	17
RTOR Reduction (vph)	0	20	0	0	1	0	0	4	0	0	3	0
Lane Group Flow (vph)	7	664	0	48	390	0	339	318	0	34	154	0
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)			2									1
Heavy Vehicles (%)	4%	4%	4%	7%	7%	7%	5%	5%	5%	7%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.0	42.9		51.4	46.6		37.2	29.6		19.5	15.9	
Effective Green, g (s)	44.0	42.9		51.4	46.6		37.2	29.6		19.5	15.9	
Actuated g/C Ratio	0.44	0.43		0.52	0.47		0.37	0.30		0.20	0.16	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	384	721		180	824		453	527		221	278	
v/s Ratio Prot	0.00	c0.40		c0.01	0.22		c0.13	0.18		0.01	0.09	
v/s Ratio Perm	0.01			0.12			c0.15			0.02		
v/c Ratio	0.02	0.92		0.27	0.47		0.75	0.60		0.15	0.55	
Uniform Delay, d1	15.7	26.6		17.7	18.0		24.6	29.9		32.8	38.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	17.1		0.3	0.5		5.8	2.0		0.1	2.5	
Delay (s)	15.7	43.8		18.0	18.5		30.4	31.9		32.9	40.9	
Level of Service	B	D		B	B		C	C		C	D	
Approach Delay (s)		43.5			18.4			31.1			39.5	
Approach LOS		D			B			C			D	

Intersection Summary

HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	99.4	Sum of lost time (s)	18.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	420	317	742	370	10
Future Volume (vph)	30	420	317	742	370	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1827	1553	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1827	1553	1770	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.92
Adj. Flow (vph)	33	462	348	815	407	11
RTOR Reduction (vph)	0	0	0	530	0	7
Lane Group Flow (vph)	33	462	348	285	407	4
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	2.4	26.7	19.3	19.3	18.5	18.5
Effective Green, g (s)	2.4	26.7	19.3	19.3	18.5	18.5
Actuated g/C Ratio	0.04	0.48	0.35	0.35	0.34	0.34
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	76	901	638	542	593	530
v/s Ratio Prot	0.02	c0.25	0.19		c0.23	0.00
v/s Ratio Perm				0.18		
v/c Ratio	0.43	0.51	0.55	0.53	0.69	0.01
Uniform Delay, d1	25.7	9.8	14.4	14.3	15.8	12.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	0.5	1.0	0.9	3.3	0.0
Delay (s)	29.7	10.3	15.4	15.2	19.1	12.2
Level of Service	C	B	B	B	B	B
Approach Delay (s)		11.6	15.3		19.0	
Approach LOS		B	B		B	

Intersection Summary

HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 0.8

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations						
Traffic Vol, veh/h	5	576	620	10	25	15
Future Vol, veh/h	5	576	620	10	25	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	626	674	11	27	16

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	685	0	-	0	1316	680
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	636	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	908	-	-	-	174	451
Stage 1	-	-	-	-	503	-
Stage 2	-	-	-	-	527	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	908	-	-	-	173	451
Mov Cap-2 Maneuver	-	-	-	-	173	-
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	527	-

Approach EB WB SB

HCM Control Delay, s	0.1	0	24.8
HCM LOS			C

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	908	-	-	-	225
HCM Lane V/C Ratio	0.006	-	-	-	0.193
HCM Control Delay (s)	9	-	-	-	24.8
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.7

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶		↷	↶	↷	
Traffic Vol, veh/h	860	35	85	340	5	5
Future Vol, veh/h	860	35	85	340	5	5
Conflicting Peds, #/hr	0	2	2	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	5	5	33	33
Mvmt Flow	989	40	98	391	6	6

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1031	0	1599
Stage 1	-	-	-	-	1011
Stage 2	-	-	-	-	588
Critical Hdwy	-	-	4.15	-	6.73
Critical Hdwy Stg 1	-	-	-	-	5.73
Critical Hdwy Stg 2	-	-	-	-	5.73
Follow-up Hdwy	-	-	2.245	-	3.797
Pot Cap-1 Maneuver	-	-	662	-	99
Stage 1	-	-	-	-	308
Stage 2	-	-	-	-	499
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	660	-	84
Mov Cap-2 Maneuver	-	-	-	-	84
Stage 1	-	-	-	-	307
Stage 2	-	-	-	-	425

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	36.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	126	-	-	660	-
HCM Lane V/C Ratio	0.091	-	-	0.148	-
HCM Control Delay (s)	36.4	-	-	11.4	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection						
Int Delay, s/veh	5.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	15	65	210	40	20	85
Future Vol, veh/h	15	65	210	40	20	85
Conflicting Peds, #/hr	0	0	1	0	0	1
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	89	89	89	89	89	89
Heavy Vehicles, %	8	8	2	2	4	4
Mvmt Flow	17	73	236	45	22	96

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	588	71	119	0	0
Stage 1	71	-	-	-	-
Stage 2	517	-	-	-	-
Critical Hdwy	6.48	6.28	4.12	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.218	-	-
Pot Cap-1 Maneuver	462	975	1469	-	-
Stage 1	937	-	-	-	-
Stage 2	586	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	385	974	1468	-	-
Mov Cap-2 Maneuver	385	-	-	-	-
Stage 1	781	-	-	-	-
Stage 2	585	-	-	-	-

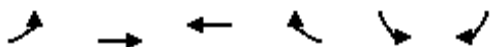
Approach	EB	NB	SB
HCM Control Delay, s	10.4	6.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1468	-	757	-	-
HCM Lane V/C Ratio	0.161	-	0.119	-	-
HCM Control Delay (s)	7.9	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.6	-	0.4	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	585	315	240	75	10
Future Volume (vph)	10	585	315	240	75	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1702	1792	1567		1597	1429
Flt Permitted	0.36	1.00	1.00		0.95	1.00
Satd. Flow (perm)	638	1792	1567		1597	1429
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	629	339	258	81	11
RTOR Reduction (vph)	0	0	21	0	0	10
Lane Group Flow (vph)	11	629	576	0	81	1
Confl. Peds. (#/hr)	2			2		
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	6%	6%	13%	13%	13%	13%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	37.2	37.2	31.1		6.8	6.8
Effective Green, g (s)	37.2	37.2	31.1		6.8	6.8
Actuated g/C Ratio	0.67	0.67	0.56		0.12	0.12
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	437	1192	871		194	173
v/s Ratio Prot	0.00	c0.35	c0.37		c0.05	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.53	0.66		0.42	0.01
Uniform Delay, d1	5.9	4.8	8.7		22.7	21.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.4	1.9		1.1	0.0
Delay (s)	6.0	5.3	10.6		23.9	21.6
Level of Service	A	A	B		C	C
Approach Delay (s)		5.3	10.6		23.6	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	17.3
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Future Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1533		1687	1750		1655	1693		1770	1849	
Flt Permitted	0.50	1.00		0.08	1.00		0.29	1.00		0.63	1.00	
Satd. Flow (perm)	848	1533		151	1750		503	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	374	374	80	316	29	310	167	40	23	259	11
RTOR Reduction (vph)	0	60	0	0	2	0	0	6	0	0	2	0
Lane Group Flow (vph)	11	688	0	80	343	0	310	201	0	23	268	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.3	43.1		53.1	47.9		44.0	37.8		25.3	23.1	
Effective Green, g (s)	44.3	43.1		53.1	47.9		44.0	37.8		25.3	23.1	
Actuated g/C Ratio	0.41	0.40		0.49	0.45		0.41	0.35		0.24	0.21	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	357	614		160	779		386	594		287	396	
v/s Ratio Prot	0.00	c0.45		c0.03	0.20		c0.13	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.22			c0.20			0.02		
v/c Ratio	0.03	1.12		0.50	0.44		0.80	0.34		0.08	0.68	
Uniform Delay, d1	18.8	32.2		23.5	20.6		24.4	25.7		31.9	38.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	74.2		0.9	0.4		10.8	0.4		0.0	4.6	
Delay (s)	18.9	106.4		24.4	21.0		35.3	26.1		31.9	43.5	
Level of Service	B	F		C	C		D	C		C	D	
Approach Delay (s)		105.2			21.7			31.6			42.6	
Approach LOS		F			C			C			D	

Intersection Summary

HCM 2000 Control Delay	59.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	107.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	310	385	370	685	15
Future Volume (vph)	5	310	385	370	685	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1696	1845	1532	1736	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1612	1696	1845	1532	1736	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	6	360	448	430	797	17
RTOR Reduction (vph)	0	0	0	307	0	8
Lane Group Flow (vph)	6	360	448	123	797	9
Confl. Peds. (#/hr)	1			1		
Confl. Bikes (#/hr)				1		1
Heavy Vehicles (%)	12%	12%	3%	3%	4%	4%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	1.1	28.2	22.1	22.1	38.9	38.9
Effective Green, g (s)	1.1	28.2	22.1	22.1	38.9	38.9
Actuated g/C Ratio	0.01	0.37	0.29	0.29	0.50	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	22	620	528	439	875	783
v/s Ratio Prot	0.00	c0.21	c0.24		c0.46	0.01
v/s Ratio Perm				0.08		
v/c Ratio	0.27	0.58	0.85	0.28	0.91	0.01
Uniform Delay, d1	37.6	19.7	25.9	21.3	17.5	9.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.4	12.1	0.4	13.5	0.0
Delay (s)	44.2	21.1	38.0	21.7	31.0	9.5
Level of Service	D	C	D	C	C	A
Approach Delay (s)		21.5	30.0		30.5	
Approach LOS		C	C		C	

Intersection Summary

HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	650	545	10	10	10
Future Vol, veh/h	10	650	545	10	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	707	592	11	11	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	603	0	-	0	1327 598
Stage 1	-	-	-	-	598 -
Stage 2	-	-	-	-	729 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	975	-	-	-	171 502
Stage 1	-	-	-	-	549 -
Stage 2	-	-	-	-	477 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	975	-	-	-	169 502
Mov Cap-2 Maneuver	-	-	-	-	169 -
Stage 1	-	-	-	-	543 -
Stage 2	-	-	-	-	477 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	20.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	975	-	-	-	253
HCM Lane V/C Ratio	0.011	-	-	-	0.086
HCM Control Delay (s)	8.7	-	-	-	20.6
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

11/10/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Future Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.98		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1532		1687	1750		1656	1693		1770	1849	
Flt Permitted	0.51	1.00		0.07	1.00		0.25	1.00		0.63	1.00	
Satd. Flow (perm)	852	1532		123	1750		437	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	374	374	80	316	29	310	167	40	23	259	11
RTOR Reduction (vph)	0	56	0	0	2	0	0	5	0	0	1	0
Lane Group Flow (vph)	11	692	0	80	343	0	310	202	0	23	269	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Effective Green, g (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Actuated g/C Ratio	0.45	0.44		0.52	0.48		0.39	0.33		0.23	0.20	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	389	672		143	839		366	560		281	366	
v/s Ratio Prot	0.00	c0.45		c0.03	0.20		c0.14	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.26			c0.20			0.02		
v/c Ratio	0.03	1.03		0.56	0.41		0.85	0.36		0.08	0.74	
Uniform Delay, d1	18.8	34.2		24.9	20.5		29.4	31.0		37.1	45.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	42.5		2.7	0.3		15.8	0.4		0.0	7.6	
Delay (s)	18.8	76.8		27.6	20.9		45.1	31.5		37.1	53.5	
Level of Service	B	E		C	C		D	C		D	D	
Approach Delay (s)		75.9			22.2			39.7			52.2	
Approach LOS		E			C			D			D	

Intersection Summary

HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	122.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	440	5	10	915	40	40
Future Vol, veh/h	440	5	10	915	40	40
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	463	5	11	963	42	42

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	468	0	1452
Stage 1	-	-	-	-	466
Stage 2	-	-	-	-	986
Critical Hdwy	-	-	4.11	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	-	-	2.209	-	3.536
Pot Cap-1 Maneuver	-	-	1099	-	142
Stage 1	-	-	-	-	627
Stage 2	-	-	-	-	358
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1099	-	140
Mov Cap-2 Maneuver	-	-	-	-	140
Stage 1	-	-	-	-	627
Stage 2	-	-	-	-	354

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	30.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	226	-	-	1099	-
HCM Lane V/C Ratio	0.373	-	-	0.01	-
HCM Control Delay (s)	30.1	-	-	8.3	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.6	-	-	0	-

Intersection						
Int Delay, s/veh	8.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	55	225	85	30	35	20
Future Vol, veh/h	55	225	85	30	35	20
Conflicting Peds, #/hr	0	0	0	0	0	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	3	3	2	2
Mvmt Flow	60	247	93	33	38	22

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	269	50	61	0	0
Stage 1	50	-	-	-	-
Stage 2	219	-	-	-	-
Critical Hdwy	6.41	6.21	4.13	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.227	-	-
Pot Cap-1 Maneuver	722	1021	1536	-	-
Stage 1	975	-	-	-	-
Stage 2	820	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	676	1020	1535	-	-
Mov Cap-2 Maneuver	676	-	-	-	-
Stage 1	914	-	-	-	-
Stage 2	819	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	5.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1535	-	927	-	-
HCM Lane V/C Ratio	0.061	-	0.332	-	-
HCM Control Delay (s)	7.5	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.5	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	370	565	110	245	15
Future Volume (vph)	5	370	565	110	245	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1703	1792	1753		1752	1534
Flt Permitted	0.20	1.00	1.00		0.95	1.00
Satd. Flow (perm)	352	1792	1753		1752	1534
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	440	673	131	292	18
RTOR Reduction (vph)	0	0	5	0	0	14
Lane Group Flow (vph)	6	440	799	0	292	4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	6%	6%	6%	3%	3%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	51.8	51.8	45.6		17.5	17.5
Effective Green, g (s)	51.8	51.8	45.6		17.5	17.5
Actuated g/C Ratio	0.64	0.64	0.56		0.22	0.22
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	237	1143	984		377	330
v/s Ratio Prot	0.00	c0.25	c0.46		c0.17	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.38	0.81		0.77	0.01
Uniform Delay, d1	17.3	7.1	14.3		30.0	25.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	5.2		9.3	0.0
Delay (s)	17.3	7.3	19.5		39.3	25.1
Level of Service	B	A	B		D	C
Approach Delay (s)		7.4	19.5		38.4	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	5	315	315	45	340	20	315	255	40	30	130	15
Future Volume (vph)	5	315	315	45	340	20	315	255	40	30	130	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1672		1687	1759		1719	1773		1687	1744	
Flt Permitted	0.44	1.00		0.09	1.00		0.41	1.00		0.56	1.00	
Satd. Flow (perm)	801	1672		152	1759		745	1773		989	1744	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	6	362	362	52	391	23	362	293	46	34	149	17
RTOR Reduction (vph)	0	21	0	0	1	0	0	4	0	0	3	0
Lane Group Flow (vph)	6	703	0	52	413	0	362	335	0	34	163	0
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)			2									1
Heavy Vehicles (%)	4%	4%	4%	7%	7%	7%	5%	5%	5%	7%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.0	42.9		51.8	46.8		38.3	30.7		20.1	16.5	
Effective Green, g (s)	44.0	42.9		51.8	46.8		38.3	30.7		20.1	16.5	
Actuated g/C Ratio	0.44	0.43		0.51	0.46		0.38	0.30		0.20	0.16	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	360	712		154	817		455	540		222	285	
v/s Ratio Prot	0.00	c0.42		c0.02	0.23		c0.14	0.19		0.01	0.09	
v/s Ratio Perm	0.01			0.16			c0.16			0.03		
v/c Ratio	0.02	0.99		0.34	0.51		0.80	0.62		0.15	0.57	
Uniform Delay, d1	16.2	28.6		19.7	18.9		24.9	30.0		32.9	38.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	30.2		0.5	0.5		8.7	2.3		0.1	2.8	
Delay (s)	16.3	58.8		20.1	19.4		33.6	32.3		33.0	41.7	
Level of Service	B	E		C	B		C	C		C	D	
Approach Delay (s)		58.5			19.5			33.0			40.2	
Approach LOS		E			B			C			D	

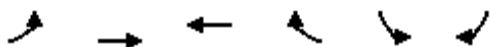
Intersection Summary

HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	100.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	445	335	785	390	10
Future Volume (vph)	30	445	335	785	390	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1827	1553	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1827	1553	1770	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.92
Adj. Flow (vph)	33	489	368	863	429	11
RTOR Reduction (vph)	0	0	0	562	0	7
Lane Group Flow (vph)	33	489	368	301	429	4
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	2.5	27.4	19.9	19.9	19.6	19.6
Effective Green, g (s)	2.5	27.4	19.9	19.9	19.6	19.6
Actuated g/C Ratio	0.04	0.48	0.35	0.35	0.34	0.34
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	77	895	637	542	608	544
v/s Ratio Prot	0.02	c0.26	0.20		c0.24	0.00
v/s Ratio Perm				0.19		
v/c Ratio	0.43	0.55	0.58	0.56	0.71	0.01
Uniform Delay, d1	26.6	10.4	15.1	15.0	16.2	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.7	1.3	1.2	3.7	0.0
Delay (s)	30.4	11.1	16.4	16.2	19.9	12.3
Level of Service	C	B	B	B	B	B
Approach Delay (s)		12.3	16.3		19.7	
Approach LOS		B	B		B	

Intersection Summary

HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	
Traffic Vol, veh/h	5	610	660	10	25	15
Future Vol, veh/h	5	610	660	10	25	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	663	717	11	27	16

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	728	0	-	0	1396 723
Stage 1	-	-	-	-	723 -
Stage 2	-	-	-	-	673 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	876	-	-	-	156 426
Stage 1	-	-	-	-	481 -
Stage 2	-	-	-	-	507 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	876	-	-	-	155 426
Mov Cap-2 Maneuver	-	-	-	-	155 -
Stage 1	-	-	-	-	478 -
Stage 2	-	-	-	-	507 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	27.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	876	-	-	-	204
HCM Lane V/C Ratio	0.006	-	-	-	0.213
HCM Control Delay (s)	9.1	-	-	-	27.4
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Intersection

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	860	40	88	340	7	6
Future Vol, veh/h	860	40	88	340	7	6
Conflicting Peds, #/hr	0	2	2	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	5	5	33	33
Mvmt Flow	989	46	101	391	8	7

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	1037
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.15
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.245
Pot Cap-1 Maneuver	-	-	659
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	657
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	39.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	119	-	-	657	-
HCM Lane V/C Ratio	0.126	-	-	0.154	-
HCM Control Delay (s)	39.5	-	-	11.5	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	0.4	-	-	0.5	-

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	15	65	210	43	28	85
Future Vol, veh/h	15	65	210	43	28	85
Conflicting Peds, #/hr	0	0	1	0	0	1
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	89	89	89	89	89	89
Heavy Vehicles, %	8	8	2	2	4	4
Mvmt Flow	17	73	236	48	31	96

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	600	80	128	0	0
Stage 1	80	-	-	-	-
Stage 2	520	-	-	-	-
Critical Hdwy	6.48	6.28	4.12	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.218	-	-
Pot Cap-1 Maneuver	454	964	1458	-	-
Stage 1	928	-	-	-	-
Stage 2	585	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	378	963	1457	-	-
Mov Cap-2 Maneuver	378	-	-	-	-
Stage 1	773	-	-	-	-
Stage 2	584	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	6.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1457	-	746	-	-
HCM Lane V/C Ratio	0.162	-	0.12	-	-
HCM Control Delay (s)	7.9	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.6	-	0.4	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd/SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	588	315	240	75	11
Future Volume (vph)	10	588	315	240	75	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1702	1792	1567		1597	1429
Flt Permitted	0.36	1.00	1.00		0.95	1.00
Satd. Flow (perm)	637	1792	1567		1597	1429
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	632	339	258	81	12
RTOR Reduction (vph)	0	0	21	0	0	11
Lane Group Flow (vph)	11	632	576	0	81	1
Confl. Peds. (#/hr)	2			2		
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	6%	6%	13%	13%	13%	13%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	37.1	37.1	31.0		6.8	6.8
Effective Green, g (s)	37.1	37.1	31.0		6.8	6.8
Actuated g/C Ratio	0.66	0.66	0.56		0.12	0.12
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	436	1191	870		194	174
v/s Ratio Prot	0.00	c0.35	c0.37		c0.05	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.53	0.66		0.42	0.01
Uniform Delay, d1	6.0	4.8	8.7		22.7	21.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.5	1.9		1.1	0.0
Delay (s)	6.0	5.3	10.6		23.8	21.6
Level of Service	A	A	B		C	C
Approach Delay (s)		5.3	10.6		23.5	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	17.3
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	333	331	70	297	25	287	145	35	20	225	10
Future Volume (vph)	10	333	331	70	297	25	287	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1533		1687	1752		1655	1693		1770	1849	
Flt Permitted	0.47	1.00		0.08	1.00		0.29	1.00		0.63	1.00	
Satd. Flow (perm)	798	1533		151	1752		501	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	383	380	80	341	29	330	167	40	23	259	11
RTOR Reduction (vph)	0	90	0	0	2	0	0	6	0	0	2	0
Lane Group Flow (vph)	11	673	0	80	368	0	330	201	0	23	268	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.3	43.1		53.1	47.9		44.6	38.4		25.4	23.2	
Effective Green, g (s)	44.3	43.1		53.1	47.9		44.6	38.4		25.4	23.2	
Actuated g/C Ratio	0.41	0.40		0.49	0.44		0.41	0.35		0.23	0.21	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	335	610		159	775		392	600		286	396	
v/s Ratio Prot	0.00	c0.44		c0.03	0.21		c0.14	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.22			c0.21			0.02		
v/c Ratio	0.03	1.10		0.50	0.48		0.84	0.34		0.08	0.68	
Uniform Delay, d1	19.1	32.5		23.7	21.3		24.7	25.6		32.1	39.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	67.9		0.9	0.5		14.5	0.4		0.0	4.6	
Delay (s)	19.2	100.4		24.6	21.8		39.1	25.9		32.1	43.7	
Level of Service	B	F		C	C		D	C		C	D	
Approach Delay (s)		99.3			22.3			34.0			42.8	
Approach LOS		F			C			C			D	

Intersection Summary

HCM 2000 Control Delay	57.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	108.2	Sum of lost time (s)	18.5
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	318	407	370	685	15
Future Volume (vph)	5	318	407	370	685	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1696	1845	1532	1736	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1612	1696	1845	1532	1736	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	6	370	473	430	797	17
RTOR Reduction (vph)	0	0	0	306	0	8
Lane Group Flow (vph)	6	370	473	124	797	9
Confl. Peds. (#/hr)	1			1		
Confl. Bikes (#/hr)				1		1
Heavy Vehicles (%)	12%	12%	3%	3%	4%	4%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	1.1	28.4	22.3	22.3	39.0	39.0
Effective Green, g (s)	1.1	28.4	22.3	22.3	39.0	39.0
Actuated g/C Ratio	0.01	0.37	0.29	0.29	0.50	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	22	622	531	441	874	782
v/s Ratio Prot	0.00	c0.22	c0.26		c0.46	0.01
v/s Ratio Perm				0.08		
v/c Ratio	0.27	0.59	0.89	0.28	0.91	0.01
Uniform Delay, d1	37.8	19.8	26.4	21.3	17.6	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.5	16.9	0.4	13.6	0.0
Delay (s)	44.4	21.4	43.3	21.7	31.2	9.6
Level of Service	D	C	D	C	C	A
Approach Delay (s)		21.7	33.0		30.8	
Approach LOS		C	C		C	

Intersection Summary

HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	
Traffic Vol, veh/h	13	650	545	49	24	10
Future Vol, veh/h	13	650	545	49	24	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	707	592	53	26	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	645	0	-	0	1354 619
Stage 1	-	-	-	-	619 -
Stage 2	-	-	-	-	735 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	940	-	-	-	165 489
Stage 1	-	-	-	-	537 -
Stage 2	-	-	-	-	474 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	940	-	-	-	163 489
Mov Cap-2 Maneuver	-	-	-	-	163 -
Stage 1	-	-	-	-	529 -
Stage 2	-	-	-	-	474 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	26.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	940	-	-	-	203
HCM Lane V/C Ratio	0.015	-	-	-	0.182
HCM Control Delay (s)	8.9	-	-	-	26.6
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	3	250	0	8	85
Future Vol, veh/h	1	3	250	0	8	85
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	3	272	0	9	92

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	382	272	0	0	272	0
Stage 1	272	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	620	767	-	-	1291	-
Stage 1	774	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	616	767	-	-	1291	-
Mov Cap-2 Maneuver	616	-	-	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	909	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	723	1291
HCM Lane V/C Ratio	-	-	0.006	0.007
HCM Control Delay (s)	-	-	10	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

11/10/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Future Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.98		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1532		1687	1750		1656	1693		1770	1849	
Flt Permitted	0.51	1.00		0.07	1.00		0.25	1.00		0.63	1.00	
Satd. Flow (perm)	852	1532		123	1750		437	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	374	374	80	316	29	310	167	40	23	259	11
RTOR Reduction (vph)	0	56	0	0	2	0	0	5	0	0	1	0
Lane Group Flow (vph)	11	692	0	80	343	0	310	202	0	23	269	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Effective Green, g (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Actuated g/C Ratio	0.45	0.44		0.52	0.48		0.39	0.33		0.23	0.20	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	389	672		143	839		366	560		281	366	
v/s Ratio Prot	0.00	c0.45		c0.03	0.20		c0.14	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.26			c0.20			0.02		
v/c Ratio	0.03	1.03		0.56	0.41		0.85	0.36		0.08	0.74	
Uniform Delay, d1	18.8	34.2		24.9	20.5		29.4	31.0		37.1	45.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	42.5		2.7	0.3		15.8	0.4		0.0	7.6	
Delay (s)	18.8	76.8		27.6	20.9		45.1	31.5		37.1	53.5	
Level of Service	B	E		C	C		D	C		D	D	
Approach Delay (s)		75.9			22.2			39.7			52.2	
Approach LOS		E			C			D			D	

Intersection Summary

HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	122.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	1.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	440	7	11	915	44	42
Future Vol, veh/h	440	7	11	915	44	42
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	463	7	12	963	46	44

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	470	0	1455
Stage 1	-	-	-	-	467
Stage 2	-	-	-	-	988
Critical Hdwy	-	-	4.11	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	-	-	2.209	-	3.536
Pot Cap-1 Maneuver	-	-	1097	-	142
Stage 1	-	-	-	-	627
Stage 2	-	-	-	-	357
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1097	-	140
Mov Cap-2 Maneuver	-	-	-	-	140
Stage 1	-	-	-	-	627
Stage 2	-	-	-	-	353

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	31.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	223	-	-	1097	-
HCM Lane V/C Ratio	0.406	-	-	0.011	-
HCM Control Delay (s)	31.8	-	-	8.3	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.8	-	-	0	-

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	55	225	85	36	38	20
Future Vol, veh/h	55	225	85	36	38	20
Conflicting Peds, #/hr	0	0	0	0	0	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	3	3	2	2
Mvmt Flow	60	247	93	40	42	22

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	280	54	65	0	0
Stage 1	54	-	-	-	-
Stage 2	226	-	-	-	-
Critical Hdwy	6.41	6.21	4.13	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.227	-	-
Pot Cap-1 Maneuver	712	1016	1531	-	-
Stage 1	971	-	-	-	-
Stage 2	814	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	666	1015	1530	-	-
Mov Cap-2 Maneuver	666	-	-	-	-
Stage 1	910	-	-	-	-
Stage 2	813	-	-	-	-

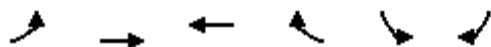
Approach	EB	NB	SB
HCM Control Delay, s	10.9	5.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1530	-	920	-	-
HCM Lane V/C Ratio	0.061	-	0.334	-	-
HCM Control Delay (s)	7.5	0	10.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.5	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd/SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	↘
Traffic Volume (vph)	5	371	566	110	245	16
Future Volume (vph)	5	371	566	110	245	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1703	1792	1753		1752	1534
Flt Permitted	0.20	1.00	1.00		0.95	1.00
Satd. Flow (perm)	351	1792	1753		1752	1534
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	442	674	131	292	19
RTOR Reduction (vph)	0	0	5	0	0	15
Lane Group Flow (vph)	6	442	800	0	292	4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	6%	6%	6%	3%	3%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	51.8	51.8	45.6		17.5	17.5
Effective Green, g (s)	51.8	51.8	45.6		17.5	17.5
Actuated g/C Ratio	0.64	0.64	0.56		0.22	0.22
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	237	1143	984		377	330
v/s Ratio Prot	0.00	c0.25	c0.46		c0.17	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.39	0.81		0.77	0.01
Uniform Delay, d1	17.3	7.1	14.4		30.0	25.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	5.2		9.3	0.0
Delay (s)	17.3	7.3	19.6		39.3	25.1
Level of Service	B	A	B		D	C
Approach Delay (s)		7.4	19.6		38.4	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	332	328	45	350	20	322	255	40	30	130	15
Future Volume (vph)	5	332	328	45	350	20	322	255	40	30	130	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1673		1687	1759		1719	1773		1687	1744	
Flt Permitted	0.43	1.00		0.09	1.00		0.41	1.00		0.56	1.00	
Satd. Flow (perm)	780	1673		152	1759		742	1773		989	1744	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	6	382	377	52	402	23	370	293	46	34	149	17
RTOR Reduction (vph)	0	21	0	0	1	0	0	4	0	0	3	0
Lane Group Flow (vph)	6	738	0	52	424	0	370	335	0	34	163	0
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)			2									1
Heavy Vehicles (%)	4%	4%	4%	7%	7%	7%	5%	5%	5%	7%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	43.9	42.8		51.7	46.7		38.4	30.8		20.0	16.4	
Effective Green, g (s)	43.9	42.8		51.7	46.7		38.4	30.8		20.0	16.4	
Actuated g/C Ratio	0.44	0.43		0.51	0.46		0.38	0.31		0.20	0.16	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	350	711		154	815		457	542		221	284	
v/s Ratio Prot	0.00	c0.44		c0.02	0.24		c0.14	0.19		0.01	0.09	
v/s Ratio Perm	0.01			0.16			c0.16			0.03		
v/c Ratio	0.02	1.04		0.34	0.52		0.81	0.62		0.15	0.57	
Uniform Delay, d1	16.3	29.0		20.9	19.1		25.0	29.9		33.0	38.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	44.1		0.5	0.6		9.6	2.1		0.1	2.9	
Delay (s)	16.4	73.1		21.3	19.7		34.6	32.1		33.1	41.8	
Level of Service	B	E		C	B		C	C		C	D	
Approach Delay (s)		72.6			19.9			33.4			40.3	
Approach LOS		E			B			C			D	

Intersection Summary

HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	462	345	785	390	10
Future Volume (vph)	30	462	345	785	390	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1827	1553	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1827	1553	1770	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.92
Adj. Flow (vph)	33	508	379	863	429	11
RTOR Reduction (vph)	0	0	0	558	0	7
Lane Group Flow (vph)	33	508	379	305	429	4
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	2.5	27.8	20.3	20.3	19.6	19.6
Effective Green, g (s)	2.5	27.8	20.3	20.3	19.6	19.6
Actuated g/C Ratio	0.04	0.48	0.35	0.35	0.34	0.34
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	77	902	646	549	604	540
v/s Ratio Prot	0.02	c0.27	0.21		c0.24	0.00
v/s Ratio Perm				0.20		
v/c Ratio	0.43	0.56	0.59	0.56	0.71	0.01
Uniform Delay, d1	26.8	10.5	15.1	14.9	16.4	12.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.8	1.4	1.2	3.9	0.0
Delay (s)	30.6	11.3	16.5	16.1	20.4	12.5
Level of Service	C	B	B	B	C	B
Approach Delay (s)		12.5	16.3		20.2	
Approach LOS		B	B		C	

Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑	↗		↘	
Traffic Vol, veh/h	6	610	660	27	55	16
Future Vol, veh/h	6	610	660	27	55	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	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	663	717	29	60	17

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	746	0	0	1409	732
Stage 1	-	-	-	732	-
Stage 2	-	-	-	677	-
Critical Hdwy	4.12	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	862	-	-	153	421
Stage 1	-	-	-	476	-
Stage 2	-	-	-	505	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	862	-	-	152	421
Mov Cap-2 Maneuver	-	-	-	152	-
Stage 1	-	-	-	472	-
Stage 2	-	-	-	505	-

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	39.9
HCM LOS			E

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	862	-	-	-	178
HCM Lane V/C Ratio	0.008	-	-	-	0.434
HCM Control Delay (s)	9.2	-	-	-	39.9
HCM Lane LOS	A	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	2

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	1	6	115	0	3	260
Future Vol, veh/h	1	6	115	0	3	260
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	7	125	0	3	283

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	414	125	0	0	125	0
Stage 1	125	-	-	-	-	-
Stage 2	289	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	595	926	-	-	1462	-
Stage 1	901	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	594	926	-	-	1462	-
Mov Cap-2 Maneuver	594	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	758	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	858	1462
HCM Lane V/C Ratio	-	-	0.009	0.002
HCM Control Delay (s)	-	-	9.2	7.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	22	94	72
Average Queue (ft)	1	36	13
95th Queue (ft)	13	74	49
Link Distance (ft)	3156		588
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		300	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	86	69	5
Average Queue (ft)	38	21	0
95th Queue (ft)	68	56	4
Link Distance (ft)	1898	746	658
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	57	277	240	102	28
Average Queue (ft)	9	86	91	33	4
95th Queue (ft)	39	231	191	73	18
Link Distance (ft)		4736	432		746
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)		4		0	
Queuing Penalty (veh)		0		0	

Queing and Blocking Report
Existing AM

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Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	131	531	211	357	268	308	51	257
Average Queue (ft)	10	393	51	154	144	84	13	128
95th Queue (ft)	82	619	137	294	246	221	38	226
Link Distance (ft)		517		996		1985		846
Upstream Blk Time (%)	0	8						
Queuing Penalty (veh)	0	50						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		18	0	13	7	0		4
Queuing Penalty (veh)		2	1	9	11	0		1

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	104	327	526	314	427	52
Average Queue (ft)	7	156	195	30	223	9
95th Queue (ft)	44	274	382	191	379	35
Link Distance (ft)		896	1377			1084
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)		19	5			
Queuing Penalty (veh)		1	21			

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	SB
Directions Served	L	T	LR
Maximum Queue (ft)	60	363	54
Average Queue (ft)	4	72	16
95th Queue (ft)	36	272	47
Link Distance (ft)		432	180
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		4	
Storage Bay Dist (ft)	200		
Storage Blk Time (%)		4	
Queuing Penalty (veh)		0	

Zone Summary

Zone wide Queuing Penalty: 101

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	6	35	12	99
Average Queue (ft)	0	4	1	39
95th Queue (ft)	5	23	8	73
Link Distance (ft)	3152		1572	584
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	105	56	2
Average Queue (ft)	59	6	0
95th Queue (ft)	89	31	2
Link Distance (ft)	1894	737	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	38	200	344	166	140
Average Queue (ft)	4	80	160	91	12
95th Queue (ft)	22	159	292	156	89
Link Distance (ft)		4732	424		737
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			1		
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)		3		2	0
Queuing Penalty (veh)		0		0	0

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	77	518	152	424	268	356	91	186
Average Queue (ft)	7	330	32	166	143	135	22	83
95th Queue (ft)	78	571	99	320	244	265	60	159
Link Distance (ft)		508		991		1981		842
Upstream Blk Time (%)	0	5						
Queuing Penalty (veh)	0	30						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		11		14	5	2	0	1
Queuing Penalty (veh)		1		6	15	8	0	0

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	134	288	281	180	252	34
Average Queue (ft)	31	143	125	12	130	6
95th Queue (ft)	89	249	223	96	211	27
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	12	1	0		
Queuing Penalty (veh)	0	4	5	0		

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	50	289	25	145
Average Queue (ft)	4	45	1	45
95th Queue (ft)	37	227	19	122
Link Distance (ft)		424	508	216
Upstream Blk Time (%)		1		2
Queuing Penalty (veh)		4		0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)	0	4		
Queuing Penalty (veh)	0	0		

Zone Summary

Zone wide Queuing Penalty: 74

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	31	90	16	77
Average Queue (ft)	1	36	1	12
95th Queue (ft)	15	73	9	48
Link Distance (ft)	3156		1576	592
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	80	72	3
Average Queue (ft)	39	23	0
95th Queue (ft)	65	60	4
Link Distance (ft)	1898	746	662
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	96	589	288	98	28
Average Queue (ft)	11	189	101	40	4
95th Queue (ft)	57	570	223	81	16
Link Distance (ft)		4736	430		746
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	16			
Queuing Penalty (veh)	0	2			

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	87	535	186	375	272	335	48	296
Average Queue (ft)	9	509	53	149	154	109	14	149
95th Queue (ft)	62	575	136	290	253	255	40	251
Link Distance (ft)		519		1000		1986		846
Upstream Blk Time (%)		20						
Queuing Penalty (veh)		136						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		39	1	15	8	1		7
Queuing Penalty (veh)		4	2	11	15	2		1

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	95	368	514	279	472	47
Average Queue (ft)	10	169	202	31	234	8
95th Queue (ft)	60	300	397	196	389	34
Link Distance (ft)		900	1377			1084
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	19	6			
Queuing Penalty (veh)	0	1	23			

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	SB
Directions Served	L	T	LR
Maximum Queue (ft)	193	444	128
Average Queue (ft)	12	216	47
95th Queue (ft)	94	502	147
Link Distance (ft)		430	236
Upstream Blk Time (%)		5	4
Queuing Penalty (veh)		36	0
Storage Bay Dist (ft)	200		
Storage Blk Time (%)		20	
Queuing Penalty (veh)		2	

Zone Summary

Zone wide Queuing Penalty: 237

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	12	31	16	140
Average Queue (ft)	0	3	1	49
95th Queue (ft)	8	20	9	101
Link Distance (ft)	3152		1572	584
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	114	54	5
Average Queue (ft)	64	7	0
95th Queue (ft)	96	34	3
Link Distance (ft)	1894	737	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	61	406	430	174	345
Average Queue (ft)	5	127	229	108	52
95th Queue (ft)	30	347	427	179	250
Link Distance (ft)		4732	424		737
Upstream Blk Time (%)			2		
Queuing Penalty (veh)			16		
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	12		11	0
Queuing Penalty (veh)	0	1		2	0

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	78	523	167	472	269	476	82	215
Average Queue (ft)	6	464	34	172	175	173	22	97
95th Queue (ft)	56	640	106	341	281	365	59	174
Link Distance (ft)		508		991		1981		842
Upstream Blk Time (%)		19						
Queuing Penalty (veh)		123						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		38	0	15	12	4		1
Queuing Penalty (veh)		2	0	7	37	12		0

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	116	367	296	160	265	44
Average Queue (ft)	30	159	138	9	142	7
95th Queue (ft)	79	287	240	89	230	30
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	14	1	0		
Queuing Penalty (veh)	0	4	7	0		

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	112	432	225	240
Average Queue (ft)	6	191	24	127
95th Queue (ft)	55	474	145	285
Link Distance (ft)		424	508	237
Upstream Blk Time (%)		4	0	26
Queuing Penalty (veh)		28	0	0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)		20		
Queuing Penalty (veh)		1		

Zone Summary

Zone wide Queuing Penalty: 242

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	32	122	12	74
Average Queue (ft)	2	41	0	15
95th Queue (ft)	17	90	9	50
Link Distance (ft)	3152		1572	584
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	86	66	26
Average Queue (ft)	39	25	1
95th Queue (ft)	69	61	11
Link Distance (ft)	1896	327	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd/SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	115	1347	346	145	83
Average Queue (ft)	15	595	139	54	7
95th Queue (ft)	71	1339	297	117	50
Link Distance (ft)		4732	421		352
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			0		
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	48		1	
Queuing Penalty (veh)	0	5		0	

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	222	526	174	370	268	359	114	316
Average Queue (ft)	23	516	56	168	168	122	15	156
95th Queue (ft)	174	531	139	317	269	274	65	274
Link Distance (ft)		511		991		1982		842
Upstream Blk Time (%)	0	37						
Queuing Penalty (veh)	0	250						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		61	0	16	11	1		7
Queuing Penalty (veh)		6	1	12	20	4		2

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	79	304	662	336	504	46
Average Queue (ft)	6	160	249	38	249	7
95th Queue (ft)	43	274	576	235	418	30
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)			1			
Queuing Penalty (veh)			0			
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)		19	11			
Queuing Penalty (veh)		1	46			

Intersection: 6: SW Herman Rd & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	224	437	20	176
Average Queue (ft)	28	380	1	138
95th Queue (ft)	140	555	18	213
Link Distance (ft)		421	511	156
Upstream Blk Time (%)		21		72
Queuing Penalty (veh)		137		0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)	0	55		
Queuing Penalty (veh)	0	7		

Intersection: 7: Site Driveway & SW 108th Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	31	31
Average Queue (ft)	4	2
95th Queue (ft)	21	17
Link Distance (ft)	241	327
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 490

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	7	37	108
Average Queue (ft)	0	4	47
95th Queue (ft)	5	24	86
Link Distance (ft)	3152		584
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		300	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	114	48	3
Average Queue (ft)	64	7	0
95th Queue (ft)	97	32	3
Link Distance (ft)	1897	327	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd/SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	84	569	425	171	303
Average Queue (ft)	9	187	235	117	75
95th Queue (ft)	50	474	425	193	286
Link Distance (ft)		4732	421		352
Upstream Blk Time (%)			2		2
Queuing Penalty (veh)			11		6
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	25		17	0
Queuing Penalty (veh)	0	1		3	1

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	123	526	174	423	269	468	93	221
Average Queue (ft)	6	506	34	183	177	181	20	94
95th Queue (ft)	77	575	100	349	282	386	61	180
Link Distance (ft)		511		991		1982		842
Upstream Blk Time (%)	0	26						
Queuing Penalty (veh)	0	176						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		49		17	12	4		1
Queuing Penalty (veh)		3		8	36	14		0

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	134	344	296	217	292	36
Average Queue (ft)	31	155	137	14	138	5
95th Queue (ft)	86	281	232	111	233	25
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	13	1	0		
Queuing Penalty (veh)	0	4	6	1		

Intersection: 6: SW Herman Rd & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	186	437	190	194
Average Queue (ft)	12	271	18	160
95th Queue (ft)	87	546	116	207
Link Distance (ft)		421	511	156
Upstream Blk Time (%)		10		91
Queuing Penalty (veh)		61		0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)	0	34		
Queuing Penalty (veh)	0	2		

Intersection: 7: Site Driveway & SW 108th Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	35	64
Average Queue (ft)	8	6
95th Queue (ft)	31	49
Link Distance (ft)	241	327
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 333



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MEMORANDUM

DATE: April 26, 2019
TO: Gary Danielson, SRG Partnership, Inc
FROM: Garth Appanaitis, PE
SUBJECT: Tualatin Ops Site Transportation Planning Rule Analysis

The purpose of this memorandum is to address Oregon Administrative Rule (OAR) 660-012-0060, Transportation Planning Rule (TPR), requirements for a map change amendment to rezone two parcels near SW 108th Ave/SW Herman Rd in Tualatin. The change in zoning may be pursued to support additional development on the site. Prior traffic analysis conducted for the site¹ addressed the additional traffic that would be added with the actual proposed development use but did not address TPR requirements.

TPR OVERVIEW

The TPR provides a means for ensuring that future land use and traffic growth is consistent with transportation system planning. The TPR requires that a change of allowable land uses do not create a significant impact on the transportation system beyond currently allowed (planned) uses. The TPR can be addressed through a variety of means, but typically compares the change in trip potential (simply trip generation or traffic impacts) between the allowed use (existing zoning) and proposed use (proposed zoning). In many cases the reasonable worst-case use (for either the existing or propose zoning) will not reflect the actual existing use for a site or the specific use that may ultimately be developed on a site. Rather, the reasonable worst case considers the allowed trip potential for either zoning condition and is rarely development specific (e.g., no site plan, nor intent to use the site for that purpose). In some cases, a "trip cap" or limit to the maximum trips generated by a site will be imposed with a change in zoning in order to limit the future trip potential while still allowing for the intended development.

SITE TRAFFIC POTENTIAL

The City of Tualatin Public Works Department is located in the northeast quadrant of SW 108th Ave/SW Herman Rd. The site is currently zoned as Light Manufacturing (ML) and composed of two parcels:

- 2S122AD00200 (approximately 5.18 acres)
- 2S122AD00300 (approximately 3.54 acres)

¹ Tualatin City Operation Site Traffic Impact Analysis, prepared by DKS Associates, December 2018.



For purposes of the TPR analysis, the existing uses on the site are ignored and redevelopment options allowed within zoning designations are considered. Applying typical industrial development assumptions, the combined size of the site (8.72 acres) could provide approximately 95,000 feet of floor area² based on overall size and not considering other site-specific limitations (topography, etc.) that may be identified through a site design process. This development potential of 95 ksf is considered for both the existing and proposed zoning designations.

Existing Zoning (ML) Traffic Potential

The existing ML zoning³ allows several industrial uses, including manufacturing and warehousing. Some components of commercial uses are allowed as ancillary components of the site. *ITE Trip Generation, 10th Edition* was used to determine traffic potential for allowed uses. The allowed industrial use with the highest trip generation rate for the p.m. peak hour is 155 High-Cube Fulfillment Center Warehouse (1.37 trips/ksf). However, data in the ITE manual indicates that these uses typically exceed 500 ksf and would not be reasonable for the site given the size.

Under the existing ML zoning, the reasonable worst-case trip potential (that would scale to the size of the site) would fall under ITE Category 140 – Manufacturing, which generates approximately 0.67 trips/ksf during the p.m. peak hour. Therefore, the reasonable worst-case trip potential for a 95 ksf building would generate approximately 64 p.m. peak hour trips. Further, this trip potential is approximately the same as the government office building documented and analyzed in the related TIA (59 p.m. peak hour trips)⁴.

Proposed Zoning (IN) Traffic Potential

The proposed Institutional (IN) zoning allows uses that serve the community, such as educational, religious, recreational, and government uses. The Community Services category within IN includes community recreation building, which is the reasonable worst-case use from a trip potential standpoint. ITE category 495 Recreational Community Center would generate approximately 2.31 p.m. peak hour vehicle trips/ksf. Therefore, a 95 ksf building would generate approximately 219 p.m. peak hour trips.

TEXT AMENDMENT IMPACTS

While the government office building analyzed in the prior TIA would fit within the general intent of the IN zone, it is not currently listed as an allowed use. A text amendment to specifically allow government office buildings in the IN zone may be required in addition to a map amendment for the site.

The potential text amendment action would not create a significant effect for TPR purposes. While a text amendment would affect all locations with IN zone designation, allowing government office uses would not increase the reasonable worst-case trip potential for IN zoning designation. The ITE trip rate for 730 Government Office Building is 1.71 trips/ksf⁵ during the p.m. peak hour, which is less trips than a

² 8.72 acres * 0.25 FAR = 95 ksf

³ <https://www.tualatinoregon.gov/developmentcode/tdc-chapter-60-light-manufacturing-zone-ml>

⁴ TIA Table 5 lists 59 p.m. peak hour trips for the additional government office building.

⁵ A higher effective trip rate of approximately 2.95 trips/ksf (59 trips/20 ksf) was used for the smaller 20 ksf building in the TIA to provide a conservative estimate and account for potential public service counter trips. However, for consideration of larger building sizes and reasonable worst-case trip potential, the overall ITE average rate of 1.71 (which includes building sizes approaching 80 ksf) is appropriate.



recreational community center (2.31 trips/ksf) and would not increase the trip potential for zones designated IN to allow this additional use.

FINDINGS

The TPR analysis addressed two potential actions, which, while related, include separate findings.

Map Amendment (ML to IN)

The trip generation potential for the existing zoning (ML) and proposed zoning (IN) was calculated using site redevelopment assumptions for a reasonable worst-case use and ITE trip generation rates. For the two subject parcels, a map amendment to change the zoning designation from ML to IN has the potential to add an increase of approximately 155 (219-64) p.m. peak hour vehicle trips. This action has the potential to create a significant effect on the transportation system, but can be resolved through either of the following actions:

- 1) Conduct additional traffic analysis to address TPR requirements and determine if additional offsite transportation improvements would be required to offset the impacts of the map amendment. This analysis would identify specific potential impacts related to adding 155 vehicle trips to the transportation system for the p.m. peak hour (during the future year Transportation System Plan horizon). This action would maximize flexibility for future uses allowed for the zoning designation, but would require additional analysis, and (pending the results of the analysis) may lead to unnecessary transportation system investments if the reasonable worst-case use is not developed.

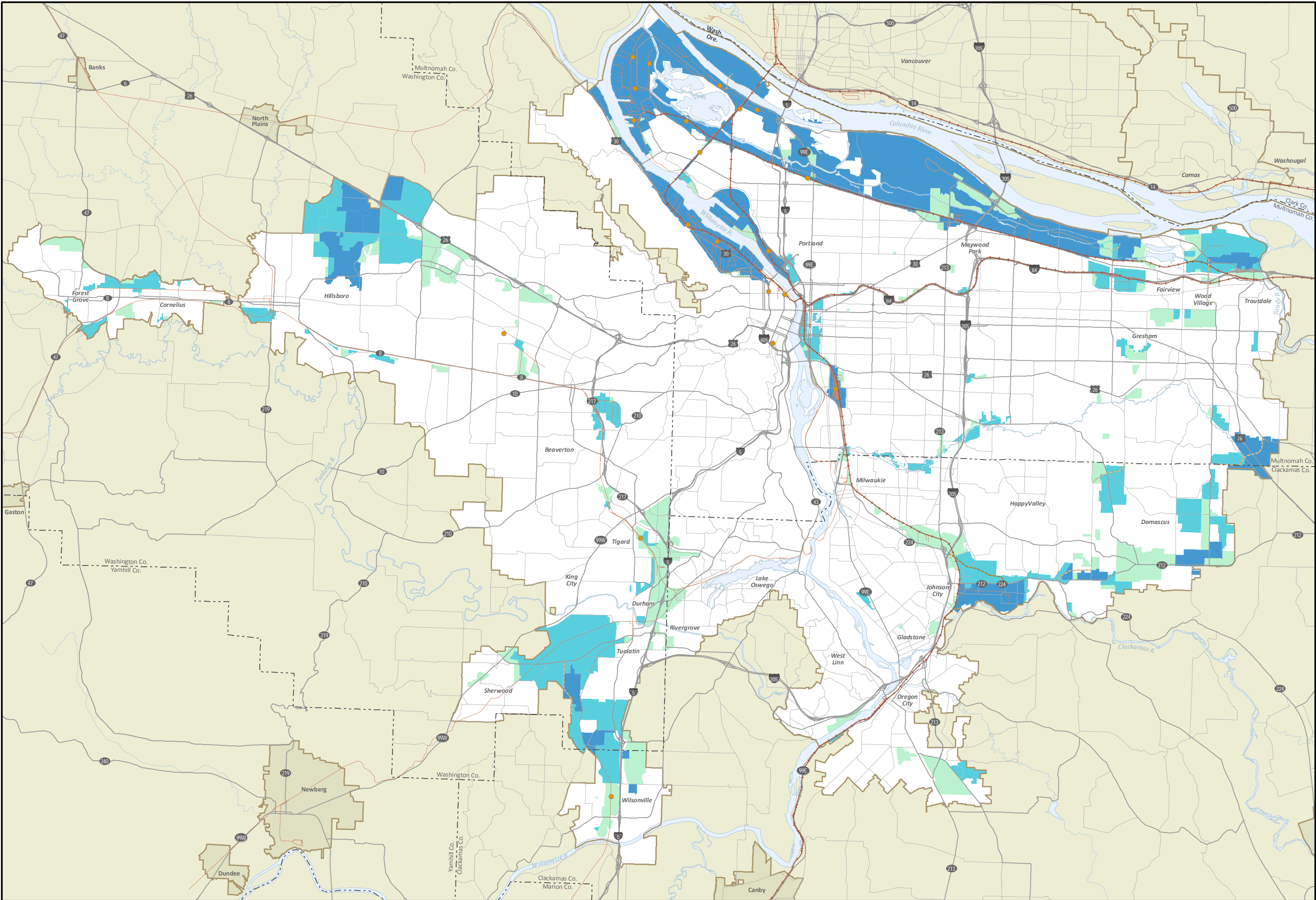
--or--

- 2) Include a trip cap with the map amendment that would limit site trips and not further degrade the transportation system. The analysis indicates that the existing zoning would allow approximately 64 p.m. peak hour trips, which would exceed the number of trips required for the government office building included in the TIA (59 p.m. peak hour trips). A trip cap of 80 p.m. peak hour trips would provide some flexibility for the site design to add a nominal portion of trips, while not creating a significant increase above the reasonable worst-case trip potential of the existing ML zoning.

Text Amendment (Allow Government Office use in IN)

The potential text amendment to allow government office buildings in any IN zone would not increase the reasonable worst-case trip potential for IN zones beyond what is currently allowed for recreational community center. Therefore, such action would meet TPR requirements.

If you have any questions, please call.



Title 4, Industrial and Other Employment Areas

October 2014

0 1 2 4 miles

- Employment areas
- Industrial areas
- Regionally significant industrial areas
- Proposed main roadway routes
- Proposed road connectors
- Mainline freight
- Branch line freight
- Rail yards
- County boundaries
- Urban growth boundaries
- Neighbor cities

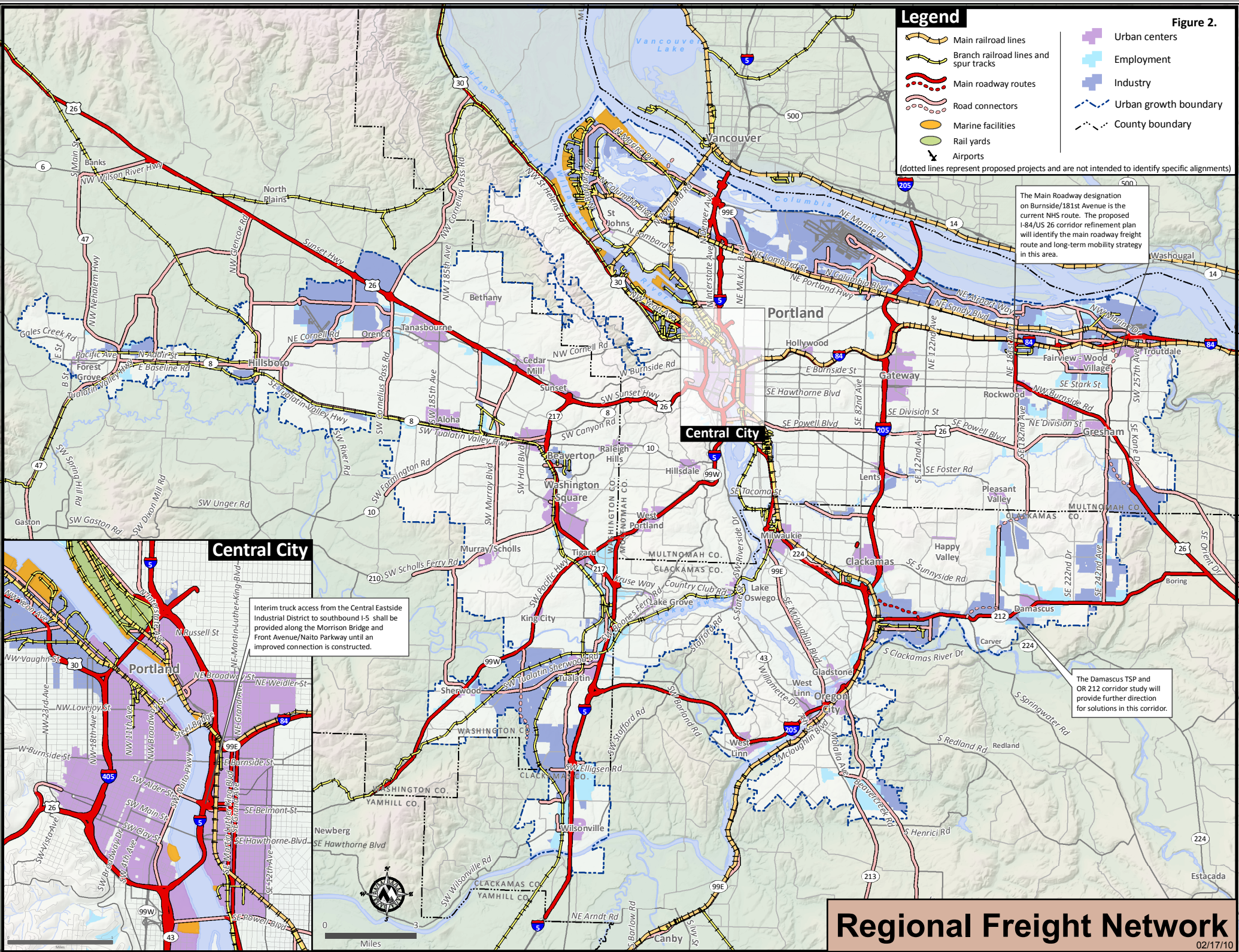


The information on this map was derived from digital databases on Metro's GIS. Care was taken in the creation of this map. Metro cannot accept any responsibility for errors, omissions, or positional accuracy. There are no warranties, expressed or implied, including the warranty of merchantability or fitness for a particular purpose, accompanying this product. However, notification of any errors are appreciated.

Figure 2.

Legend

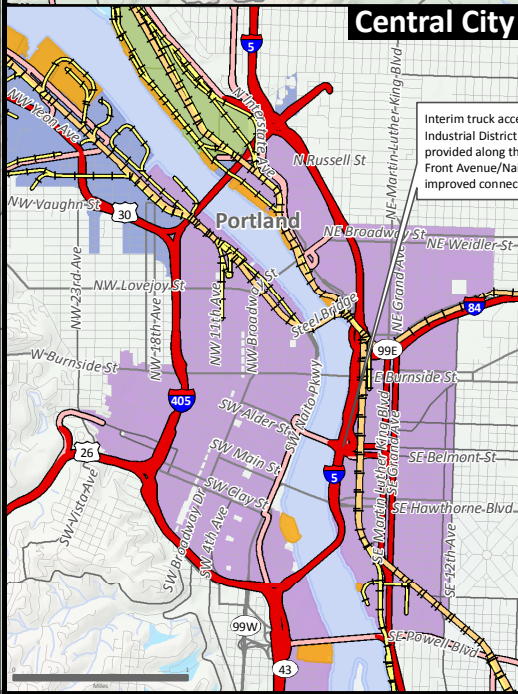
- Main railroad lines
 - Branch railroad lines and spur tracks
 - Main roadway routes
 - Road connectors
 - Marine facilities
 - Rail yards
 - Airports
 - Urban centers
 - Employment
 - Industry
 - Urban growth boundary
 - County boundary
- (dotted lines represent proposed projects and are not intended to identify specific alignments)



The Main Roadway designation on Burnside/181st Avenue is the current NHS route. The proposed I-84/US 26 corridor refinement plan will identify the main roadway freight route and long-term mobility strategy in this area.

Interim truck access from the Central Eastside Industrial District to southbound I-5 shall be provided along the Morrison Bridge and Front Avenue/Naito Parkway until an improved connection is constructed.

The Damascus TSP and OR 212 corridor study will provide further direction for solutions in this corridor.



Regional Freight Network

02/17/10

TDC 49: Institutional Zone (IN)

Development Code:

Chapter 49: Institutional Zone (IN)

Details

Section 49.100 – Purpose. The purpose of the Institutional (IN) Zone is to provide areas of the City that are suitable for **public**, educational, religious, recreational, and incidental support facilities to serve the community. The Zone is intended to:

- (1) Be consistent with the Institutional land use designation in the Tualatin Community Plan;
- (2) Support lands and facilities that are owned and operated by governmental or nonprofit entities and that serve and benefit the community; and
- (3) Provide for location and development of permitted and conditionally permitted uses in a manner that is harmonious with adjacent and nearby residential, commercial, or manufacturing planning zones and uses; and protects the health, safety, and general welfare of adjacent residential, commercial, and manufacturing uses.

Section 49.200 – Use Categories.

(1) **Use Categories.** Table 49-1 lists use categories Permitted Outright (P) or Conditionally Permitted (C) in the IN zone. Use categories may also be designated as Limited (L) and subject to the limitations listed in Table 49-1 and restrictions identified in TDC 49.210. Limitations may restrict the specific type of use, location, size, or other characteristics of the use category. Use categories which are not listed are prohibited within the zone, except for uses which are found by the City Manager or appointee to be of a similar character and to meet the purpose of this zone, as provided in TDC 31.070.

(2) **Overlay Zones.** Additional uses may be allowed in a particular overlay zone. See the overlay zone Chapters for additional uses.

**Table 49-1
Use Categories in the IN Zone**

USE CATEGORY	STATUS	LIMITATIONS AND CODE REFERENCES
INSTITUTIONAL USE CATEGORIES		
Assembly Facilities	P (L)	Permitted uses limited to places of religious worship.
Community Services	P/C (L)	Permitted uses limited to public recreation buildings and facilities: <ul style="list-style-type: none"> o Community recreation building; o Indoor community aquatic centers. Conditional uses limited to outdoor public community aquatic centers

USE CATEGORY	STATUS	LIMITATIONS AND CODE REFERENCES
Schools	P	--
<u>Offices</u>	<u>P (L)</u>	<u>Permitted uses limited to government offices.</u>
INFRASTRUCTURE AND UTILITIES USE CATEGORIES		
<u>Public Safety and Utility Facilities</u>	<u>P (L)</u>	<u>Permitted uses limited to public works storage yard and shop.</u>
Basic Utilities	P/C (L)	Permitted uses limited to water or sewage pump stations and pressure reading stations. Conditional uses limited to: ○ Water reservoirs; ○ Electrical substation; and ○ Natural gas pumping station.
Greenways and Natural Areas	P	--
Parks and Open Space	P (L)	Permitted uses limited to: ○ Government-owned parks; and ○ Sports fields and tennis courts.
Transportation Facilities	P	--
Wireless Communication Facility	P (L)	Must be located within 300 feet of the centerline of Interstate 5 and <u>subject to maximum height and minimum setback standards defined by</u> TDC Chapter 73F.

Section 49.210 – Additional Limitations on Uses.

(1) **Accessory Uses Conditionally Permitted.** The following uses may be permitted as a conditional use when incidental and subordinate to a permitted or conditionally permitted primary use:

- (a) Child day care center;
- (b) Exterior lighting, if the height of the fixture or standard is greater than the tallest permitted building on the site; **and**
- (c) Outdoor public address or audio amplification system; ~~and~~
- ~~(d) Wireless Communication Facility.~~

Section 49.300 – Development Standards. Development standards in the IN zone are listed in Table 49-2. Additional standards may apply to some uses and situations, see TDC 49.310.

**Table 49-2
Development Standards in the IN Zone**

STANDARD	REQUIREMENT	LIMITATIONS AND CODE REFERENCES
MINIMUM LOT SIZE		
All Uses	1.5 acres	
MINIMUM LOT WIDTH		
Minimum Average Lot Width	100 feet	When lot has frontage on public street, minimum lot width is 40 feet.
Infrastructure and Utilities Uses	--	As determined through the Subdivision, Partition, or Lot Line Adjustment process
Flag Lots	--	Must be sufficient to comply with minimum access requirements of TDC 73C.
MINIMUM SETBACKS		
Front	25 feet	No fence is to be constructed within 5 feet of a public right-of-way.
Side	<u>0-25 feet</u>	<u>As determined through the Architectural Review process.</u>
Rear	25 feet	
Corner Lots	--	On corner lots, the setback is the same as the front yard setback on any side facing a street other than an alley.
Parking and Vehicle Circulation Areas	<u>5 feet</u>	
From any property	10 feet	
From public right-of-way	30 feet	
<u>Fences</u>	<u>5 feet from public right-of-way</u>	
Conditional Uses	--	As determined through Conditional Use Permit and Architectural Review process. No minimum setback must be greater than 50 feet.
MAXIMUM STRUCTURE HEIGHT		
All Uses	50 feet	

[...]

Chapter 73F - Wireless Communications Facilities

Development Code:

Chapter 73F: Wireless Communications Facilities

Details

[...]

Section 73F.020 - Maximum Height. The maximum height for a wireless communication facilities, support structures, and antennas is as follows:

PLANNING DISTRICT	MAXIMUM STRUCTURE HEIGHT
(1) Low Density Residential (RL)	<ul style="list-style-type: none"> • 35 feet
(2) Medium-Low Density Residential (RML)	<ul style="list-style-type: none"> • 35 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(3) Medium-High Density Residential (RMH)	<ul style="list-style-type: none"> • 35 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(4) High Density Residential (RH)	<ul style="list-style-type: none"> • 35 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(5) High Density/High-Rise Residential (RH/HR)	<ul style="list-style-type: none"> • 64 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(6) Institutional (IN)	<ul style="list-style-type: none"> • 50 feet <u>100 feet</u> • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(7) Office Commercial (CO)	<ul style="list-style-type: none"> • 45 feet

	<ul style="list-style-type: none"> • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(8) Neighborhood Commercial (CN)	N/A
(9) Recreational Commercial (CR)	<ul style="list-style-type: none"> • 35 feet
(10) Central Commercial (CC)	<ul style="list-style-type: none"> • 45 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5 • 125 feet maximum height if approved under TDC 53.310(1).
(11) General Commercial (CG)	<ul style="list-style-type: none"> • 45 feet • 60 feet if in the Leveton Tax Increment District • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5 • Maximum structure height for specified portions of the Central Urban Renewal Plan area is: <ul style="list-style-type: none"> ○ 35 feet between the Tualatin Commons central water feature and the primary pedestrian corridor around the central water feature ○ 75 feet in Block 13, unless between the Tualatin Commons central water feature and the primary pedestrian corridor around the central water feature then 35 feet ○ 60 feet in Blocks 1, 2, 3, 5, 14, 15, 16, 17, 18, 19, 20 and 22, unless between the Tualatin Commons central water feature and the primary pedestrian corridor around the central water feature then 35 feet
(12) Mid-Rise/Office Commercial (CO/MR)	<ul style="list-style-type: none"> • 75 feet • 120 feet (including antennas) if structure is within 300 feet

	of the centerline of I-5
(13) Medical Center (MC)	<ul style="list-style-type: none"> • 100 feet • Attached WCFs based on building height regulations in TDC 56.300
(14) Mixed Use Commercial Overlay (MUCOD)	<ul style="list-style-type: none"> • 50 feet if within the Durham Quarry Area • 50 feet if within 100 feet of the Durham Quarry Site Boundary, except that portion of the Boundary contiguous with the City of Tigard • 70 feet if contiguous to the boundary with the City of Tigard • 70 feet if greater than 100 feet from the Durham Quarry Site Boundary
(15) Light Manufacturing (ML)	<ul style="list-style-type: none"> • 100 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(16) General Manufacturing (MG)	<ul style="list-style-type: none"> • 100 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(17) Manufacturing Park (MP)	<ul style="list-style-type: none"> • 100 feet
(18) Manufacturing Business Park (MBP)	<ul style="list-style-type: none"> • 65 feet • 85 feet if all yards adjacent to the structure are not less than a distance equal to one and one-half times the height of the structure • 28 feet if a property line, street, or alley separates MBP land from land in a residential district
(19) Industrial Business Park Overlay (IBP)	<ul style="list-style-type: none"> • 70 feet • 100 feet if approved as a conditional use

	<p>and all yards adjacent to the structure are not less than a distance equal to the height of the structure</p> <ul style="list-style-type: none">• 28 feet if a property line, street, or alley separates IBP land from land in a residential district except as provided in TDC Chapter 32, in which case the maximum permitted structure height may be increased to 100 feet,
--	---

[...]



City of Tualatin

CITY OF TUALATIN Staff Report

TO: Honorable Mayor and Members of the City Council
THROUGH: Sherilyn Lombos, City Manager
FROM: Sean Brady, City Attorney
DATE: 07/08/2019

SUBJECT:

Consideration of **Ordinance No. 1422-19** Amending Tualatin Development Code Chapter 49: Institutional Zone and Chapter 73F: Wireless Communication Facilities (PTA 19-0002); and Amending Map 9-1 To Rezone the City Operations Center Property from Light Manufacturing to Institutional Zone (PMA 19-0002)

RECOMMENDATION:

Staff recommends Council adopt Ordinance No. 1422-19.

EXECUTIVE SUMMARY:

The City of Tualatin submitted an application for PTA 19-0002 and PMA 19-0002 on February 6, 2019. Notice of the PTA and PMA was provided to the Oregon Department of Land Conservation and Development in accordance with ORS 197.610. The City also provided notice of the public hearing, as required by TDC 33.250 and TDC 33.070.

Ordinance No. 1422-19 adopts the Plan Text Amendment (PTA 19-0002) to Chapter 49 and to Chapter 73F and Plan Text Amendment (PMA 19-0002) to Community Plan Map 9-1 to rezone the City Operations Center Property located at 10699 SW Herman Road from the Light Manufacturing to Institutional Zone.

Ordinance No. 1422-19 amends:

- **Community Plan Map 9-1:** to rezone the Operations Center Property from Light Manufacturing to Industrial;
- **TDC Chapter 49: Institutional Zone** to add government offices and public works storage yard as permitted uses and to modify minimum setbacks standards;
- **TDC Chapter 73F: Wireless Communications Facilities** to modify maximum structure height standards in the Institutional Zone.

ATTACHMENTS:

Ordinance No. 1422-19

- Exhibit 1 – PTA 19-0002 and PMA 19-0002 Analysis and Findings
- Exhibit 2 – Amended Map 9-1 - Community Plan Map
- Exhibit 3 – Transportation Impact Analysis (TIA)
- Exhibit 4 – Transportation Planning Rule (TPR) Analysis

- Exhibit 5 – Metro Title 4 – Industrial and Other Employment Areas Map
- Exhibit 6 – Metro Regional Freight Map

ORDINANCE NO. 1422-19

AN ORDINANCE AMENDING TUALATIN DEVELOPMENT CODE CHAPTER 49: INSTITUTIONAL ZONE AND CHAPTER 73F: WIRELESS COMMUNICATION FACILITIES (PTA 19-0002); AND AMENDING MAP 9-1 TO REZONE THE CITY OPERATIONS CENTER PROPERTY FROM LIGHT MANUFACTURING TO INSTITUTIONAL ZONE (PMA 19-0002).

WHEREAS, the Council wishes to amend the Tualatin Comprehensive Plan and Development Code to rezone the City's Operation Center Property, which is a 8.73 acre site located on the northeast corner of Herman Road and 108th Avenue (10699 SW Herman Road), from Light Manufacturing (ML) to the Institutional (IN) zone;

WHEREAS, the Council wishes to add government offices and public works storage yard and shop as Permitted uses in the Institutional Zone (IN);

WHEREAS, the Council wishes to modify minimum setback standards in the Institutional Zone (IN);

WHEREAS, the Council wishes to modify maximum structure height standards for wireless communications facilities in the Institutional Zone (IN);

WHEREAS, upon the application of Community Development Department, a public hearing was held before the City Council of the City of Tualatin on June 10, 2019 and continued to July 8, 2019, to consider adopting the proposed Tualatin Comprehensive Plan and Development Code amendments;

WHEREAS, the City provided notice of proposed amendments to the Oregon Department of Land Conservation and Development, as provided in ORS 197.610;

WHEREAS, the City provided notice of the public hearing, as required by TDC 32.250 and TDC 33.070;

WHEREAS, at the public hearing, the Council heard and considered the testimony and evidence presented by City staff, and those appearing at the public hearing, and approved the proposed amendments; and

WHEREAS, the Council finds the proposed amendments to be in the best interest of the residents and inhabitants of the City and the public, that the public interest will be served by adopting the amendments at this time, the amendments conform to the Tualatin Community Plan (Comprehensive Plan) and the Development Code should be amended.

THE CITY OF TUALATIN ORDAINS AS FOLLOWS:

Section 1. TDC Section 49.100 (Purpose), Section 49.200 (Use Categories) and Table 49-1, Section 49.210 (Additional Limitations on Uses), and Section 49.300 (Development Standards) are amended to read as follows:

Section 49.100 – Purpose. The purpose of the Institutional (IN) Zone is to provide areas of the City that are suitable for public, educational, religious, recreational, and incidental support facilities to serve the community. The Zone is intended to:

- (1) Be consistent with the Institutional land use designation in the Tualatin Community Plan;
- (2) Support lands and facilities that are owned and operated by governmental or nonprofit entities and that serve and benefit the community; and
- (3) Provide for location and development of permitted and conditionally permitted uses in a manner that is harmonious with adjacent and nearby residential, commercial, or manufacturing planning zones and uses; and protects the health, safety, and general welfare of adjacent residential, commercial, and manufacturing uses.

Section 49.200 – Use Categories.

(1) **Use Categories.** Table 49-1 lists use categories Permitted Outright (P) or Conditionally Permitted (C) in the IN zone. Use categories may also be designated as Limited (L) and subject to the limitations listed in Table 49-1 and restrictions identified in TDC 49.210. Limitations may restrict the specific type of use, location, size, or other characteristics of the use category. Use categories which are not listed are prohibited within the zone, except for uses which are found by the City Manager or appointee to be of a similar character and to meet the purpose of this zone, as provided in TDC 31.070.

(2) **Overlay Zones.** Additional uses may be allowed in a particular overlay zone. See the overlay zone Chapters for additional uses.

**Table 49-1
Use Categories in the IN Zone**

USE CATEGORY	STATUS	LIMITATIONS AND CODE REFERENCES
INSTITUTIONAL USE CATEGORIES		
Assembly Facilities	P (L)	Permitted uses limited to places of religious worship.
Community Services	P/C (L)	Permitted uses limited to public recreation buildings and facilities: <ul style="list-style-type: none"> o Community recreation building; o Indoor community aquatic centers. Conditional uses limited to outdoor public community aquatic centers
Schools	P	--
<u>Offices</u>	<u>P (L)</u>	<u>Permitted uses limited to government offices.</u>
INFRASTRUCTURE AND UTILITIES USE CATEGORIES		
<u>Public Safety and Utility Facilities</u>	<u>P (L)</u>	<u>Permitted uses limited to public works storage yard and shop.</u>

USE CATEGORY	STATUS	LIMITATIONS AND CODE REFERENCES
Basic Utilities	P/C (L)	Permitted uses limited to water or sewage pump stations and pressure reading stations. Conditional uses limited to: <ul style="list-style-type: none"> ○ Water reservoirs; ○ Electrical substation; and ○ Natural gas pumping station.
Greenways and Natural Areas	P	--
Parks and Open Space	P (L)	Permitted uses limited to: <ul style="list-style-type: none"> ○ Government-owned parks; and ○ Sports fields and tennis courts.
Transportation Facilities	P	--
Wireless Communication Facility	P (L)	Must be located within 300 feet of the centerline of Interstate 5 and s <u>Subject to maximum height and minimum setback standards in TDC Chapter 73F.</u>

Section 49.210 – Additional Limitations on Uses.

(1) **Accessory Uses Conditionally Permitted.** The following uses may be permitted as a conditional use when incidental and subordinate to a permitted or conditionally permitted primary use:

- (a) Child day care center;
- (b) Exterior lighting, if the height of the fixture or standard is greater than the tallest permitted building on the site; and
- (c) Outdoor public address or audio amplification system; and
- ~~(d) Wireless Communication Facility.~~

Section 49.300 – Development Standards. Development standards in the IN zone are listed in Table 49-2. Additional standards may apply to some uses and situations, see TDC 49.310.

**Table 49-2
Development Standards in the IN Zone**

STANDARD	REQUIREMENT	LIMITATIONS AND CODE REFERENCES
MINIMUM LOT SIZE		
All Uses	1.5 acres	
MINIMUM LOT WIDTH		
Minimum Average Lot Width	100 feet	When lot has frontage on public street, minimum lot width is 40 feet.
Infrastructure and Utilities Uses	--	As determined through the Subdivision, Partition, or Lot Line Adjustment process
Flag Lots	--	Must be sufficient to comply with minimum access requirements of TDC 73C.
MINIMUM SETBACKS		
Front	25 feet	No fence is to be constructed within 5 feet of a public right-of-way.
Side	<u>0-25 feet</u>	<u>As determined through the Architectural Review process.</u>
Rear	25 feet	
Corner Lots	--	On corner lots, the setback is the same as the front yard setback on any side facing a street other than an alley.
Parking and Vehicle Circulation Areas	<u>5 feet</u>	
⊖ From any property	10 feet	
⊖ From public right-of-way	30 feet	
<u>Fences</u>	<u>5 feet from public right-of-way</u>	
Conditional Uses	--	As determined through Conditional Use Permit and Architectural Review process. No minimum setback must be greater than 50 feet.
MAXIMUM STRUCTURE HEIGHT		
All Uses	50 feet	

Section 2. TDC Section 73F.020 (Maximum Height) is amended to read as follows:

Section 73F.020 - Maximum Height. The maximum height for a wireless communication facilities, support structures, and antennas is as follows:

PLANNING DISTRICT	MAXIMUM STRUCTURE HEIGHT
(1) Low Density Residential (RL)	<ul style="list-style-type: none"> • 35 feet
(2) Medium-Low Density Residential (RML)	<ul style="list-style-type: none"> • 35 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(3) Medium-High Density Residential (RMH)	<ul style="list-style-type: none"> • 35 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(4) High Density Residential (RH)	<ul style="list-style-type: none"> • 35 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(5) High Density/High-Rise Residential (RH/HR)	<ul style="list-style-type: none"> • 64 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(6) Institutional (IN)	<ul style="list-style-type: none"> • 50 feet <u>100 feet</u> • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(7) Office Commercial (CO)	<ul style="list-style-type: none"> • 45 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
(8) Neighborhood Commercial (CN)	N/A
(9) Recreational Commercial (CR)	<ul style="list-style-type: none"> • 35 feet

<p>(10) Central Commercial (CC)</p>	<ul style="list-style-type: none"> • 45 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5 • 125 feet maximum height if approved under TDC 53.310(1).
<p>(11) General Commercial (CG)</p>	<ul style="list-style-type: none"> • 45 feet • 60 feet if in the Leveton Tax Increment District • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5 • Maximum structure height for specified portions of the Central Urban Renewal Plan area is: <ul style="list-style-type: none"> ○ 35 feet between the Tualatin Commons central water feature and the primary pedestrian corridor around the central water feature ○ 75 feet in Block 13, unless between the Tualatin Commons central water feature and the primary pedestrian corridor around the central water feature then 35 feet ○ 60 feet in Blocks 1, 2, 3, 5, 14, 15, 16, 17, 18, 19, 20 and 22, unless between the Tualatin Commons central water feature and the primary pedestrian corridor around the central water feature then 35 feet
<p>(12) Mid-Rise/Office Commercial (CO/MR)</p>	<ul style="list-style-type: none"> • 75 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
<p>(13) Medical Center (MC)</p>	<ul style="list-style-type: none"> • 100 feet • Attached WCFs based on building height regulations in TDC 56.300

<p>(14) Mixed Use Commercial Overlay (MUCOD)</p>	<ul style="list-style-type: none"> • 50 feet if within the Durham Quarry Area • 50 feet if within 100 feet of the Durham Quarry Site Boundary, except that portion of the Boundary contiguous with the City of Tigard • 70 feet if contiguous to the boundary with the City of Tigard • 70 feet if greater than 100 feet from the Durham Quarry Site Boundary
<p>(15) Light Manufacturing (ML)</p>	<ul style="list-style-type: none"> • 100 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
<p>(16) General Manufacturing (MG)</p>	<ul style="list-style-type: none"> • 100 feet • 120 feet (including antennas) if structure is within 300 feet of the centerline of I-5
<p>(17) Manufacturing Park (MP)</p>	<ul style="list-style-type: none"> • 100 feet
<p>(18) Manufacturing Business Park (MBP)</p>	<ul style="list-style-type: none"> • 65 feet • 85 feet if all yards adjacent to the structure are not less than a distance equal to one and one-half times the height of the structure • 28 feet if a property line, street, or alley separates MBP land from land in a residential district
<p>(19) Industrial Business Park Overlay (IBP)</p>	<ul style="list-style-type: none"> • 70 feet • 100 feet if approved as a conditional use and all yards adjacent to the structure are not less than a distance equal to the height of the structure • 28 feet if a property line, street, or alley separates IBP land from land in a residential district except as provided in TDC Chapter

	32, in which case the maximum permitted structure height may be increased to 100 feet,
--	--

Section 3. Tualatin Community Plan Map 9-1 is amended as shown on Exhibit 2, which is attached and incorporated by reference.

Section 4. Findings. The Council adopts the Findings as set forth in Exhibit 1, which is attached and incorporated by reference. In support of its Findings, the Council also adopts those materials referenced in the Findings, and which are attached as Exhibits 2 through 6, which are attached and incorporated by reference.

Section 5. Severability. Each section of this ordinance, and any part thereof is severable. If any part of this ordinance is held invalid by a court of competent jurisdiction, the remainder of this ordinance remains in full force and effect.

Section 6. Effective Date. As provided in the Tualatin Charter, this ordinance is effective 30 days from the date of adoption.

ADOPTED by the City Council this ____ day of July, 2019.

CITY OF TUALATIN, OREGON

BY _____
Mayor

APPROVED AS TO FORM

ATTEST:

BY _____
City Attorney

BY _____
City Recorder



City of Tualatin

www.tualatinoregon.gov

July 08, 2019

Analysis and Findings for PTA 19-0002 and PMA 19-0002

Case #:	PTA 19-0002 and PMA 19-0002
Project:	Tualatin Services Center
Location:	10699 SW Herman Road; Tax lots: 2S1 22AD 200 and 300
Applicant:	Clayton Reynolds, Maintenance Services Manager
Owner:	City of Tualatin

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I. INTRODUCTION

A. Applicable Criteria

Applicable Statewide Planning Goals; Divisions 9 and 12 of the Oregon Administrative Rules; Title 4 of Metro Chapter 3.07 (Urban Growth Management Functional Plan); applicable Goals and Policies from the City of Tualatin Comprehensive Plan; applicable Sections of the City of Tualatin Development Code, including Section 33.070 (Plan Amendments).

B. Project Description

The applicant requests approval of a Comprehensive Plan Text Amendment (PTA 19-0002) that would add government offices and public works storage yard and shop as Permitted uses in the Institutional Zone (IN). The applicant also requests approval of a Plan Map Amendment (PMA 19-0002) to change the zoning on an approximately 8.73 acre site that is located on the northeast corner of Herman Road and 108th Avenue (10699 SW Herman Road) from Light Manufacturing (ML) to Institutional (IN).

The subject site is presently developed with approximately four buildings, surface parking areas, and landscaping. Access is provided via one driveway located on Herman Road and two gated access points on 108th Avenue. The site is presently the home of the City's Public Works Department, and also supports the Street/Sewer/Storm, Water, and portions of the Engineering Division.

The proposed amendments would facilitate future development of a government office building which would allow for the siting of a unified permitting and development services center on City-owned property. The building would house approximately 65 staff members and would also be the future home of the City's Community Development Department (Planning and Building Divisions), Engineering Division, and potentially Municipal Court. Future structural and site development would be reviewed under a subsequent Architectural Review application.

C. Site Description and Surrounding Uses

Surrounding uses include a variety of industrial uses:

North: Light Manufacturing (ML)

- DOT Storage
- Ascentec Engineering

South: General Manufacturing (MG)

- Herman Road
- CFN Cardlock

West: Light Manufacturing (ML)

- 108th Avenue
- NW Metal Fab

East: Light Manufacturing (ML)

- Pacific Foods

Figure 1: Aerial view of subject site (highlighted)



D. Exhibit List

- 2 - Amended Map 9-1 – Community Plan Map
- 3 - Transportation Impact Analysis (TIA)
- 4 - Transportation Planning Rule (TPR) Analysis
- 5- Metro Title 4 – Industrial and Other Employment Areas Map
- 6- Metro Regional Freight Map

II. FINDINGS

A. The following Oregon Statewide Planning Goals are applicable to the proposed amendments:

Goal 1 – Citizen Involvement

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Finding:

Notice of the proposed amendments has been provided pursuant to Sections 32.240 and 33.070. The Tualatin Planning Commission will hold a public meeting on May 16, 2019, and the City Council will hold a public hearing on the proposed amendments on June 10, 2019. The proposed amendments conform to Goal 1.

Goal 2 – Land Use Planning

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

[...]

Finding:

The proposed amendments have been reviewed pursuant to the City's established land use planning process and procedures. The proposed amendments conform to Goal 2.

Goal 5 – Open Spaces, Scenic and Historic Area, and Natural Resource

Finding:

Applicability of Goal 5 to post-acknowledgment plan amendments is governed by OAR 660- 023-0250. The proposed map amendments do not modify the acknowledged Goal 5 resource list, or a policy that addresses specific requirements of Goal 5. The proposed amendments do not allow uses that would conflict with a particular Goal 5 resource site on an acknowledged resource list. The proposed amendments conform to Goal 5.

Goal 6 – Air, Water and Land Resources Quality

Finding:

The proposal does not affect policies associated with Goal 6 established by the Comprehensive Plan. As reported in the previous findings for Goal 5, the proposed Comprehensive Plan/Zoning Map Amendment will continue to preserve environmentally sensitive lands. The Oregon Department of Environmental Quality (DEQ) regulates air, water and land with Clean Water Act (CWA) Section 401 Water Quality, Water Quality Certificate, State 303(d) listed waters, Hazardous Wastes, Clean Air Act (CAA), and Section 402 NPDES Construction and Stormwater Permits. The Oregon Department of State Lands and the U.S. Army Corps of Engineers regulate jurisdictional wetlands and CWA Section 404 water of the state and the country respectively. Clean Water Services (SWC) coordinates storm water

management, water quality and stream enhancement projects throughout the city. Future development will still need to comply with these state, national and regional regulations and protections for air, water and land resources. The proposed amendments conform to Goal 6.

Goal 7 – Areas Subject to Natural Disasters and Hazards

Finding:

The proposed amendments do not affect policies associated with Goal 7 established by the Comprehensive Plan. Approval of the proposed amendments will not eliminate the requirement for future development to meet the requirements of the Chapters 70 and 72 of the Tualatin Development Code. The proposed amendments conform to Goal 7.

Goal 9 – Economy of the State

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

[...]

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, which will increase economic opportunities relative to the existing site development. The proposed amendments conform to Goal 9.

Goal 11 – Public Facilities and Services

Finding:

The subject site is adequately served by public facilities and services. The development that would be facilitated by the proposed amendments is not anticipated to result in a “significant” impact to the transportation system. No amendments to the public facilities plans are necessary in order to accommodate the proposed map amendment. The proposed amendments conform to Goal 12.

Goal 12 – Transportation

To provide and encourage a safe, convenient and economic transportation system.

[...]

Goal 12 requires the provision and encouragement of a safe, convenient, multimodal and economic transportation system. The proposed amendments are consistent with the City’s acknowledged policies and strategies for the provision of transportation facilities and services as required by Goal 12 the Transportation Planning Rule (TPR), the findings for which are found under Oregon Administrative Rules Chapter 660, Division 12. The proposed amendments conform to Goal 12.

B. The following Oregon Administrative Rules (OAR) are applicable to the proposed amendments:

OAR Chapter 660, Division 9 (Economic Development)

660-009-0010

Application

[...]

(4) For a post-acknowledgement plan amendment under OAR chapter 660, division 18, that changes the plan designation of land in excess of two acres within an existing urban growth boundary from an industrial use designation to a non-industrial use designation, or another employment use designation to any other use designation, a city or county must address all applicable planning requirements, and:

(a) Demonstrate that the proposed amendment is consistent with its most recent economic opportunities analysis and the parts of its acknowledged comprehensive plan which address the requirements of this division; or

(b) Amend its comprehensive plan to incorporate the proposed amendment, consistent with the requirements of this division; or

(c) Adopt a combination of the above, consistent with the requirements of this division.

(5) The effort necessary to comply with OAR 660-009-0015 through 660-009-0030 will vary depending upon the size of the jurisdiction, the detail of previous economic development planning efforts, and the extent of new information on national, state, regional, county, and local economic trends. A jurisdiction's planning effort is adequate if it uses the best available or readily collectable information to respond to the requirements of this division.

(6) The amendments to this division are effective January 1, 2007. A city or county may voluntarily follow adopted amendments to this division prior to the effective date of the adopted amendments.

[...]

Finding:

Although the proposed amendment would change the plan designation of land in excess of two acres within an existing urban growth boundary from an industrial use designation (Light Manufacturing Zone (ML)) to a non-industrial use designation (Institutional Zone (IN)), the proposed amendments are otherwise consistent with the City's acknowledged comprehensive plan and would facilitate future development of government offices employing approximately 65 people, which will increase economic opportunities relative to the existing site development. The proposed amendments are consistent with these requirements.

OAR Chapter 660, Division 12 (Transportation Planning)

[...]

660-012-0060

Plan and Land Use Regulation Amendments

(1) If an amendment to a functional plan, an acknowledged comprehensive plan, or a land use regulation (including a zoning map) would significantly affect an existing or planned transportation facility, then the local government must put in place measures as provided in section (2) of this rule, unless the amendment is allowed under section (3), (9) or (10) of this rule. A plan or land use regulation amendment significantly affects a transportation facility if it would:

(a) Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan);

(b) Change standards implementing a functional classification system; or

(c) Result in any of the effects listed in paragraphs (A) through (C) of this subsection based on projected conditions measured at the end of the planning period identified in the adopted TSP. As part of evaluating projected conditions, the amount of traffic projected to be generated within the area of the amendment may be reduced if the amendment includes an enforceable, ongoing requirement that would demonstrably limit traffic generation, including, but not limited to, transportation demand management. This reduction may diminish or completely eliminate the significant effect of the amendment.

(A) Types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

(B) Degrade the performance of an existing or planned transportation facility such that it would not meet the performance standards identified in the TSP or comprehensive plan; or

(C) Degrade the performance of an existing or planned transportation facility that is otherwise projected to not meet the performance standards identified in the TSP or comprehensive plan.

(2) If a local government determines that there would be a significant effect, then the local government must ensure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility measured at the end of the planning period identified in the adopted TSP through one or a combination of the remedies listed in (a) through (e) below, unless the amendment meets the balancing test in subsection (2)(e) of this section or qualifies for partial mitigation in section (11) of this rule. A local government using subsection (2)(e), section (3), section (10) or section (11) to approve an amendment recognizes that additional motor vehicle traffic congestion may result and that other facility providers would not be expected to provide additional capacity for motor vehicles in response to this congestion.

(a) Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

(b) Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of this division; such amendments shall include a funding plan or mechanism consistent with section (4) or include an amendment to the transportation finance plan so that the facility, improvement, or service will be provided by the end of the planning period.

(c) Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

(d) Providing other measures as a condition of development or through a development agreement or similar funding method, including, but not limited to, transportation system management measures or minor transportation improvements. Local governments shall, as part of the amendment, specify when measures or improvements provided pursuant to this subsection will be provided.

(e) Providing improvements that would benefit modes other than the significantly affected mode, improvements to facilities other than the significantly affected facility, or improvements at other locations, if:

(A) The provider of the significantly affected facility provides a written statement that the system-wide benefits are sufficient to balance the significant effect, even though the improvements would not result in consistency for all performance standards;

(B) The providers of facilities being improved at other locations provide written statements of approval; and

(C) The local jurisdictions where facilities are being improved provide written statements of approval.

(3) Notwithstanding sections (1) and (2) of this rule, a local government may approve an amendment that would significantly affect an existing transportation facility without assuring that the allowed land uses are consistent with the function, capacity and performance standards of the facility where:

(a) In the absence of the amendment, planned transportation facilities, improvements and services as set forth in section (4) of this rule would not be adequate to achieve consistency with the identified function, capacity or performance standard for that facility by the end of the planning period identified in the adopted TSP;

(b) Development resulting from the amendment will, at a minimum, mitigate the impacts of the amendment in a manner that avoids further degradation to the performance of the facility by the time of the development through one or a combination of transportation improvements or measures;

(c) The amendment does not involve property located in an interchange area as defined in paragraph (4)(d)(C); and

(d) For affected state highways, ODOT provides a written statement that the proposed funding and timing for the identified mitigation improvements or measures are, at a minimum, sufficient to avoid further degradation to the performance of the affected state highway. However, if a local government provides the appropriate ODOT regional office with written notice of a proposed amendment in a manner that provides ODOT reasonable opportunity to submit a written statement into the record of the local government proceeding, and ODOT does not provide a written statement, then the local government may proceed with applying subsections (a) through (c) of this section.

(4) Determinations under sections (1)–(3) of this rule shall be coordinated with affected transportation facility and service providers and other affected local governments.

(a) In determining whether an amendment has a significant effect on an existing or planned transportation facility under subsection (1)(c) of this rule, local governments shall rely on existing transportation facilities and services and on the planned transportation facilities, improvements and services set forth in subsections (b) and (c) below.

(b) Outside of interstate interchange areas, the following are considered planned facilities, improvements and services:

(A) Transportation facilities, improvements or services that are funded for construction or implementation in the Statewide Transportation Improvement Program or a locally or regionally adopted transportation improvement program or capital improvement plan or program of a transportation service provider.

(B) Transportation facilities, improvements or services that are authorized in a local transportation system plan and for which a funding plan or mechanism is in place or approved. These include, but are not limited to, transportation facilities, improvements or services for which: transportation systems development charge revenues are being collected; a local improvement district or reimbursement district has been established or will be established prior to development; a development agreement has been adopted; or conditions of approval to fund the improvement have been adopted.

(C) Transportation facilities, improvements or services in a metropolitan planning organization (MPO) area that are part of the area's federally-approved, financially constrained regional transportation system plan.

(D) Improvements to state highways that are included as planned improvements in a regional or local transportation system plan or comprehensive plan when ODOT provides a written statement that the improvements are reasonably likely to be provided by the end of the planning period.

(E) Improvements to regional and local roads, streets or other transportation facilities or services that are included as planned improvements in a regional or local transportation system plan or comprehensive plan when the local government(s) or transportation service provider(s) responsible for the facility, improvement or service provides a written statement that the facility, improvement or service is reasonably likely to be provided by the end of the planning period.

(c) Within interstate interchange areas, the improvements included in (b)(A)–(C) are considered planned facilities, improvements and services, except where:

(A) ODOT provides a written statement that the proposed funding and timing of mitigation measures are sufficient to avoid a significant adverse impact on the Interstate Highway system, then local governments may also rely on the improvements identified in paragraphs (b)(D) and (E) of this section; or

(B) There is an adopted interchange area management plan, then local governments may also rely on the improvements identified in that plan and which are also identified in paragraphs (b)(D) and (E) of this section.

(d) As used in this section and section (3):

(A) Planned interchange means new interchanges and relocation of existing interchanges that are authorized in an adopted transportation system plan or comprehensive plan;

(B) Interstate highway means Interstates 5, 82, 84, 105, 205 and 405; and

(C) Interstate interchange area means:

(i) Property within one-quarter mile of the ramp terminal intersection of an existing or planned interchange on an Interstate Highway; or

(ii) The interchange area as defined in the Interchange Area Management Plan adopted as an amendment to the Oregon Highway Plan.

(e) For purposes of this section, a written statement provided pursuant to paragraphs (b)(D), (b)(E) or (c)(A) provided by ODOT, a local government or transportation facility provider, as appropriate, shall be conclusive in determining whether a transportation facility, improvement or service is a planned transportation facility, improvement or service. In the absence of a written statement, a local government can only rely upon planned transportation facilities, improvements and services identified in paragraphs (b)(A)–(C) to determine whether there is a significant effect that requires application of the remedies in section (2).

(5) The presence of a transportation facility or improvement shall not be a basis for an exception to allow residential, commercial, institutional or industrial development on rural lands under this division or OAR 660-004-0022 and 660-004-0028.

(6) In determining whether proposed land uses would affect or be consistent with planned transportation facilities as provided in sections (1) and (2), local governments shall give full credit for potential reduction in vehicle trips for uses located in mixed-use, pedestrian-friendly centers, and neighborhoods as provided in subsections (a)–(d) below;

(a) Absent adopted local standards or detailed information about the vehicle trip reduction benefits of mixed-use, pedestrian-friendly development, local governments shall assume that uses located within a mixed-use, pedestrian-friendly center, or neighborhood, will generate 10% fewer daily and peak hour trips than are specified in available published estimates, such as those provided by the Institute of Transportation Engineers (ITE) Trip Generation Manual that do not specifically account for the effects of mixed-use, pedestrian-friendly development. The 10% reduction allowed for by this section shall be available only if uses which rely solely on auto trips, such as gas stations, car washes, storage facilities, and motels are prohibited;

(b) Local governments shall use detailed or local information about the trip reduction benefits of mixed-use, pedestrian-friendly development where such information is available and presented to the local government. Local governments may, based on such information, allow reductions greater than the 10% reduction required in subsection (a) above;

(c) Where a local government assumes or estimates lower vehicle trip generation as provided in subsection (a) or (b) above, it shall assure through conditions of approval, site plans, or approval standards that subsequent development approvals support the development of a mixed-use, pedestrian-friendly center or neighborhood and provide for on-site bike and pedestrian connectivity and access to transit as provided for in OAR 660-012-0045(3) and (4). The provision of on-site bike and pedestrian connectivity and access to transit may be accomplished through application of acknowledged ordinance provisions which comply with 660-012-0045(3) and (4) or through conditions of approval or findings adopted with the plan amendment that assure compliance with these rule requirements at the time of development approval; and

(d) The purpose of this section is to provide an incentive for the designation and implementation of pedestrian-friendly, mixed-use centers and neighborhoods by lowering the regulatory barriers to plan amendments which accomplish this type of development. The actual trip reduction benefits of mixed-use, pedestrian-friendly development will vary from case to case and may be somewhat higher or lower than presumed pursuant to subsection (a) above. The Commission concludes that this assumption is warranted given general information about the expected effects of mixed-use, pedestrian-friendly development and its intent to encourage changes to plans and development

patterns. Nothing in this section is intended to affect the application of provisions in local plans or ordinances which provide for the calculation or assessment of systems development charges or in preparing conformity determinations required under the federal Clean Air Act.

(7) Amendments to acknowledged comprehensive plans and land use regulations which meet all of the criteria listed in subsections (a)–(c) below shall include an amendment to the comprehensive plan, transportation system plan the adoption of a local street plan, access management plan, future street plan or other binding local transportation plan to provide for on-site alignment of streets or accessways with existing and planned arterial, collector, and local streets surrounding the site as necessary to implement the requirements in OAR 660-012-0020(2)(b) and 660-012-0045(3):

(a) The plan or land use regulation amendment results in designation of two or more acres of land for commercial use;

(b) The local government has not adopted a TSP or local street plan which complies with OAR 660-012-0020(2)(b) or, in the Portland Metropolitan Area, has not complied with Metro's requirement for street connectivity as contained in Title 6, Section 3 of the Urban Growth Management Functional Plan; and

(c) The proposed amendment would significantly affect a transportation facility as provided in section (1).

(8) A "mixed-use, pedestrian-friendly center or neighborhood" for the purposes of this rule, means:

(a) Any one of the following:

(A) An existing central business district or downtown;

(B) An area designated as a central city, regional center, town center or main street in the Portland Metro 2040 Regional Growth Concept;

(C) An area designated in an acknowledged comprehensive plan as a transit oriented development or a pedestrian district; or

(D) An area designated as a special transportation area as provided for in the Oregon Highway Plan.

(b) An area other than those listed in subsection (a) above which includes or is planned to include the following characteristics:

(A) A concentration of a variety of land uses in a well-defined area, including the following:

(i) Medium to high density residential development (12 or more units per acre);

(ii) Offices or office buildings;

(iii) Retail stores and services;

(iv) Restaurants; and

(v) Public open space or private open space which is available for public use, such as a park or plaza.

(B) Generally include civic or cultural uses;

(C) A core commercial area where multi-story buildings are permitted;

(D) Buildings and building entrances oriented to streets;

(E) Street connections and crossings that make the center safe and conveniently accessible from adjacent areas;

(F) A network of streets and, where appropriate, accessways and major driveways that make it attractive and highly convenient for people to walk between uses within the center or neighborhood, including streets and major driveways within the center with wide sidewalks and other features, including pedestrian-oriented street crossings, street trees, pedestrian-scale lighting and on-street parking;

(G) One or more transit stops (in urban areas with fixed route transit service); and

(H) Limit or do not allow low-intensity or land extensive uses, such as most industrial uses, automobile sales and services, and drive-through services.

(9) Notwithstanding section (1) of this rule, a local government may find that an amendment to a zoning map does not significantly affect an existing or planned transportation facility if all of the following requirements are met.

(a) The proposed zoning is consistent with the existing comprehensive plan map designation and the amendment does not change the comprehensive plan map;

(b) The local government has an acknowledged TSP and the proposed zoning is consistent with the TSP; and

(c) The area subject to the zoning map amendment was not exempted from this rule at the time of an urban growth boundary amendment as permitted in OAR 660-024-0020(1)(d), or the area was exempted from this rule but the local government has a subsequently acknowledged TSP amendment that accounted for urbanization of the area.

(10) Notwithstanding sections (1) and (2) of this rule, a local government may amend a functional plan, a comprehensive plan or a land use regulation without applying performance standards related to motor vehicle traffic congestion (e.g. volume to capacity ratio or V/C), delay or travel time if the amendment meets the requirements of subsection (a) of this section. This section does not exempt a proposed amendment from other transportation performance standards or policies that may apply including, but not limited to, safety for all modes, network connectivity for all modes (e.g. sidewalks, bicycle lanes) and accessibility for freight vehicles of a size and frequency required by the development.

(a) A proposed amendment qualifies for this section if it:

(A) Is a map or text amendment affecting only land entirely within a multimodal mixed-use area (MMA); and

(B) Is consistent with the definition of an MMA and consistent with the function of the MMA as described in the findings designating the MMA.

(b) For the purpose of this rule, “multimodal mixed-use area” or “MMA” means an area:

(A) With a boundary adopted by a local government as provided in subsection (d) or (e) of this section and that has been acknowledged;

(B) Entirely within an urban growth boundary;

(C) With adopted plans and development regulations that allow the uses listed in paragraphs (8)(b)(A) through (C) of this rule and that require new development to be consistent with the characteristics listed in paragraphs (8)(b)(D) through (H) of this rule;

(D) With land use regulations that do not require the provision of off-street parking, or regulations that require lower levels of off-street parking than required in other areas and allow flexibility to meet the parking requirements (e.g. count on-street parking, allow long-term leases, allow shared parking); and

(E) Located in one or more of the categories below:

(i) At least one-quarter mile from any ramp terminal intersection of existing or planned interchanges;

(ii) Within the area of an adopted Interchange Area Management Plan (IAMP) and consistent with the IAMP; or

(iii) Within one-quarter mile of a ramp terminal intersection of an existing or planned interchange if the mainline facility provider has provided written concurrence with the MMA designation as provided in subsection (c) of this section.

(c) When a mainline facility provider reviews an MMA designation as provided in subparagraph (b)(E)(iii) of this section, the provider must consider the factors listed in paragraph (A) of this subsection.

(A) The potential for operational or safety effects to the interchange area and the mainline highway, specifically considering:

(i) Whether the interchange area has a crash rate that is higher than the statewide crash rate for similar facilities;

(ii) Whether the interchange area is in the top ten percent of locations identified by the safety priority index system (SPIS) developed by ODOT; and

(iii) Whether existing or potential future traffic queues on the interchange exit ramps extend onto the mainline highway or the portion of the ramp needed to safely accommodate deceleration.

(B) If there are operational or safety effects as described in paragraph (A) of this subsection, the effects may be addressed by an agreement between the local government and the facility provider regarding traffic management plans favoring traffic movements away from the interchange, particularly those facilitating clearing traffic queues on the interchange exit ramps.

(d) A local government may designate an MMA by adopting an amendment to the comprehensive plan or land use regulations to delineate the boundary following an existing zone, multiple existing zones, an urban renewal area, other existing boundary, or establishing a new boundary. The designation must be accompanied by findings showing how the area meets the definition of an MMA. Designation of an MMA is not subject to the requirements in sections (1) and (2) of this rule.

(e) A local government may designate an MMA on an area where comprehensive plan map designations or land use regulations do not meet the definition, if all of the other elements meet the definition, by concurrently adopting comprehensive plan or land use regulation amendments necessary to meet the definition. Such amendments are not subject to performance standards related to motor vehicle traffic congestion, delay or travel time.

(11) A local government may approve an amendment with partial mitigation as provided in section (2) of this rule if the amendment complies with subsection (a) of this section, the amendment meets the balancing test in subsection (b) of this section, and the local government coordinates as provided in subsection (c) of this section.

(a) The amendment must meet paragraphs (A) and (B) of this subsection or meet paragraph (D) of this subsection.

(A) Create direct benefits in terms of industrial or traded-sector jobs created or retained by limiting uses to industrial or traded-sector industries.

(B) Not allow retail uses, except limited retail incidental to industrial or traded sector development, not to exceed five percent of the net developable area.

(C) For the purpose of this section:

(i) “Industrial” means employment activities generating income from the production, handling or distribution of goods including, but not limited to, manufacturing, assembly, fabrication, processing, storage, logistics, warehousing, importation, distribution and transshipment and research and development.

(ii) “Traded-sector” means industries in which member firms sell their goods or services into markets for which national or international competition exists.

(D) Notwithstanding paragraphs (A) and (B) of this subsection, an amendment complies with subsection (a) if all of the following conditions are met:

(i) The amendment is within a city with a population less than 10,000 and outside of a Metropolitan Planning Organization.

(ii) The amendment would provide land for “Other Employment Use” or “Prime Industrial Land” as those terms are defined in OAR 660-009-0005.

(iii) The amendment is located outside of the Willamette Valley as defined in ORS 215.010.

(E) The provisions of paragraph (D) of this subsection are repealed on January 1, 2017.

(b) A local government may accept partial mitigation only if the local government determines that the benefits outweigh the negative effects on local transportation facilities and the local government receives from the provider of any transportation facility that would be significantly affected written concurrence that the benefits outweigh the negative effects on their transportation facilities. If the amendment significantly affects a state highway, then ODOT must coordinate with the Oregon Business Development Department regarding the economic and job creation benefits of the proposed amendment as defined in subsection (a) of this section. The requirement to obtain concurrence from a provider is satisfied if the local government provides notice as required by subsection (c) of this section and the provider does not respond in writing (either concurring or non-concurring) within forty-five days.

(c) A local government that proposes to use this section must coordinate with Oregon Business Development Department, Department of Land Conservation and Development, area commission on transportation, metropolitan planning organization, and transportation providers and local governments directly impacted by the proposal to allow opportunities for comments on whether the

proposed amendment meets the definition of economic development, how it would affect transportation facilities and the adequacy of proposed mitigation. Informal consultation is encouraged throughout the process starting with pre-application meetings. Coordination has the meaning given in ORS 197.015 and Goal 2 and must include notice at least 45 days before the first evidentiary hearing. Notice must include the following:

(A) Proposed amendment.

(B) Proposed mitigating actions from section (2) of this rule.

(C) Analysis and projections of the extent to which the proposed amendment in combination with proposed mitigating actions would fall short of being consistent with the function, capacity, and performance standards of transportation facilities.

(D) Findings showing how the proposed amendment meets the requirements of subsection (a) of this section.

(E) Findings showing that the benefits of the proposed amendment outweigh the negative effects on transportation facilities.

[...]

Finding:

As identified in the provided Transportation Planning Rule (TPR) analysis Exhibits 3 and 4, the trip generation potential for the existing zoning (ML) and proposed zoning (IN) was calculated using site redevelopment assumptions for a reasonable worst-case use and ITE trip generation rates. Applying the reasonable worst case scenario to the subject site, the proposed Plan Map Amendment (from ML to IN) would have the potential to add an increase of approximately 155 (219-64) p.m. peak hour vehicle trips, which would potentially create a significant effect on the transportation system.

In order to mitigate for this potential effect, the applicant proposes a trip cap with the amendments that would limit site trips and not further degrade the transportation system. The provided TPR analysis indicates that a trip cap of 80 p.m. peak hour trips would result in the proposed amendment not having a significant effect on the transportation system. Subject to imposition of the aforementioned trip cap, these criteria are met.

C. The following Chapter and Titles of Metro Code are applicable to the proposed amendments:

Chapter 3.07, Urban Growth Management Functional Plan

[...]

Title 4: Industrial and Other Employment Areas

[...]

3.07.450 Employment and Industrial Areas Map

(a) The Employment and Industrial Areas Map is the official depiction of the boundaries of Regionally Significant Industrial Areas, Industrial Areas and Employment Areas.

[...]

(c) A city or county may amend its comprehensive plan or zoning regulations to change its designation of land on the Employment and Industrial Areas Map in order to allow uses not allowed by this title upon a demonstration that:

(1) The property is not surrounded by land designated on the map as Industrial Area, Regionally Significant Industrial Area or a combination of the two;

Finding:

The subject site is adjacent to Herman Road to the south, south of which is railroad right-of-way, and 108th Avenue to the west and is therefore not “surrounding” by properties designated as Industrial or Regionally Significant Industrial Area. This criterion is met.

(2) The amendment will not reduce the employment capacity of the city or county;

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, which will increase the employment capacity of the subject site and the City overall. This criterion is met.

(3) If the map designates the property as Regionally Significant Industrial Area, the subject property does not have access to specialized services, such as redundant electrical power or industrial gases, and is not proximate to freight loading and unloading facilities, such as trans-shipment facilities;

Finding:

The site is designated as Industrial not Regionally Significant Industrial Area. This criterion is not applicable.

(4) The amendment would not allow uses that would reduce off-peak performance on Main Roadway Routes and Roadway Connectors shown on the Regional Freight Network Map in the RTP below volume-to capacity standards in the plan, unless mitigating action is taken that will restore performance to RTP standards within two years after approval of uses;

[...]

Finding:

Herman Road and 108th Avenue are not designated as Main Roadway Routes or Roadway Connectors on the Regional Freight Network Map. This criterion is not applicable.

(6) If the map designates the property as Regionally Significant Industrial Area, the property subject to the amendment is ten acres or less; if designated Industrial Area, the property subject to the amendment is 20 acres or less; if designated Employment Area, the property subject to the amendment is 40 acres or less.

[...]

Finding:

The subject site is a less than 20 acre site, designated as Industrial on the Employment and Industrial Areas Map. This criterion is met.

D. The following Chapters of the Tualatin Comprehensive Plan are applicable to the proposed amendments:

Chapter 9. Plan Map

Finding:

The proposed amendments would apply the IN designation to the subject site and amend Community Plan Map 9-1. This objective is met.

Chapter 11. Transportation

Section 11.610. Transportation Goals and Objectives

(2) Goal 1: Mobility and access

Maintain and enhance the transportation system to reduce travel times, provide travel-time reliability, provide a functional and smooth transportation system, and promote access for all users.

Finding:

The proposed amendments have been determined to be in compliance with OAR Chapter 660 Division 12 and therefore, comply with the above goal. This objective is met.

(3) Goal 2: Safety, improve safety for all users, all modes, all ages, and all abilities within the City of Tualatin.

Finding:

The proposed amendments would not impact safety relative to the transportation system. The provided transportation analysis demonstrates that the government office use would not negatively impact road users in the vicinity of the subject site. This objective is met.

(4) Goal 3: Vibrant Community. Allow for a variety of alternative transportation choices for citizens of and visitors to Tualatin to support a high quality of life and community livability.

Finding:

The proposed amendments would facilitate development of a government office on the subject site, which would support alternative transportation options by providing bicycle parking areas and spaces for vanpools. This objective is met.

(5) Goal 4: Equity. Consider the distribution of benefits and impacts from potential transportation options, and work towards fair access to transportation facilities for all users, all ages, and all abilities.

Finding:

The proposed amendments do not reflect a significant change to the existing transportation system and rather have been determined to be in compliance with the City's existing TSP, which is reflective of this

goal. Further, all transportation and pedestrian facilities will comply with accessibility requirements upon construction. This objective is met.

(6) Goal 5: Economy. Support local employment, local businesses, and a prosperous community while recognizing Tualatin’s role in the regional economy.

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, which will increase the employment capacity of the subject site and the City overall. These employees will support local businesses as well as provide permitting services to local businesses helping to support the overall prosperity of the community. This objective is met.

(7) Goal 6: Health/Environment. Provide active transportation options to improve the health of citizens in Tualatin. Ensure that transportation does not adversely affect public health or the environment.

Finding:

The proposed amendments identify a transportation system, including streets, pedestrian and bicycle facilities. Herman Road and 108th Avenue both have both sidewalks and bike lanes. This objective is met.

(8) Goal 7: Ability to Be Implemented. Promote potential options that are able to be implemented because they have community and political support and are likely to be funded.

Finding:

The proposed amendments would facilitate future development of government offices employing approximately 65 people, for which a plan and budget have been developed. This objective is met.

E. The following Chapters of the Tualatin Development Code are applicable to the proposed amendments:

Chapter 33: Applications and Approval Criteria

Section 33.070 Plan Amendments

[...]

(2) Applicability. Quasi-judicial amendments may be initiated by the City Council, the City staff, or by a property owner or person authorized in writing by the property owner. Legislative amendments may only be initiated by the City Council.

Finding:

A Plan Text Amendment and Plan Map Amendment are proposed. This proposal is quasi-judicial in nature and therefore has been processed consistent with the Type IV-A procedures in Chapter 32. This criterion is met.

[...]

(5) Approval Criteria.

(a) Granting the amendment is in the public interest.

Finding:

The Tualatin Comprehensive Plan and Development Code implement the Oregon Statewide Planning Goals. Statewide Planning Goal 2 requires all parcels in each city and county to be designated with a planning district. The proposed amendment would rezone the subject site from Light Manufacturing (ML) to Institutional (IN) and government offices and public works yard and storage area as Permitted uses in the IN district.

The site is currently functions as the City’s Public Works and Operations center. An objective of the Institutional Planning District is to accommodate campus-style development, owned and operated by governmental entities consisting of multiple structures or facilities, which may serve multiple purposes and provide multiple services to the community, per TDC 8.100.

Approval of the proposed amendments would facilitate the development government offices employing approximately 65 people, which will increase economic opportunities relative to the existing site development and provide permitting and development services in one location for the community. The proposed Plan Map Amendment to rezone the property from ML to IN and the proposed Plan Text Amendment to add government offices as a Permitted use in the Institutional District is therefore consistent with the public interest. This criterion is met.

(b) The public interest is best protected by granting the amendment at this time.

Finding:

The Operations center anticipates future expansion to provide community development operations in addition to the existing public works operations. Chapter 8 addresses these semi-public and miscellaneous uses as not neatly fitting into traditional use categories, such as Industrial. The proposed Plan Map Amendment to IN provides clarity that the site provides community services. Chapter 8 of the Community Plan recognizes government offices as a use that is compatible with the Institutional Planning District objectives. This criterion is met.

(c) The proposed amendment is in conformity with the applicable objectives of the Tualatin Community Plan.

Finding:

The City’s Operations Center is recognized as a government service, in Chapter 8: Public Land Use, Section 8.020 of the Tualatin Community Plan. Additionally, the Institutional Planning District objectives of 8.100 state that, “The district may be applied to land that is able to accommodate large-scale campus-style development and operation of related uses, as follows: (a) Contiguous land one and one-half acre in size or greater; (b) Access to a collector or arterial street; and (c) Adequate public facilities are available to the property. The operations center is (a) approximately 8.73 acres in size, (b) served by two major arterial streets: Herman Road and 108th Avenue, and (c) is served by public utilities. This criterion is met.

(d) The following factors were consciously considered:

(i) The various characteristics of the areas in the City;

Finding:

The site is bordered by Light Manufacturing uses to the west, north, and east; and General Manufacturing uses to the south. The existing public works functions and operations are compatible with surrounding industrial uses. The proposed amendments would facilitate development of a government office building on the site which would be the future home to permitting and development review services for the City, which is a use that is compatible with the uses presently on the subject site as well as those on neighboring properties. This criterion is met.

(ii) The suitability of the areas for particular land uses and improvements in the areas;

Finding:

The subject site is located in Neighborhood Planning Area 7 as shown on Map 9-2. This area comprises the majority of the City's industrial land. The site is located in area designated light industrial to buffer residential uses to the north. Rezoning the land from ML to IN will preserve the campus-style development needs of the Operations Center while remaining harmonious with surround land uses. This criterion is met.

(iii) Trends in land improvement and development;

Finding:

The subject site is located in an area designated as Industrial Area by Metro's Urban Growth Management Functional Plan (TDC Map 9-4). The proposed zone change will comply with Metro's Title 4. The IN zone does not permit retail or professional services uses. This criterion is met.

(iv) Property values;

Finding:

The subject site is a City-owned property. The proposed amendments would accommodate future development of government offices on the subject site, a proposal which would be reviewed through further Architectural Review for a demonstration of compliance with applicable development standards. Overall, the nature of the existing and proposed site development are harmonious with the subject site as well as surrounding properties. This criterion is met.

(v) The needs of economic enterprises and the future development of the area; needed right-of-way and access for and to particular sites in the area;

Finding:

Rezoning the land to IN will benefit the City in capturing a more accurate Industrial land inventory. Impacts to the transportation system are addressed in (f) and (h). This criterion is met.

(vi) Natural resources of the City and the protection and conservation of said resources;

Finding:

Natural resources are identified and protected through applicable regulations of the TDC, and protection and conservation of said resources is implemented by Clean Water Services. No amendments are proposed that would affect the protection and conservation of natural resources. This criterion is not applicable.

(vii) Prospective requirements for the development of natural resources in the City;

Finding:

No development of natural resources is proposed as part of the proposed amendments. This criterion is not applicable.

(viii) The public need for healthful, safe, esthetic surroundings and conditions; and

Finding:

The proposed amendments satisfy the public need for healthful, safe, esthetic surroundings and conditions by applying a land use designation that ensures compatibility with adjoining industrial lands, implement transportation improvements, prescribe required infrastructure to serve the area and address environmental protection requirements. Further, Oregon Statewide Planning Goal 2 requires all parcels in each city and county to be designated with a planning district. Therefore, the public need for healthful, safe, aesthetic surroundings and conditions will best be served by granting the amendments at this time. This criterion is met.

(ix) Proof of change in a neighborhood or area, or a mistake in the Plan Text or Plan Map for the property under consideration are additional relevant factors to consider.

Finding:

The proposed Plan Map amendment to IN provides clarity that the City Operations site provides community services. The proposed Plan Text amendment would correct a Scribner's error, in which public buildings, facilities, and operations were unintentionally omitted from the permitted use categories in the IN zone- Chapter 49, Table 49-1. Chapter 8 of the Community Plan recognizes government offices as a use that is compatible with the Institutional Planning District objectives. This criterion is met.

(e) If the amendment involves residential uses, then the appropriate school district or districts must be able to reasonably accommodate additional residential capacity by means determined by any affected school district.

Finding:

The amendment does not involve residential uses. This criterion is not applicable.

(f) Granting the amendment is consistent with the applicable State of Oregon Planning Goals and applicable Oregon Administrative Rules, including compliance with the Transportation Planning Rule TPR (OAR 660-012-0060).

Finding:

Findings addressing the applicable Oregon Statewide Planning Goals and TPR have been addressed above. This criterion is met.

(g) Granting the amendment is consistent with the Metropolitan Service District's Urban Growth Management Functional Plan.

Finding:

Findings addressing the applicable Titles of the Metro Urban Growth Management Functional Plan have been addressed above. This criterion is met.

(h) Granting the amendment is consistent with Level of Service F for the p.m. peak hour and E for the one-half hour before and after the p.m. peak hour for the Town Center 2040 Design Type (TDC Map 9-4), and E/E for the rest of the 2040 Design Types in the City's planning area.

Finding:

The subject site is outside of the Town Center 2040 Design Type area. As identified Table 7 of the Transportation Impact Analysis (Exhibit 3), the proposed amendment would facilitate future development of a government office building on the site. The additional trip generation from this use would result in a LOS of D or greater for the weekday PM peak hour, at the nearby study intersections. This criterion is met.

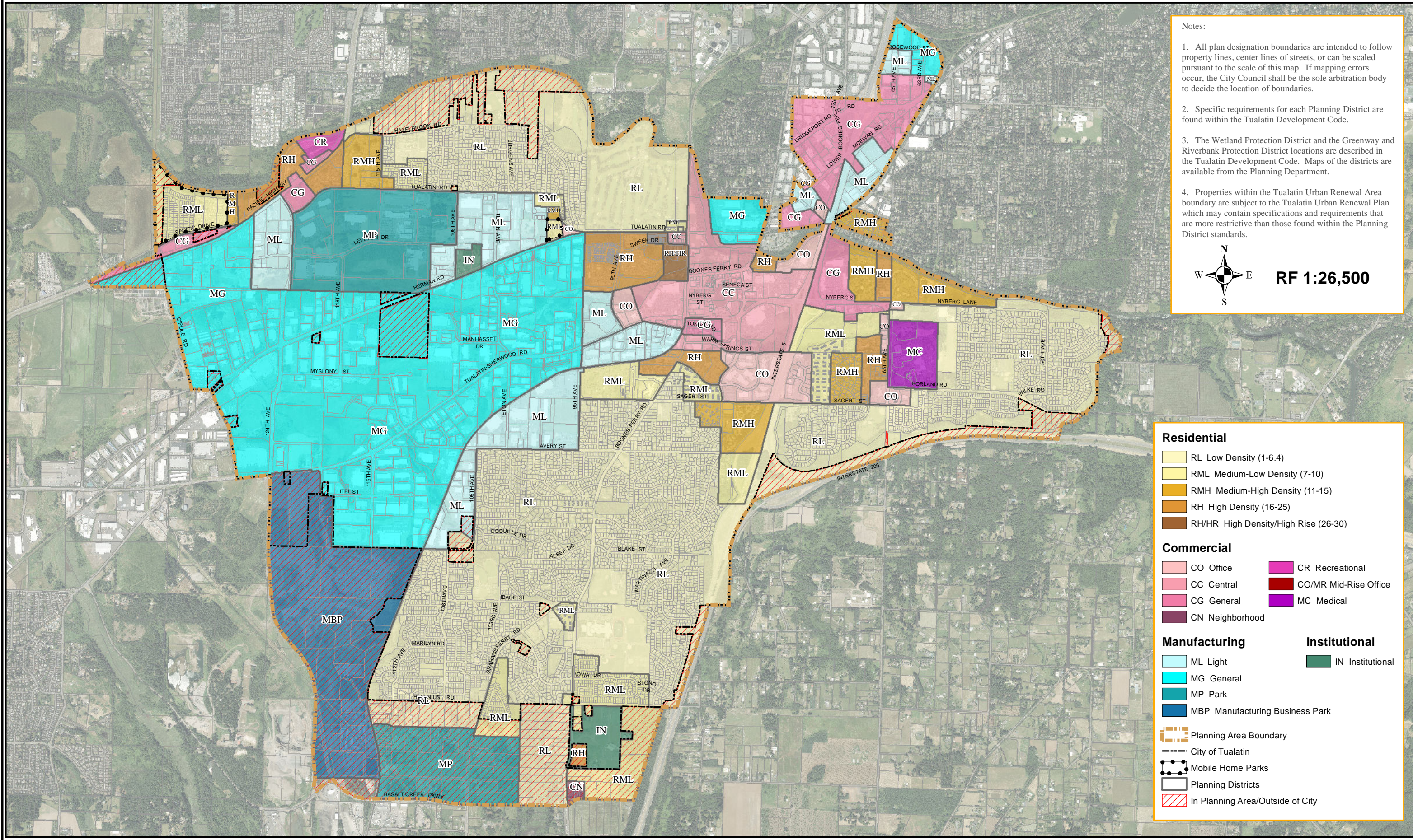
- (i) Granting the amendment is consistent with the objectives and policies regarding potable water, sanitary sewer, and surface water management pursuant to TDC 12.020, water management issues are adequately addressed during development or redevelopment anticipated to follow the granting of a plan amendment.**

[...]

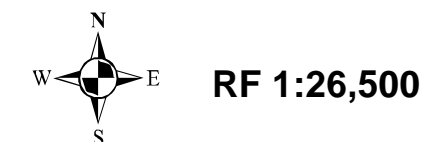
Finding:

The subject site is presently served with utilities such as potable water, sanitary sewer, and stormwater management. Future structure development on the site will require approval of an Architectural Review land use application, at which time these issues will be addressed in greater detail. This criterion is met.

Map 9-1 Community Plan Map



- Notes:
1. All plan designation boundaries are intended to follow property lines, center lines of streets, or can be scaled pursuant to the scale of this map. If mapping errors occur, the City Council shall be the sole arbitration body to decide the location of boundaries.
 2. Specific requirements for each Planning District are found within the Tualatin Development Code.
 3. The Wetland Protection District and the Greenway and Riverbank Protection District locations are described in the Tualatin Development Code. Maps of the districts are available from the Planning Department.
 4. Properties within the Tualatin Urban Renewal Area boundary are subject to the Tualatin Urban Renewal Plan which may contain specifications and requirements that are more restrictive than those found within the Planning District standards.



Residential

- RL Low Density (1-6.4)
- RML Medium-Low Density (7-10)
- RMH Medium-High Density (11-15)
- RH High Density (16-25)
- RH/HR High Density/High Rise (26-30)

Commercial

- CO Office
- CC Central
- CG General
- CN Neighborhood
- CR Recreational
- CO/MR Mid-Rise Office
- MC Medical

Manufacturing

- ML Light
- MG General
- MP Park
- MBP Manufacturing Business Park

Institutional

- IN Institutional

Planning Area Boundary
 City of Tualatin
 Mobile Home Parks
 Planning Districts
 In Planning Area/Outside of City

Tualatin City Operations Site Traffic Impact Analysis

Prepared for:

SRG Partnership, Inc.

Prepared by:

DKS Associates

December 2018



EXPIRES: 12/31/19



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Introduction

The purpose of this study is to identify potential transportation system impacts and mitigations needed to support a proposed city operations site for the City of Tualatin. The proposed site is located at the northeast corner of Herman Road and 108th Avenue in Tualatin, Oregon. The current zoning of the site is Light Manufacturing (ML)¹, and the proposed land use is a government office building, which is similar to the existing use of the site but may vary in operational function with inclusion of visits from individuals that are not employed at the site.

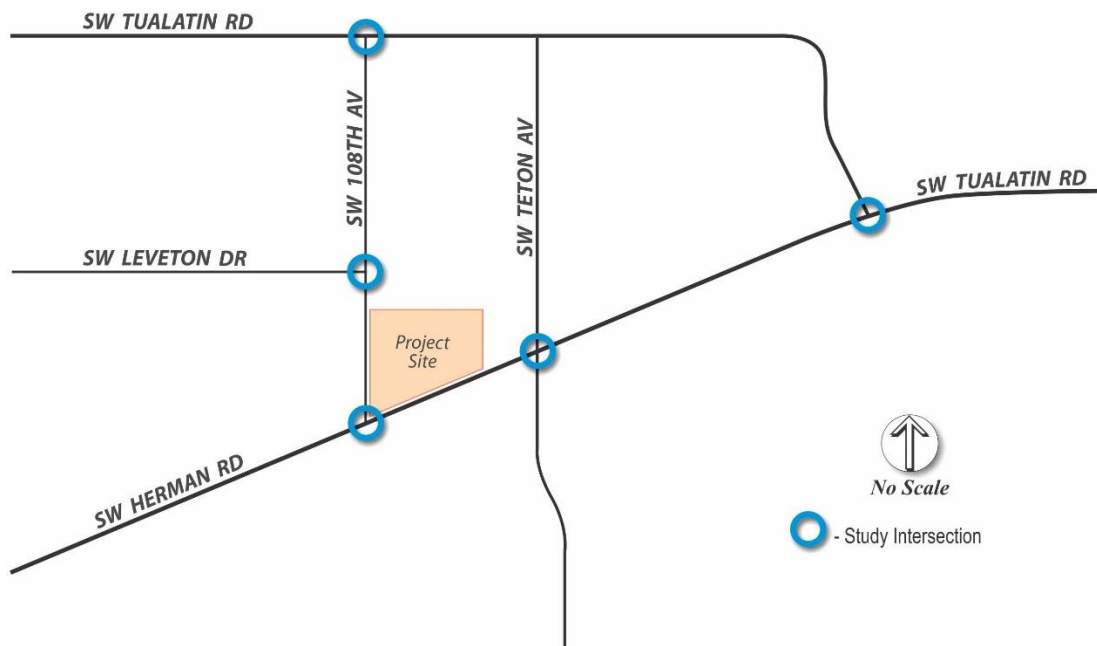
While general office buildings is allowed under the existing zoning, a government office building is not directly allowed and would ultimately require findings to address Transportation Planning Rule (TPR) requirements. The specific analysis required to address TPR requirements would vary based on the proposed action (minor modification to zoning, significant map change, or significant text change) and is not included in this analysis. The traffic analysis summarized in this TIA focuses on the direct impacts to the transportation system related to the proposed site development.

Assumptions related to the proposed site (relative to conservative vehicle trip generation assumptions) include:

- The building will have up to 20,000 square feet of gross floor area.
- The building will accommodate up to 60 employees in addition to the current employees.

Study Area

FIGURE 1: STUDY AREA



¹ Tualatin Development Code, City of Tualatin.

The study area (Figure 1) for traffic analysis was defined by reviewing the City of Tualatin Traffic Study Requirements², coordination with City staff, and identifying intersections that may be significantly impacted by the development of the proposed site. These intersections include:

1. SW Tualatin Road/SW 108th Avenue
2. SW Leveton Drive/SW 108th Avenue
3. SW Herman Road/SW 108th Avenue
4. SW Herman Road/SW Teton Avenue
5. SW Herman Road/SW Tualatin Road

Existing Conditions

This section summarizes current (year 2018) transportation conditions in the study area, including an inventory of the existing roadway network, identification of transit, pedestrian, and bicycle facilities, an analysis of recent study area collision history, and an operational analysis of study intersections.

Roadway Network

Table 1 summarizes the characteristics of the study area streets including functional classification, cross-section, posted speed, and presence of parking, sidewalks, and bike lanes.

TABLE 1: EXISTING ROADWAY NETWORK CHARACTERISTICS

Roadway	Functional Classification	Travel Lanes	Posted Speed (mph)	On-Street Parking	Sidewalks	Bike Lanes
SW Tualatin Road	Major Collector	3 Lanes	35	No	Yes	Yes
SW 108th Avenue¹	Major/Minor Collector	2 Lanes	35	No	Yes	Yes
SW Leveton Drive²	Major Arterial	2 Lanes	40	No	Yes	Yes
SW Herman Road³	Major Arterial/ Major Collector	3 Lanes	45	No	Partial	Yes
SW Teton Avenue	Major Collector	2 Lanes	35	No	Partial	Yes

¹SW 108th Avenue is classified as a minor collector between Tualatin Road and Leveton Drive, and a major collector between Leveton Drive and Herman Road.

²SW Leveton Drive is classified as a major arterial between 108th Avenue and 118th Avenues.

³SW Herman Road is classified as a major arterial between Teton Avenue and 108th Avenue, and a major collector elsewhere.

Public Transit

Currently there is one public transit line that operates in the study area. Tualatin Shuttle Blue Line provides fixed-route service linking WES Station to employment destinations along SW 124th Avenue, SW Leveton Drive, SW 108th Avenue, SW Herman Road, SW Teton Avenue, and SW Boones Ferry Road. Tualatin WES station provides commuter connections to Wilsonville Transit Center, Tigard Transit Center, and Beaverton Transit Center which provides regional connections to TriMet and SMART’s transit systems in the Portland Metropolitan Area.

² City of Tualatin Traffic Study Requirements, 2016.

Pedestrian Environment

Sidewalks are generally available on both sides of the streets within the study area and provide connectivity for pedestrians. One larger gap in sidewalk availability exists along the south side of SW Herman Road due to the proximity to the railroad tracks. In addition, there is a lack of sidewalk for approximately 440 feet on the west side of SW Teton Avenue south of Herman Road. Sidewalks are available elsewhere within the study area.

Pedestrian crosswalks exist on all legs at the unsignalized intersections within the study area. All signalized intersections have striped pedestrian crosswalks with push button controls and pedestrian signal heads to indicate “Walk” and “Don’t Walk” periods of time, with the exceptions at the following locations where crosswalks are closed with the indication of “Crosswalk Closed” signs:

- The west and east legs of SW Herman Road/SW 108th Avenue (no sidewalk present on south side of SW Herman Road due to rail proximity)
- The west and east legs of SW Herman Road/SW Tualatin Road (no sidewalk present on south side of SW Herman Road due to rail proximity)

Pedestrian activity counts for each of the legs of the study area intersections were collected during the weekday AM and PM peak hour. The heaviest utilized intersection (in aggregated pedestrian activity) was at Teton Avenue/Herman Road (4 total pedestrians during the AM peak hour).

Bicycle Environment

There are dedicated on-street bicycle facilities within most of the study area. Bicycle activity counts for each approach at study area intersections were collected during the weekday AM and PM peak hour. The heaviest utilized intersection (in aggregated bicycle activity) was at Tualatin Road/Herman Road (11 total bikes during the weekday PM peak hour), with the heaviest approach activity on the west leg (5 bikes).

Safety Analysis

Crash rates at study intersections were analyzed to identify potential safety issues. Collision history at study area intersections was obtained from ODOT spanning the most recent five-year period from October 2012 to September 2017. Table 2 summarizes the crash history at study intersections. There was a total of 17 crashes in the study area over the five years.

Crash rates at study intersections were also calculated to identify problem areas in need of further investigation. The total number of crashes experienced at an intersection is often proportional to the number of vehicles entering it. Therefore, a crash rate describing the frequency of crashes per million entering vehicles (MEV) is used to evaluate the intersection.

The observed crash rate at each site is compared to the critical crash rate, which is unique to each intersection and based on the critical crash rate procedure in the Highway Safety Manual (HSM)³. However, due to the small study area, there is an insufficient reference population of comparison

³2010 Highway Safety Manual (HSM), Chapter 4, Page 4-11: The critical crash rate is a threshold value that allows for relative comparison among sites with similar characteristics. The critical crash rate depends on the average crash rate at similar sites, traffic volume, and a statistical constant that represents a desired level of significance.

intersections from which to calculate a critical crash rate. Therefore, to broaden the field of comparison, study area crash rates were compared to 90th percentile crash rates for similar intersections in a statewide database provided in ODOT’s Analysis Procedures Manual (Table 4-1). An observed crash rate greater than the 90th percentile crash rate is an indication that further investigation may be warranted. As listed in Table 2, all the study intersections have an observed crash rate less than the 90th percentile crash rates, indicating that the number of crashes experienced would be no more than expected.

TABLE 2: STUDY AREA INTERSECTION COLLISIONS (OCTOBER 2012 – SEPTEMBER 2017)

Intersection	Total Collisions	Collision Severity			Observed Crash Rate (per MEV)	90 th Percentile Crash Rate (per MEV)
		Fatal	Injury	Property Damage Only		
SW Tualatin Road/ SW 108 th Avenue	5	0	4	1	0.20	0.293
SW Leveton Drive/ SW 108 th Avenue	1	0	0	1	0.14	0.293
SW Herman Road/ SW 108 th Avenue	2	0	1	1	0.09	0.509
SW Herman Road/ SW Teton Avenue	1	0	1	0	0.03	0.860
SW Herman Road/ SW Tualatin Road	8	0	7	1	0.23	0.509

SOURCE: Oregon Department of Transportation

Intersection Operations

This section describes the existing intersection operating conditions in the study area.

Intersection Performance Measures

All the study intersections fall under the jurisdiction of the City of Tualatin. Level of service (LOS) and volume-to-capacity (V/C) ratio are the two performance measures utilized in this analysis for determining intersection operations. A description of each is outlined below.

Level of Service

An intersection's level of service is similar to a "report card" rating (A through F), based on average vehicle delay. LOS A, B, and C indicate conditions where vehicles can move freely. LOS D and E are progressively worse. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.

V/C Ratio

A volume-to-capacity (v/c) ratio is a measure of effectiveness that takes into account the total volume entering an intersection and compares it to the overall capacity at that intersection to determine a ratio on a scale of 0.0 to 1.0 for the intersection. As an intersection’s v/c ratio becomes closer to 1.0, the intersection becomes more congested and performance is reduced. If the ratio is greater than 1.00, this indicates that demand is greater than the available capacity and the turn movement, approach leg, or intersection is oversaturated and typically experiences excessive queues and long delays.

Jurisdictional Operational Standards

The City of Tualatin has adopted a level-of-service (LOS) standard that is based on the average delay calculated at intersections. The operating standard is LOS D for signalized intersections and LOS E for unsignalized intersections⁴.

Existing Traffic Volumes

Intersection turn movement counts were collected in August and September of 2018 during the weekday morning peak period (7:00 to 9:00 AM) and evening peak period (4:00 to 6:00 PM). Morning counts were collected when schools were in session. Figure 2 shows the balanced existing AM and PM hour traffic volumes.

Existing Operating Conditions

The existing traffic operating conditions at the study intersections were determined for the weekday AM and PM peak hour based on the 2000 Highway Capacity Manual (HCM) methodology for all signalized intersections and based on the 2010 HCM methodologies for intersections that are unsignalized. As listed in Table 3, all study intersections are currently operating in LOS D or better. However, the intersection of SW Herman Road/SW Teton Avenue is currently approaching LOS E (achieved at 55 seconds delay) during the AM peak hour.

TABLE 3: 2018 EXISTING WEEKDAY AM AND PM PEAK HOUR INTERSECTION PERFORMANCE

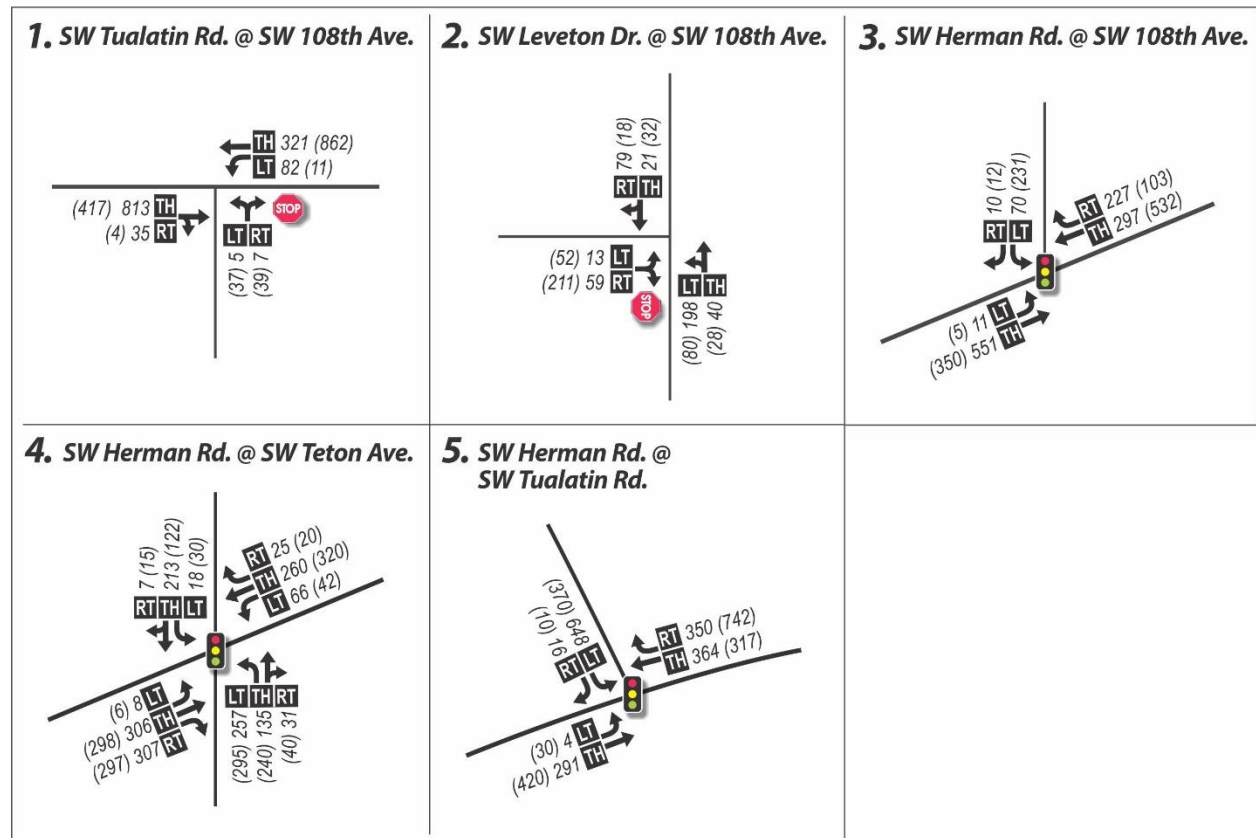
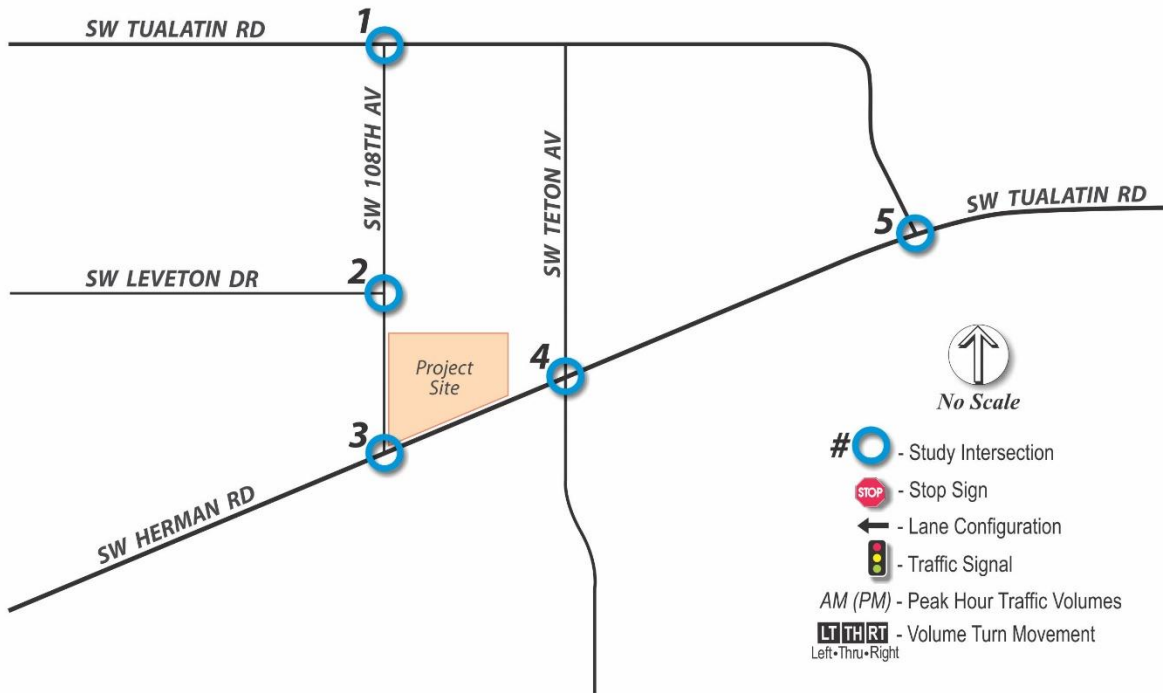
Intersection	Control Type	Intersection Performance					
		AM Peak			PM Peak		
		Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS
SW Tualatin Road/ SW 108th Avenue	Two-way stop control	30.7	0.14	D	25.6	0.32	D
SW 108th Avenue/ SW Leveton Drive	Two-way stop control	10.2	0.15	B	10.5	0.31	B
SW Herman Road/ SW 108th Avenue	Signal	8.6	0.62	A	18.4	0.79	B
SW Herman Road/ SW Teton Avenue	Signal	53.8	0.93	D	33.4	0.84	C
SW Herman/ SW Tualatin Road	Signal	25.8	0.87	C	15.1	0.66	B
Site driveway on SW Herman Road	Two-way stop control	17.7	0.05	C	24.8	0.19	C

Delay and volume-to-capacity ratio for two-way stop intersections reported for the worst movement.

LOS for two-way stop control intersection reported for the worst major street/worst minor street movements.

⁴ Tualatin Development Code 74.420 (17)

FIGURE 2: 2018 EXISTING WEEKDAY AM AND PM PEAK HOUR TRAFFIC VOLUMES



The HCM methodologies used to estimate intersection delay do not account for the interaction between adjacent intersections and the potential impact of queue spillbacks. Therefore, it is necessary to evaluate how the traffic moves between intersections. Queuing analysis was conducted for the study area to provide further information regarding transportation operations. SimTraffic microsimulation analysis was used to estimate the 95th percentile vehicle queues for each of the study area intersection approach movements under the existing conditions scenario. Table 4 indicates that queues in the study area during both the weekday AM and PM peak hours generally do not spill back into adjacent intersections or through travel lanes, with single exception of the southbound approach of SW Herman Road/SW 108th Avenue. Detailed queuing reports are included in the Appendix.

TABLE 4: 2018 EXISTING WEEKDAY AM AND PM PEAK HOUR MOTOR VEHICLE 95TH PERCENTILE QUEUEING

Intersection	Movement	Available Storage Length (ft.)	95th Percentile Queue (ft)*	
			AM Peak	PM Peak
SW Tualatin Road/ SW 108 th Avenue	Westbound L	350	75	25
	Northbound L/R	>1000	50	75
SW Leveton Drive/ SW 108 th Avenue	Eastbound L/R	>1000	75	100
	Northbound L/T	800	75	50
SW Herman Road/ SW 108 th Avenue	Eastbound L	660	50	25
	Southbound L	170	75	175
SW Herman Road/ SW Teton Avenue	Westbound L	150	150	100
	Southbound L	140	50	75
SW Herman Road/ SW Tualatin Road	Eastbound L	140	50	100
	Westbound R	250	200	100
	Southbound L	>700	400	225

Note: This table only contains the movements in the study area that have potential queuing issues.

*The 95th percentile queue lengths are rounded up to the closest multiples of 25 feet.

Growth and Development Assumptions

The following section documents assumptions describing background traffic growth in future years and trip growth related to the proposed redevelopment.

Background Traffic

The amount of local and regional traffic growth independent of the project site is referred to as background traffic growth. Based on the historical traffic counts used in City of Tualatin’s Transportation System Plan, the annual growth rates on the streets within the study area are in the range of 1 percent to 2 percent. The higher end of the range, a 2 percent annual growth rate, was applied to all intersection volumes within the study area to determine background traffic conditions for the 2021 future year scenarios.

There are no “in-process” trips assumed in the vicinity of the proposed site (related to approved but not yet built developments) that may impact the traffic conditions within the study area⁵. The background traffic growth was added to the 2018 existing traffic volumes to create 2021 “No Build” scenarios representing conditions that would exist if the project area did not develop as proposed. The 2021 No Build traffic volumes used in the traffic analysis are provided in Figure 3.

Trip Generation

The following section describes motor vehicle trip generations estimates for the proposed site. The trip estimate assumes the addition of a government office building with up to 20,000 square feet of gross floor area. The two access driveways to the site are assumed to be located on SW Herman Road and SW 108th Avenue.

The number of vehicle trips generated by a proposed land use is typically estimated using trip rates published in Institute of Transportation Engineers (ITE) *Trip Generation*. The ITE trip rates for Government Office (ITE land use code 730) were used to calculate the expected number of daily vehicle trips and AM peak hour vehicle trips generated with full buildout of the proposed site. The daily trip generation for the project is 452 vehicle trips. The AM peak hour trip generation is 67 vehicle trips.

In addition, a custom vehicle trip generation rate was also used to estimate the vehicle trips to and from the proposed City office during the PM peak hour. After consultation with the City of Tualatin staff, it was determined that applying the ITE trip rate alone may result in underestimating the motor vehicle trip generation potential of the site. The ITE trip rate for Government Office Building was used to calculate the baseline for expected number of vehicle trips generated with full buildout of 20,000 square feet of office space. On-site visitor (customer) arrival data was previously collected by City staff and used to supplement the ITE trip generation estimate. The custom rate adds additional ‘customer’ trips (based on the site survey) to ‘employee’ trips (based on the published ITE rate). The result is a higher vehicle trip generation estimate for the PM peak hour due to potential for “double counting” (customer trips included in the base ITE rate), which provides a conservative estimate for the potential traffic impacts at the proposed site. The estimated daily and peak hour trip generation is listed in Table 5.

⁵ Per email communications with Tony Doran, Engineering Associate at City of Tualatin on August 24th, 2018.

TABLE 5: DAILY AND PEAK HOUR TRIP GENERATION ESTIMATES

Description	Land Use	Quantity	Units	Average Trips									
				Daily		AM Peak Hour				PM Peak Hour			
				Rate	Total	Rate	Enter	Exit	Total	Rate	Enter	Exit	Total
City of Tualatin Operations Site Custom Trip Generation Estimates	ITE Code 730 (Government Office Building)	20	KSF	22.59	452	3.34	50	17	67	1.71	9	26	35
	Customer Trips (based on site survey; 12 customer trips for 30 employees)	60	# of Added Employees	-	-	-	-	-	-	0.4	12	12	24
Total Trips				-	452	-	50	17	67	-	21	38	59

Source: ITE Trip Generations Manual, 10th Edition

Trip Distribution

Trip distribution reflects how site generated traffic will arrive and leave the proposed site and what roads those trips will use. The trip distribution for the proposed project was estimated based on a review of the regional travel demand model, existing traffic flows, and consideration for potential employees and customers. Rounding adjustments (within 5%) were applied based on existing travel patterns and likely travel paths of expected users. The site traffic was assigned to the street network using the trip distribution patterns shown in Figure 4. These trips, also illustrated in Figure 4, were added to the base “No Build” traffic volumes to develop the “Build” scenarios for the year of 2021. The Build scenario represents conditions that would exist with the proposed development in place. The Build scenario traffic volumes are shown in Figures 5.

FIGURE 3: 2021 NO BUILD WEEKDAY AM AND PM PEAK HOUR TRAFFIC VOLUMES

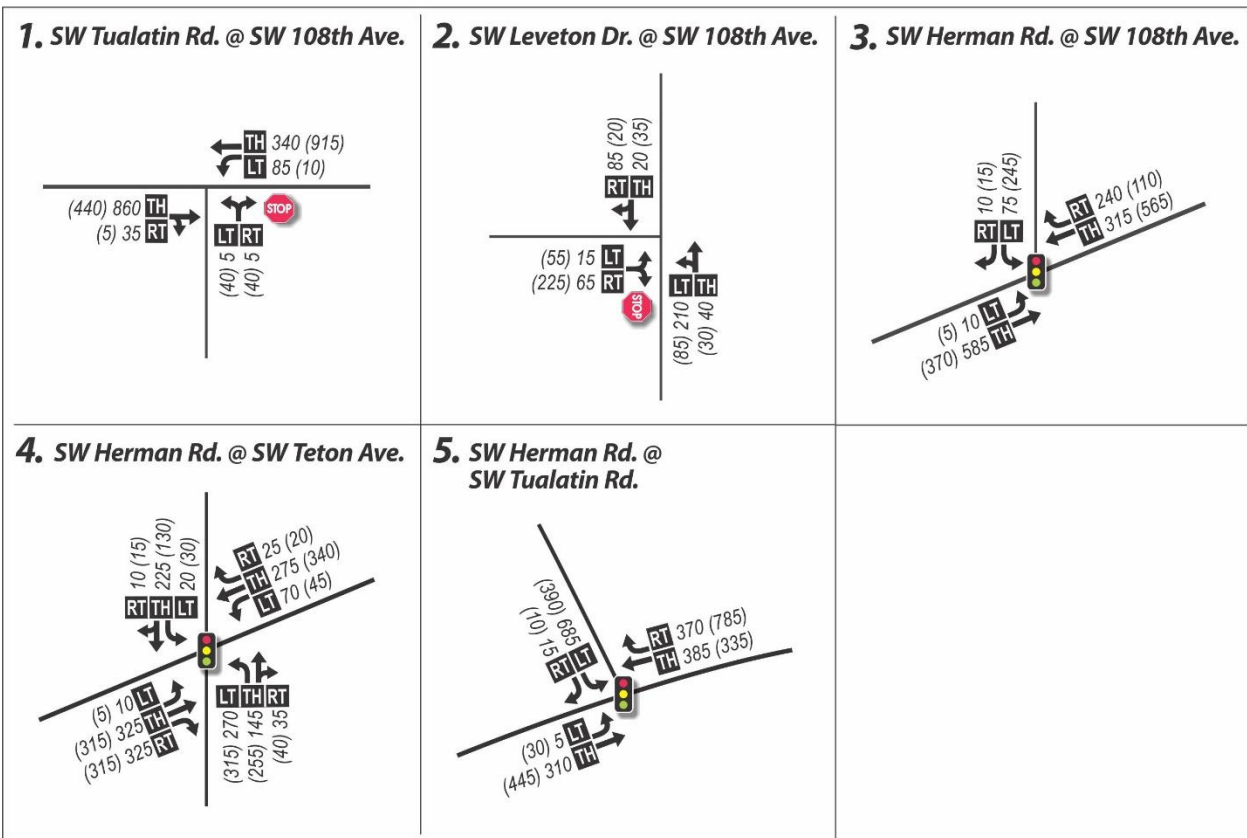
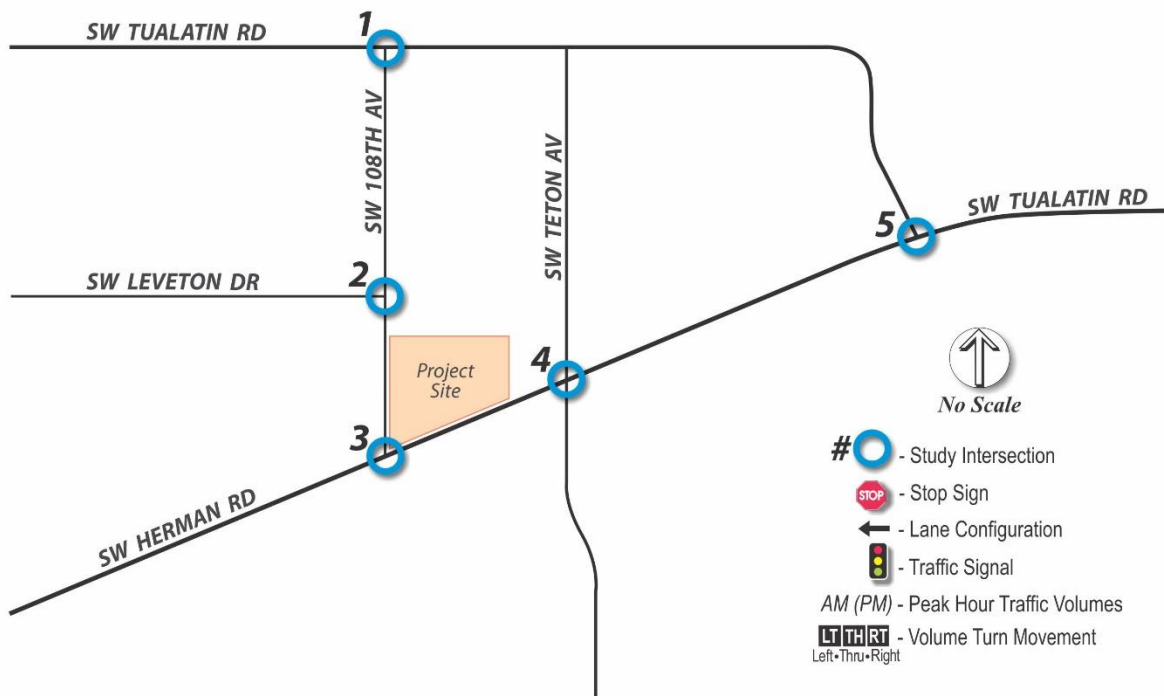


FIGURE 4: WEEKDAY AM AND PM PEAK HOUR TRIP DISTRIBUTION AND PROJECT ADDED TRIPS

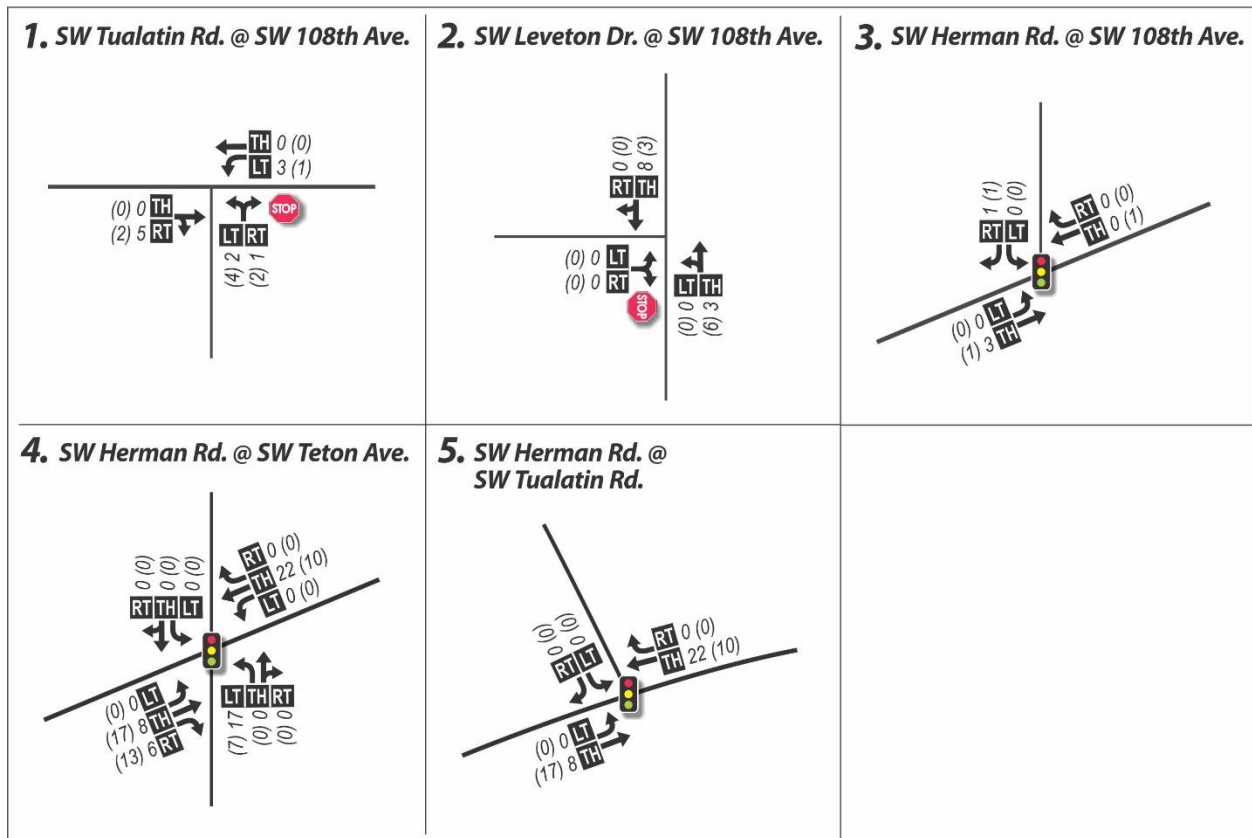
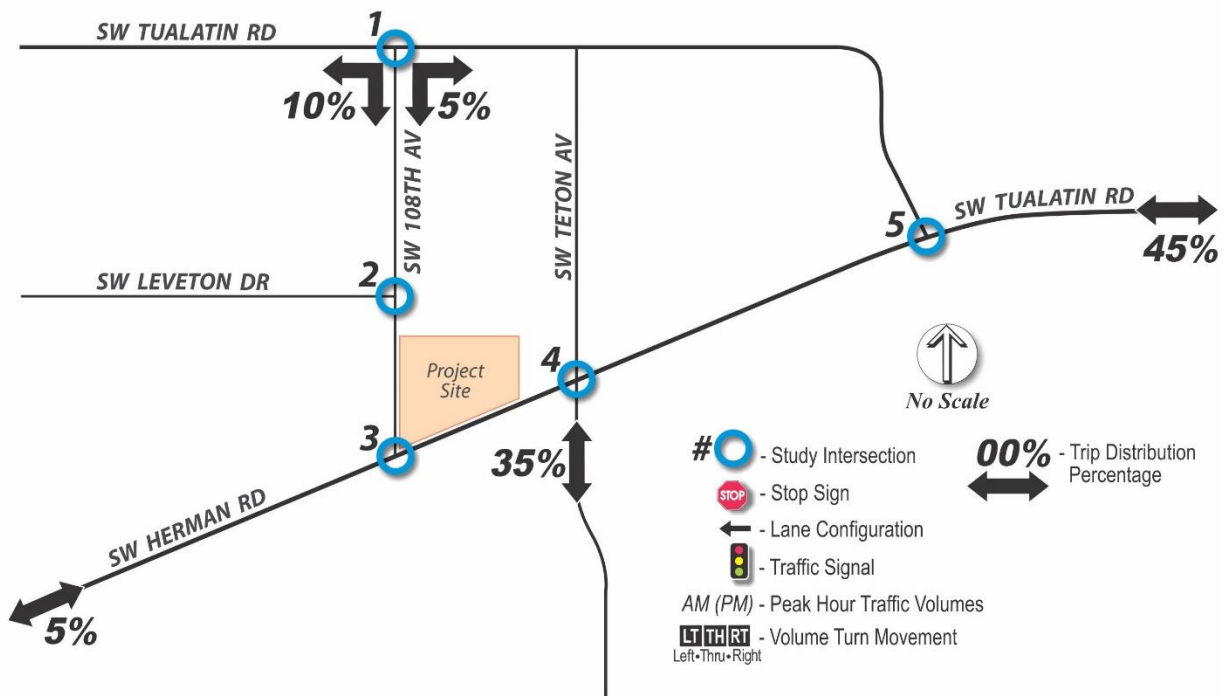
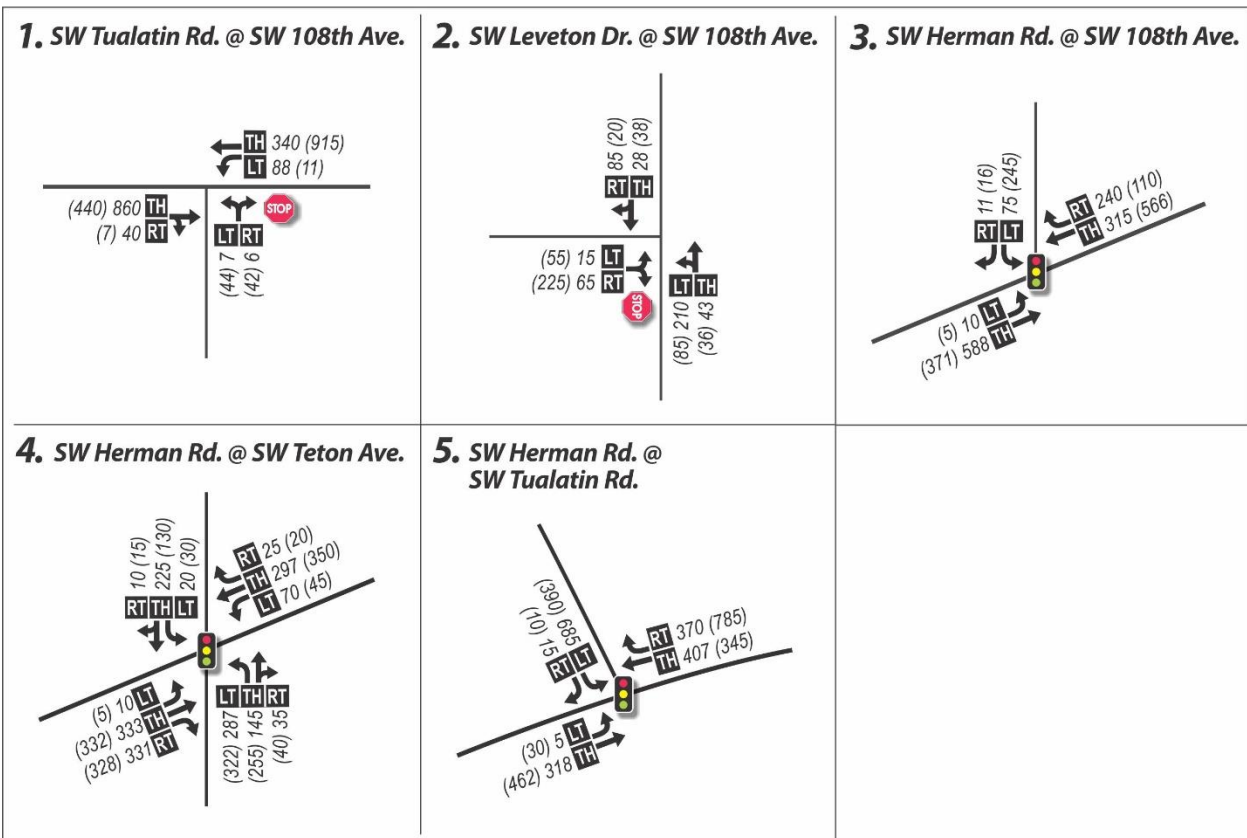
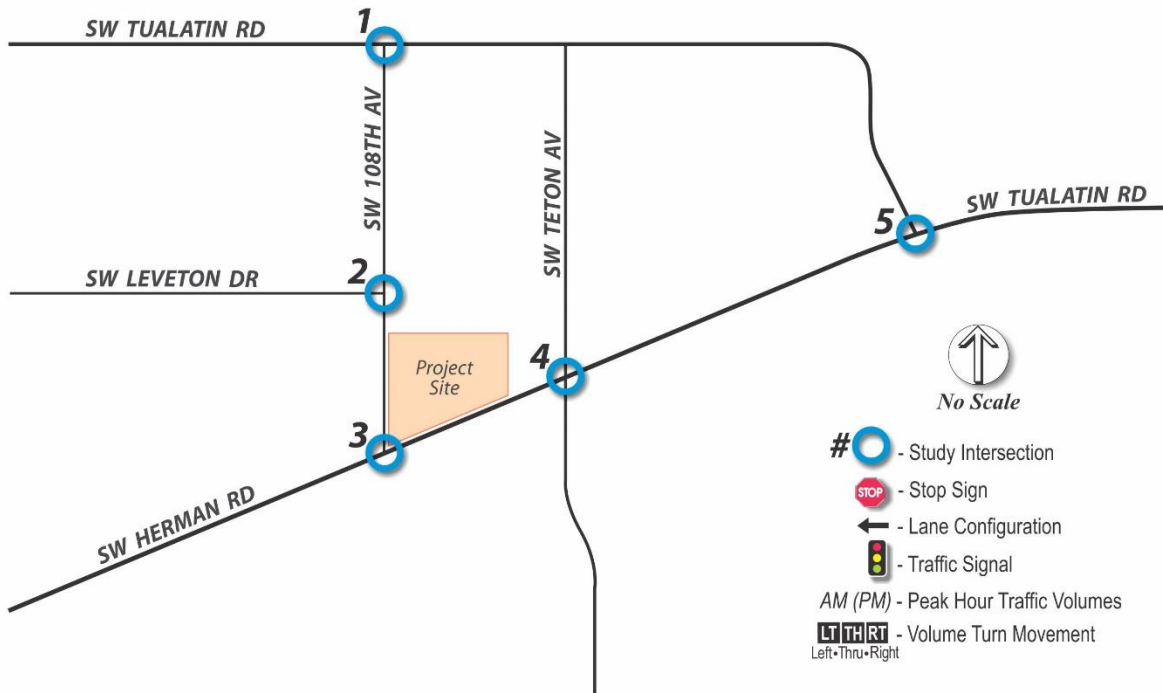


FIGURE 5: 2021 BUILD WEEKDAY AM AND PM PEAK HOUR TRAFFIC VOLUMES



Future Conditions

The following section summarizes the future weekday AM and PM peak hour traffic operating conditions for the expected year of opening (2021). Future traffic operating conditions were analyzed at the study intersections, as well as the site driveways, to determine if the transportation network can support traffic generated by the proposed development. The study area intersection operations were evaluated for both No Build and Build scenarios to determine if the proposed redevelopment would cause any intersections to not meet jurisdictional standards.

Intersection Operations

Table 6 and Table 7 list the future 2021 No Build and Build intersection performance, for the AM and PM peak hour, respectively. As listed, all intersections would operate within the acceptable mobility standards of City of Tualatin, except for the intersection of Herman Road/Teton Avenue. Under both 2021 No Build and Build scenarios, the intersection would operate at LOS E during AM peak hour and exceed the LOS D standard with existing signal timing parameters.

The intersection of Herman Road/Teton Avenue was analyzed to determine potential improvements to address performance standards. The intersection is currently approaching the performance standard⁶ and would be exceeded in the 2021 No Build condition without project traffic. Based on projected traffic flows and the intersection configuration, adding an eastbound right turn lane would directly address the capacity needs at the intersection. However, this improvement would require significant cost and impact to adjacent properties to achieve given the proximity to the rail and reconfiguration required to construct the right turn lane. Therefore, this turn lane is not a recommended solution. A review of the current signal timing parameters indicated that minor adjustments to the signal timing (extending maximum duration of the eastbound phase) will help this intersection continue to meet performance standards with or without the proposed project. Given that the intersection is currently approaching the performance threshold, it is recommended that the performance continue to be monitored and signal timing adjustments made, regardless of project development.

⁶ Table 4 indicates that the current intersection delay is 53.8 seconds during the AM peak hour, narrowly under the threshold of 55 seconds to maintain LOS D.

TABLE 6: 2021 WEEKDAY AM PEAK HOUR INTERSECTION PERFORMANCE

Intersection	Intersection Control	2021 No Build (AM)			2021 Build (AM)		
		Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS
SW Tualatin Road/ SW 108 th Avenue	Two-way stop control	36.4	0.15	E	39.5	0.15	E
SW Leveton Drive/ SW 108 th Avenue	Two-way stop control	10.4	0.16	B	10.5	0.16	B
SW Herman Road/ SW 108 th Avenue	Signal	8.9	0.65	A	9.0	0.65	A
SW Herman Road/ SW Teton Avenue*	Signal	59.1 (51.6)	0.96 (0.95)	E (D)	57.3 (51.4)	0.97 (0.96)	E (D)
SW Herman Road/ SW Tualatin Road	Signal	28.7	0.91	C	30.1	0.92	C
Site driveway on SW Herman Road	Two-way stop control	20.6	0.09	C	26.2	0.18	D
Site driveway on SW 108 th Avenue	Two-way stop control	-	-	-	10.0	0.01	B

Delay and volume-to-capacity ratio for two-way stop intersections reported for the worst movement.

LOS for two-way stop control intersection reported for the worst major street/worst minor street movements.

*The performance measures in parenthesis are under mitigated conditions with adjusted east/west max green.

TABLE 7: 2021 WEEKDAY PM PEAK HOUR INTERSECTION PERFORMANCE

Intersection	Intersection Control	2021 No Build (PM)			2021 Build (PM)		
		Delay (sec)	v/c	LOS	Delay (sec)	v/c	LOS
SW Tualatin Road/ SW 108 th Avenue	Two-way stop control	30.1	0.37	D	31.8	0.41	D
SW Leveton Drive/ SW 108 th Avenue	Two-way stop control	10.8	0.33	B	10.9	0.33	B
SW Herman Road/ SW 108 th Avenue	Signal	19.8	0.81	B	19.8	0.81	B
SW Herman Road/ SW Teton Avenue	Signal	39.5	0.90	D	45.0	0.93	D
SW Herman Road/ SW Tualatin Road	Signal	16.0	0.69	B	16.1	0.70	B
Site driveway on SW Herman Road	Two-way stop control	27.4	0.21	D	39.9	0.43	E
Site driveway on SW 108 th Avenue	Two-way stop control	-	-	-	9.2	0.01	A

Delay and volume-to-capacity ratio for two-way stop intersections reported for the worst movement.

LOS for two-way stop control intersection reported for the worst major street/worst minor street movements.

Queuing analysis was also conducted for the study area, with detailed reports included in the Appendix.

Table 8 lists the 95th-percentile vehicle queue lengths for the study intersections. Vehicle queuing at

most locations under the No Build scenario is not substantially different than existing conditions. Build conditions also do not change significantly compared to No Build conditions, with the queue lengths generally increasing by less than two-car length (approximately 50 feet). The only location with a queue that is projected to exceed storage (by approximately one vehicle length) is the southbound left turn at the Herman Road/108th Avenue intersection. This location would experience the same 95th-percentile queue for both the No Build and Build condition and the project would not add any trips to this movement. This indicates that the proposed site does not have significant impact on the traffic conditions within the study area.

TABLE 8: 2021 WEEKDAY AM AND PM PEAK HOUR MOTOR VEHICLE 95TH PERCENTILE QUEUEING

Intersection	Movement	Available Storage (ft.)	95th Percentile Queue (ft)*			
			2021 AM Peak		2021 PM Peak	
			No Build	Build	No Build	Build
SW Tualatin Road/ SW 108th Avenue	Westbound L	350	75	100	25	25
	Northbound L/R	>1000	50	50	125	100
SW Leveton Drive/ SW 108th Avenue	Eastbound L/R	>1000	75	75	100	100
	Northbound L/T	800	75	75	50	50
SW Herman Road/ SW 108th Avenue	Eastbound L	660	100	75	50	50
	Southbound L	170	100	125	200	200
SW Herman Road/ SW Teton Avenue	Westbound L	150	150	150	125	100
	Southbound L	140	50	75	75	75
SW Herman Road/ SW Tualatin Road	Eastbound L	140	75	50	100	100
	Westbound R	250	200	250	100	125
	Southbound L	>700	400	425	250	250

Note: *The 95th percentile queue lengths are rounded up to the closest multiples of 25 feet.

Driveway Interaction

The site is assumed to continue using the existing driveways on both Herman Road and 108th Avenue. The southern site driveway located on the east side of SW 108th Avenue is within 100 feet of the closest opposing driveway on the west side of 108th Avenue. The proximity and configuration of these driveways have the potential to create vehicle interaction between the opposing driveways if there are left turning vehicles exiting from each driveway simultaneously. However, the existing site driveways on 108th Avenue are gated and during the data collection on weekday AM and PM peak hours, no driveway use was observed. Assuming the driveways on 108th Avenue remain gated and the access remain unchanged after the proposed city operations building is completed, the potential interaction with opposing driveways on 108th Avenue will remain minimal. Further, if the gate is removed from the driveway on 108th, the vehicle activity (and potential for conflicts) is anticipated to remain minimal due to the distribution of site trips and minimal use of the driveway (primarily entry/exit to/from the north on 108th Avenue).

Findings and Recommendations

Based on the analysis of existing transportation conditions and potential site traffic, no improvements were identified to mitigate the site development impacts. However, one traffic mobility need was noted

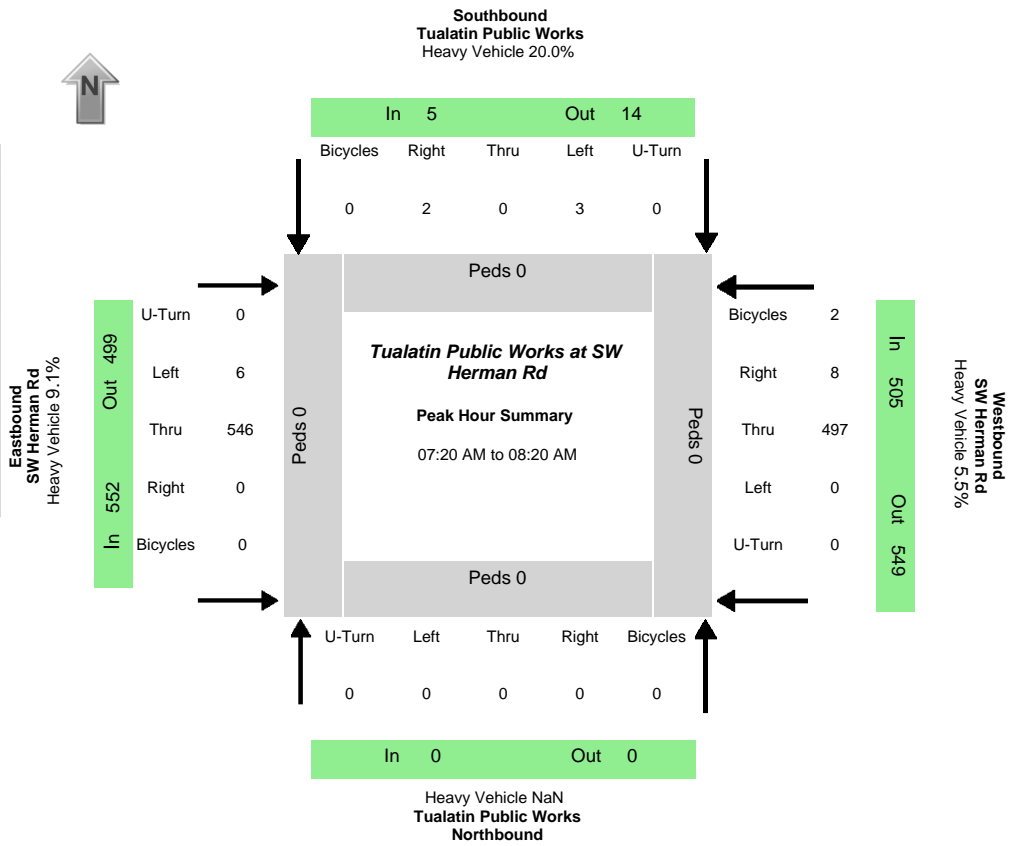
at the intersection of SW Herman Road/SW Teton Avenue. This traffic mobility item is not related to site development and should be monitored/addressed separately (regardless) of the proposed development. The intersection of SW 108th Avenue/SW Teton Avenue is currently approaching intersection performance standards during the AM peak hour and is projected to exceed standards by the 2021 No Build condition with minimal added growth. Continue to monitor the operations of the intersection and consider optimizing the existing signal timing parameters to reduce delay for the eastbound approach. Increasing the maximum green duration for these approaches would likely address performance needs at this intersection.

Appendix

The following items are included in the Appendix:

- Traffic Counts
- Intersection Operations Worksheets
- Intersection Queuing Worksheets

Data Provided by K-D-N.com 503-594-4224	
N/S street	Tualatin Public Works
E/W street	SW Herman Rd
City, State	Tualatin OR
Site Notes	
Location	45.384202 - -122.786072
Start Date	Wednesday, October 10, 2018
Start Time	07:00:00 AM
Weather	
Study ID #	
Peak Hour Start	07:20:00 AM
Peak 15 Min Start	07:45:00 AM
PHF (15-Min Int)	0.89



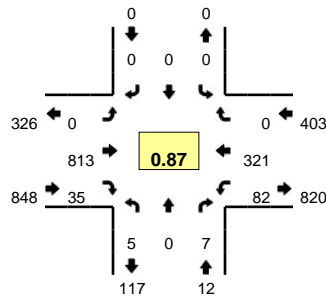
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	3	0	2	0	6	546	0	0	0	497	8	0	0	5	552	505	0	14	499	549
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	9.2%	0.0%	0.0%	0.0%	5.6%	0.0%	0.0%	NaN	20.0%	9.1%	5.5%	NaN	0.0%	5.8%	9.1%

PHV - Bicycles												PHV - Pedestrians									
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0

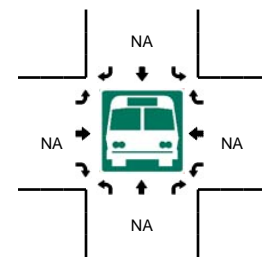
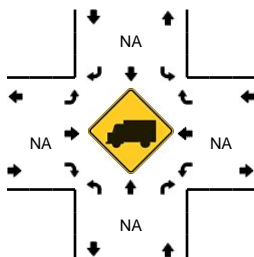
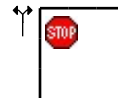
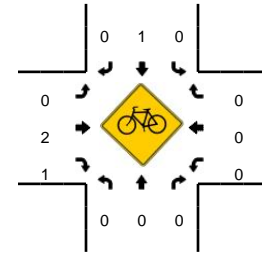
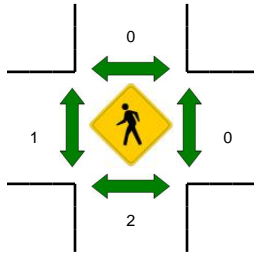
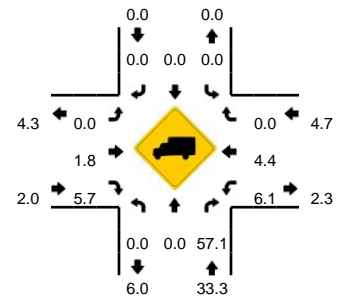
All Vehicle Volumes																			
Time	Northbound Tualatin Public Works				Southbound Tualatin Public Works				Eastbound SW Herman Rd				Westbound SW Herman Rd				15 Min Sum	1 HR Sum	
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn			
07:00:00 AM	0	0	0	0	0	0	0	0	0	0	32	0	0	0	49	0	0		
07:05:00 AM	0	0	0	0	2	0	0	0	1	42	0	0	0	46	2	0			
07:10:00 AM	0	0	0	0	0	0	0	0	1	20	0	0	0	23	1	0	219		
07:15:00 AM	0	0	0	0	0	0	0	0	1	44	0	0	0	35	3	0	221		
07:20:00 AM	0	0	0	0	1	0	0	0	1	52	0	0	0	32	1	0	215		
07:25:00 AM	0	0	0	0	0	0	0	0	2	40	0	0	0	44	1	0	257		
07:30:00 AM	0	0	0	0	0	0	0	0	1	66	0	0	0	38	0	0	279		
07:35:00 AM	0	0	0	0	0	0	0	0	1	56	0	0	0	39	0	0	288		
07:40:00 AM	0	0	0	0	0	0	0	0	0	46	0	0	0	36	0	0	283		
07:45:00 AM	0	0	0	0	0	0	0	0	0	55	0	0	0	43	0	0	276		
07:50:00 AM	0	0	0	0	0	0	0	0	0	44	0	0	0	56	0	0	280		
07:55:00 AM	0	0	0	0	0	0	0	0	0	47	0	0	0	52	1	0	298	1057	
08:00:00 AM	0	0	0	0	0	0	0	0	1	29	0	0	0	26	1	0	257	1033	
08:05:00 AM	0	0	0	0	0	0	1	0	0	43	0	0	0	50	4	0	255	1038	
08:10:00 AM	0	0	0	0	0	0	1	0	0	24	0	0	0	38	0	0	218	1056	
08:15:00 AM	0	0	0	0	2	0	0	0	0	44	0	0	0	43	0	0	250	1062	
08:20:00 AM	0	0	0	0	0	0	0	0	0	24	0	0	0	32	2	0	210	1033	
08:25:00 AM	0	0	0	0	4	0	0	0	0	37	0	0	0	47	0	0	235	1034	
08:30:00 AM	0	0	0	0	2	0	0	0	0	21	0	0	0	17	0	0	186	969	
08:35:00 AM	0	0	0	0	4	0	0	0	1	26	0	0	0	35	1	0	195	940	
08:40:00 AM	0	0	0	0	1	0	0	0	1	35	0	0	0	35	0	0	179	930	
08:45:00 AM	0	0	0	0	1	0	0	0	0	19	0	0	0	26	0	0	185	878	
08:50:00 AM	0	0	0	0	0	0	0	0	0	14	0	0	0	42	0	0	174	834	
08:55:00 AM	0	0	0	0	2	0	0	0	0	18	0	0	0	28	0	0	150	782	

LOCATION: SW 108th Ave -- SW Tualatin Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768943
DATE: Tue, Sep 11 2018



Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

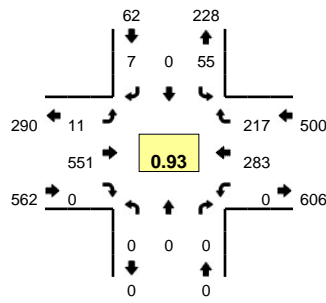


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Tualatin Rd (Eastbound)				SW Tualatin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	2	0	0	0	0	0	0	49	4	0	4	13	0	0	72	
7:05 AM	1	0	1	0	0	0	0	0	0	57	1	0	2	12	0	0	74	
7:10 AM	0	0	0	0	0	0	0	0	0	50	3	0	4	17	0	0	74	
7:15 AM	1	0	0	0	0	0	0	0	0	59	2	0	1	14	0	0	77	
7:20 AM	1	0	1	0	0	0	0	0	0	50	3	0	5	22	0	0	82	
7:25 AM	0	0	1	0	0	0	0	0	0	61	2	0	7	26	0	0	97	
7:30 AM	1	0	1	0	0	0	0	0	0	78	4	0	1	21	0	0	106	
7:35 AM	0	0	1	0	0	0	0	0	0	74	1	0	6	28	0	0	110	
7:40 AM	0	0	0	0	0	0	0	0	0	78	1	0	6	19	0	0	104	
7:45 AM	0	0	0	0	0	0	0	0	0	94	2	0	10	20	0	0	126	
7:50 AM	2	0	1	0	0	0	0	0	0	73	4	0	10	35	0	0	125	
7:55 AM	1	0	0	0	0	0	0	0	0	75	2	0	10	26	0	0	114	1161
8:00 AM	0	0	0	0	0	0	0	0	0	58	3	0	7	37	0	0	105	1194
8:05 AM	0	0	1	0	0	0	0	0	0	63	7	0	9	30	0	0	110	1230
8:10 AM	0	0	1	0	0	0	0	0	0	52	4	0	4	28	0	0	89	1245
8:15 AM	1	0	0	0	0	0	0	0	0	55	2	0	5	19	0	0	82	1250
8:20 AM	0	0	1	0	0	0	0	0	0	52	3	0	7	32	0	0	95	1263
8:25 AM	0	0	2	0	0	0	0	0	0	50	3	0	5	19	0	0	79	1245
8:30 AM	0	0	1	0	0	0	0	0	0	48	1	0	4	17	0	0	71	1210
8:35 AM	2	0	0	0	0	0	0	0	0	38	3	0	13	30	0	0	86	1186
8:40 AM	3	0	1	0	0	0	0	0	0	30	3	0	6	29	0	0	72	1154
8:45 AM	0	0	1	0	0	0	0	0	0	42	2	0	4	26	0	0	75	1103
8:50 AM	1	0	0	0	0	0	0	0	0	40	1	0	5	36	0	0	83	1061
8:55 AM	0	0	2	0	0	0	0	0	0	23	0	0	5	29	0	0	59	1006
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	12	0	4	0	0	0	0	0	0	968	32	0	120	324	0	0	1460	
Heavy Trucks	0	0	0	0	0	0	0	0	0	20	0	0	4	8	0	0	32	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1	
Railroad																		
Stopped Buses																		

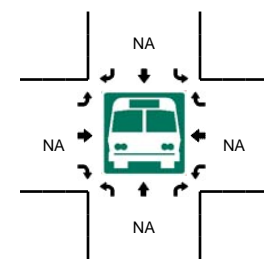
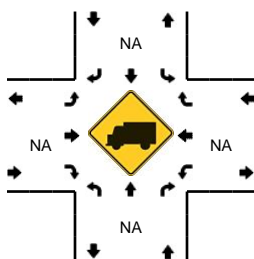
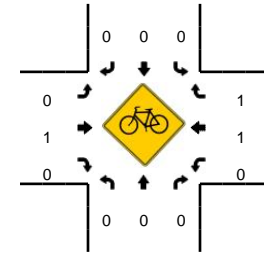
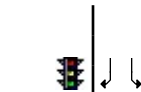
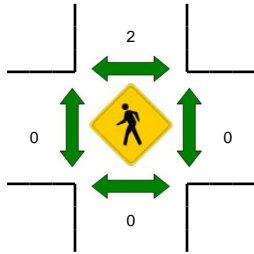
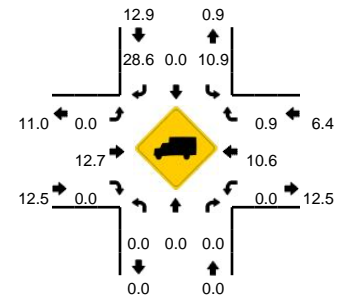
Comments:

LOCATION: SW 108th Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768944
DATE: Tue, Sep 11 2018



Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

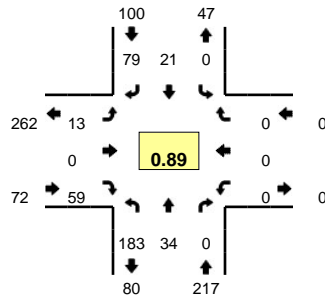


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	3	0	0	0	1	37	0	0	0	29	6	0	76	
7:05 AM	0	0	0	0	4	0	1	0	0	38	0	0	0	32	18	0	93	
7:10 AM	0	0	0	0	6	0	1	0	1	29	0	0	0	22	12	0	71	
7:15 AM	0	0	0	0	2	0	0	0	0	34	0	0	0	21	13	0	70	
7:20 AM	0	0	0	0	7	0	1	0	0	44	0	0	0	20	14	0	86	
7:25 AM	0	0	0	0	6	0	1	0	0	50	0	0	0	34	17	0	108	
7:30 AM	0	0	0	0	8	0	0	0	1	39	0	0	0	18	14	0	80	
7:35 AM	0	0	0	0	5	0	0	0	1	62	0	0	0	20	20	0	108	
7:40 AM	0	0	0	0	3	0	1	0	0	37	0	0	0	19	24	0	84	
7:45 AM	0	0	0	0	7	0	0	0	3	55	0	0	0	18	16	0	99	
7:50 AM	0	0	0	0	6	0	1	0	3	59	0	0	0	27	15	0	111	
7:55 AM	0	0	0	0	3	0	0	0	0	35	0	0	0	32	17	0	87	1073
8:00 AM	0	0	0	0	3	0	0	0	0	50	0	0	0	25	25	0	103	1100
8:05 AM	0	0	0	0	1	0	0	0	3	41	0	0	0	27	24	0	96	1103
8:10 AM	0	0	0	0	4	0	3	0	0	45	0	0	0	22	18	0	92	1124
8:15 AM	0	0	0	0	4	0	0	0	0	19	0	0	0	27	9	0	59	1113
8:20 AM	0	0	0	0	6	0	1	0	1	37	0	0	0	16	22	0	83	1110
8:25 AM	0	0	0	0	4	0	0	0	1	30	0	0	0	13	22	0	70	1072
8:30 AM	0	0	0	0	6	0	0	0	0	26	0	0	0	17	24	0	73	1065
8:35 AM	0	0	0	0	2	0	0	0	0	17	0	0	0	14	22	0	55	1012
8:40 AM	0	0	0	0	2	0	1	0	3	16	0	0	0	21	20	0	63	991
8:45 AM	0	0	0	0	2	0	1	0	1	18	0	0	0	20	19	0	61	953
8:50 AM	0	0	0	0	0	0	0	0	5	12	0	0	0	22	17	0	56	898
8:55 AM	0	0	0	0	0	0	0	0	1	23	0	0	0	20	21	0	65	876
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	48	0	4	0	12	576	0	0	0	336	228	0	1204	
Heavy Trucks	0	0	0	0	8	0	0	0	0	60	0	0	0	28	4	0	100	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

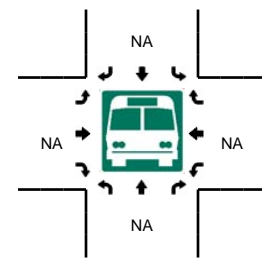
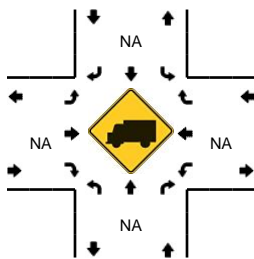
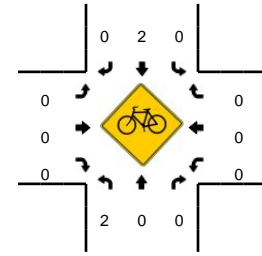
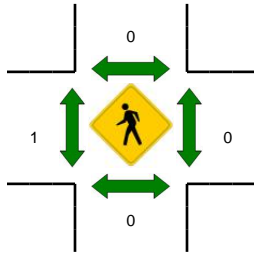
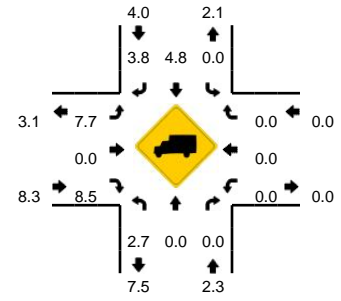
Comments:

LOCATION: SW 108th Ave -- Leveton Dr
CITY/STATE: Tualatin, OR

QC JOB #: 14768945
DATE: Tue, Sep 11 2018



Peak-Hour: 7:40 AM -- 8:40 AM
Peak 15-Min: 8:25 AM -- 8:40 AM

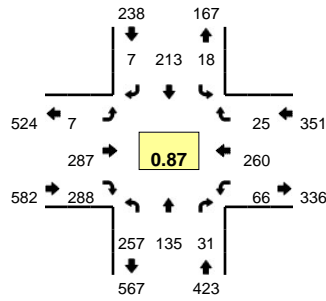


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				Leveton Dr (Eastbound)				Leveton Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	4	2	0	0	0	1	2	0	4	0	3	0	0	0	0	0	16	
7:05 AM	11	5	0	0	0	1	2	0	1	0	3	0	0	0	0	0	23	
7:10 AM	7	5	0	0	0	2	2	0	0	0	4	0	0	0	0	0	20	
7:15 AM	10	3	0	0	0	1	2	0	1	0	3	0	0	0	0	0	20	
7:20 AM	7	0	0	0	0	2	6	0	3	0	6	0	0	0	0	0	24	
7:25 AM	10	6	0	0	0	2	4	0	0	0	9	0	0	0	0	0	31	
7:30 AM	8	0	0	0	0	1	2	0	2	0	7	0	0	0	0	0	20	
7:35 AM	16	1	0	0	0	3	2	0	2	0	4	0	0	0	0	0	28	
7:40 AM	19	3	0	0	0	1	3	0	0	0	8	0	0	0	0	0	34	
7:45 AM	11	3	0	0	0	2	7	0	1	0	7	0	0	0	0	0	31	
7:50 AM	8	4	0	0	0	0	10	0	1	0	13	0	0	0	0	0	36	
7:55 AM	13	2	0	0	0	2	10	0	6	0	3	0	0	0	0	0	36	319
8:00 AM	12	7	0	0	0	1	7	0	2	0	6	0	0	0	0	0	35	338
8:05 AM	20	3	0	0	0	2	5	0	0	0	1	0	0	0	0	0	31	346
8:10 AM	13	1	0	0	0	1	4	0	1	0	6	0	0	0	0	0	26	352
8:15 AM	12	1	0	0	0	0	6	0	0	0	4	0	0	0	0	0	23	355
8:20 AM	15	1	0	0	0	2	6	0	0	0	4	0	0	0	0	0	28	359
8:25 AM	22	2	0	0	0	7	6	0	2	0	2	0	0	0	0	0	41	369
8:30 AM	20	4	0	0	0	2	2	0	0	0	3	0	0	0	0	0	31	380
8:35 AM	18	3	0	0	0	1	13	0	0	0	2	0	0	0	0	0	37	389
8:40 AM	10	4	0	0	0	1	8	0	1	0	2	0	0	0	0	0	26	381
8:45 AM	17	5	0	0	0	2	6	0	1	0	1	0	0	0	0	0	32	382
8:50 AM	15	1	0	0	0	0	4	0	1	0	4	0	0	0	0	0	25	371
8:55 AM	15	2	0	0	0	0	4	0	0	0	1	0	0	0	0	0	22	357
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	240	36	0	0	0	40	84	0	8	0	28	0	0	0	0	0	436	
Heavy Trucks	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Railroad																		
Stopped Buses																		

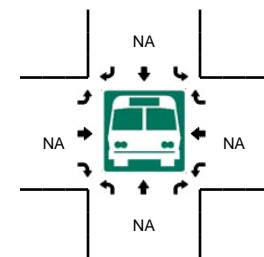
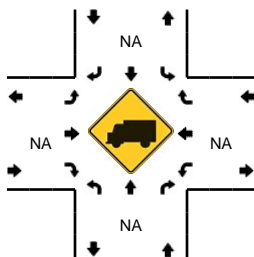
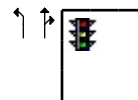
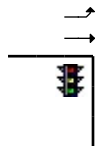
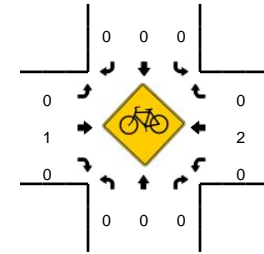
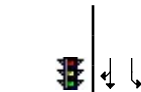
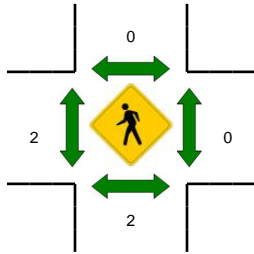
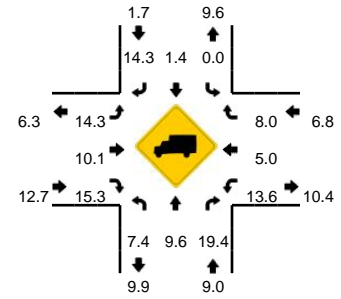
Comments:

LOCATION: SW Teton Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768946
DATE: Tue, Sep 11 2018



Peak-Hour: 7:20 AM -- 8:20 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

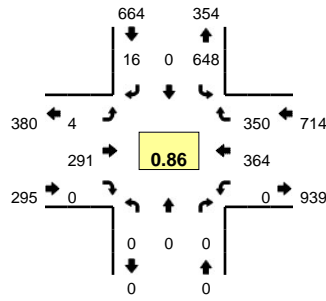


5-Min Count Period Beginning At	SW Teton Ave (Northbound)				SW Teton Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	23	6	0	0	2	8	0	0	0	19	21	0	1	17	1	0	98	
7:05 AM	29	5	3	0	0	13	0	0	0	25	20	0	1	24	0	0	120	
7:10 AM	20	5	1	0	1	17	0	0	1	11	12	0	2	17	0	0	87	
7:15 AM	18	9	2	0	1	16	0	0	2	20	22	0	0	18	0	0	108	
7:20 AM	15	9	1	0	0	9	0	0	0	21	23	0	5	26	1	0	110	
7:25 AM	21	11	3	0	3	13	0	0	0	27	26	0	3	27	2	0	136	
7:30 AM	14	6	1	0	1	26	0	0	0	27	22	0	2	17	0	0	116	
7:35 AM	20	12	4	0	3	18	0	0	2	21	33	0	5	27	1	0	146	
7:40 AM	27	7	5	0	1	24	0	0	0	27	20	0	2	18	1	0	132	
7:45 AM	15	10	3	0	0	23	3	0	2	20	26	0	6	16	2	0	126	
7:50 AM	21	16	0	0	1	21	0	0	0	37	35	0	7	21	7	0	166	
7:55 AM	29	12	5	0	4	23	0	0	0	16	19	0	10	25	1	0	144	1489
8:00 AM	26	13	4	0	1	17	0	0	0	23	27	0	10	25	4	0	150	1541
8:05 AM	26	11	3	0	0	18	2	0	1	22	22	0	6	23	3	0	137	1558
8:10 AM	22	11	1	0	3	13	1	0	1	26	20	0	4	17	1	0	120	1591
8:15 AM	21	17	1	0	1	8	1	0	1	20	15	0	6	18	2	0	111	1594
8:20 AM	15	11	0	0	0	13	0	0	1	20	23	0	2	20	2	0	107	1591
8:25 AM	20	17	2	0	0	13	1	0	0	26	16	0	2	15	1	0	113	1568
8:30 AM	24	12	2	0	0	10	0	0	0	25	7	0	3	16	1	0	100	1552
8:35 AM	22	23	5	0	2	7	1	0	0	16	6	0	0	24	0	0	106	1512
8:40 AM	19	31	6	0	0	13	1	0	0	10	4	0	2	17	0	0	103	1483
8:45 AM	16	15	3	0	2	19	0	0	1	13	8	0	4	19	0	0	100	1457
8:50 AM	22	21	2	0	5	15	0	0	0	18	7	0	3	18	0	0	111	1402
8:55 AM	21	6	4	0	1	7	0	0	1	16	8	0	3	22	3	0	92	1350
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	304	164	36	0	24	244	0	0	0	304	324	0	108	284	48	0	1840	
Heavy Trucks	16	4	8		0	4	0		0	24	52		12	20	4		144	
Pedestrians	0	0	0		0	0	0		0	0	0		0	0	0		0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

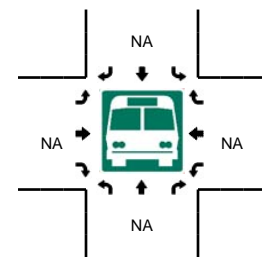
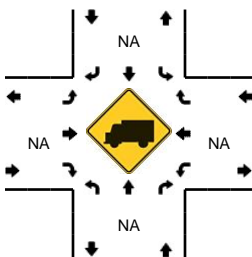
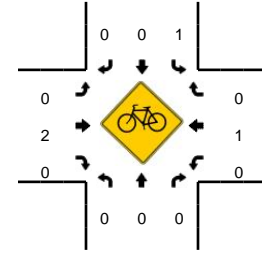
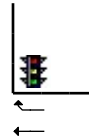
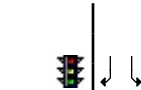
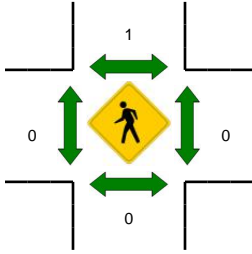
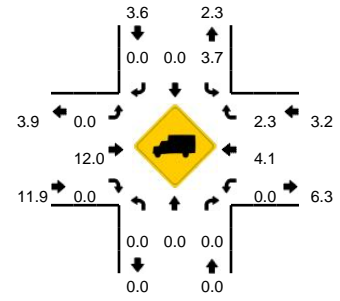
Comments:

LOCATION: SW Tualatin Rd -- SW Herman Rd
CITY/STATE: Washington, OR

QC JOB #: 14768947
DATE: Tue, Sep 11 2018



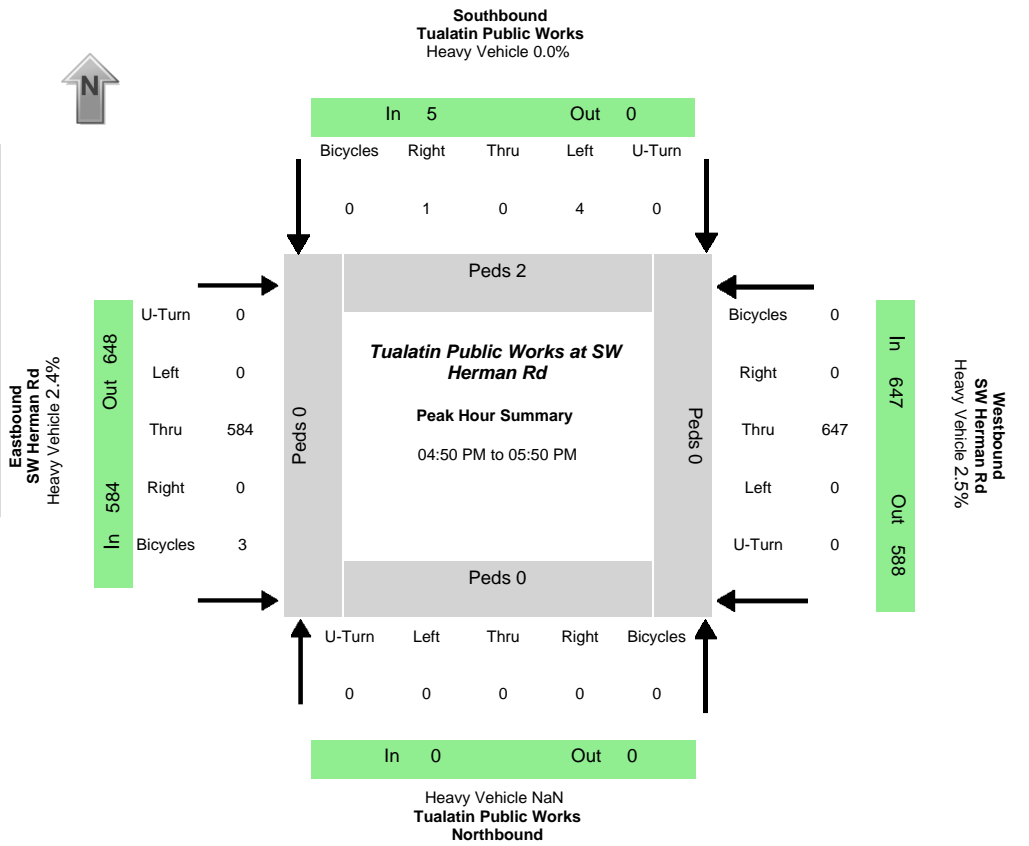
Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 7:55 AM -- 8:10 AM



5-Min Count Period Beginning At	SW Tualatin Rd (Northbound)				SW Tualatin Rd (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
7:00 AM	0	0	0	0	28	0	0	0	0	15	0	0	0	0	22	18	0	83	
7:05 AM	0	0	0	0	47	0	1	0	0	29	0	0	0	0	33	9	0	119	
7:10 AM	0	0	0	0	52	0	0	0	1	18	0	0	0	0	21	16	0	108	
7:15 AM	0	0	0	0	45	0	2	0	1	21	0	0	0	0	18	14	0	101	
7:20 AM	0	0	0	0	37	0	3	0	0	19	0	0	0	0	41	27	0	127	
7:25 AM	0	0	0	0	52	0	0	0	0	23	0	0	0	0	34	19	0	128	
7:30 AM	0	0	0	0	61	0	3	0	2	24	0	0	0	0	19	20	0	129	
7:35 AM	0	0	0	0	65	0	1	0	0	24	0	0	0	0	33	26	0	149	
7:40 AM	0	0	0	0	47	0	1	0	0	19	0	0	0	0	29	16	0	112	
7:45 AM	0	0	0	0	54	0	2	0	1	29	0	0	0	0	29	33	0	148	
7:50 AM	0	0	0	0	61	0	1	0	0	21	0	0	0	0	35	33	0	151	
7:55 AM	0	0	0	0	61	0	3	0	0	23	0	0	0	0	43	39	0	169	1524
8:00 AM	0	0	0	0	55	0	2	0	0	33	0	0	0	0	37	40	0	167	1608
8:05 AM	0	0	0	0	54	0	0	0	0	37	0	0	0	0	26	35	0	152	1641
8:10 AM	0	0	0	0	41	0	3	0	0	24	0	0	0	0	28	32	0	128	1661
8:15 AM	0	0	0	0	47	0	0	0	0	17	0	0	0	0	23	16	0	103	1663
8:20 AM	0	0	0	0	50	0	0	0	1	17	0	0	0	0	28	41	0	137	1673
8:25 AM	0	0	0	0	40	0	0	0	0	34	0	0	0	0	24	23	0	121	1666
8:30 AM	0	0	0	0	58	0	3	0	0	22	0	0	0	0	22	27	0	132	1669
8:35 AM	0	0	0	0	53	0	0	0	0	32	0	0	0	0	28	35	0	148	1668
8:40 AM	0	0	0	0	35	0	0	0	0	20	0	0	0	0	22	36	0	113	1669
8:45 AM	0	0	0	0	48	0	1	0	0	18	0	0	0	0	19	34	0	120	1641
8:50 AM	0	0	0	0	52	0	0	0	0	21	0	0	0	0	19	30	0	122	1612
8:55 AM	0	0	0	0	29	0	2	0	0	18	0	0	0	0	29	28	0	106	1549
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total		
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
All Vehicles	0	0	0	0	680	0	20	0	0	372	0	0	0	424	456	0	1952		
Heavy Trucks	0	0	0	0	24	0	0	0	0	44	0	0	0	16	12	0	96		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1		
Railroad																			
Stopped Buses																			

Comments:

Data Provided by K-D-N.com 503-594-4224	
N/S street	Tualatin Public Works
E/W street	SW Herman Rd
City, State	Tualatin OR
Site Notes	
Location	45.384202 - -122.786072
Start Date	Wednesday, October 10, 2018
Start Time	04:00:00 PM
Weather	
Study ID #	
Peak Hour Start	04:50:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.85



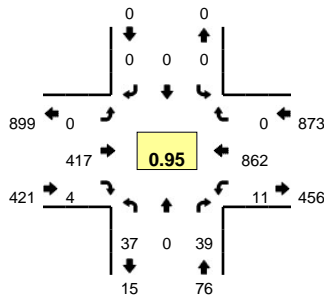
Peak-Hour Volumes (PHV)																							
Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	4	0	1	0	0	584	0	0	0	647	0	0	0	5	584	647	0	0	648	588
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	NaN	0.0%	2.4%	2.5%	NaN	0.0%	2.5%	2.4%

PHV - Bicycles												PHV - Pedestrians									
Northbound				Southbound				Eastbound				Westbound				in Crosswalk					
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	2	0	0	2

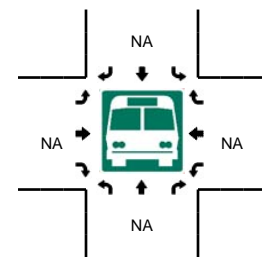
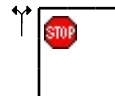
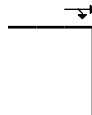
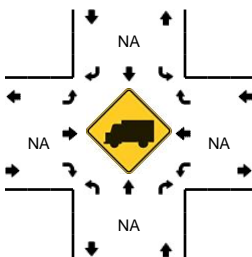
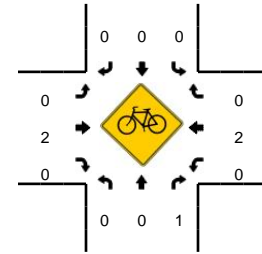
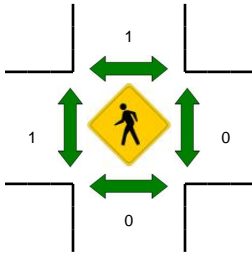
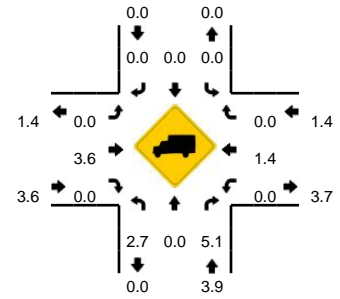
All Vehicle Volumes																		
Time	Northbound Tualatin Public Works				Southbound Tualatin Public Works				Eastbound SW Herman Rd				Westbound SW Herman Rd				15 Min Sum	1 HR Sum
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn		
04:00:00 PM	0	0	0	0	18	0	10	0	1	38	0	0	0	40	1	0		
04:05:00 PM	0	0	0	0	5	0	3	0	0	32	0	0	0	45	1	0		
04:10:00 PM	0	0	0	0	0	0	0	0	0	29	0	0	0	41	1	0	265	
04:15:00 PM	0	0	0	0	0	0	0	0	0	31	0	0	0	38	0	0	226	
04:20:00 PM	0	0	0	0	0	0	1	0	0	48	0	0	0	60	1	0	250	
04:25:00 PM	0	0	0	0	1	0	1	0	0	32	0	0	0	29	0	0	242	
04:30:00 PM	0	0	0	0	0	0	0	0	0	35	0	0	0	37	0	0	245	
04:35:00 PM	0	0	0	0	0	0	0	0	0	53	0	0	0	57	0	0	245	
04:40:00 PM	0	0	0	0	0	0	0	0	0	29	0	0	0	31	0	0	242	
04:45:00 PM	0	0	0	0	0	0	0	0	0	49	0	0	0	40	0	0	259	
04:50:00 PM	0	0	0	0	3	0	0	0	0	45	0	0	0	46	0	0	243	
04:55:00 PM	0	0	0	0	0	0	0	0	0	44	0	0	0	50	0	0	277	1026
05:00:00 PM	0	0	0	0	1	0	0	0	0	50	0	0	0	60	0	0	299	1029
05:05:00 PM	0	0	0	0	0	0	1	0	0	71	0	0	0	55	0	0	332	1070
05:10:00 PM	0	0	0	0	0	0	0	0	0	65	0	0	0	56	0	0	359	1120
05:15:00 PM	0	0	0	0	0	0	0	0	0	52	0	0	0	64	0	0	364	1167
05:20:00 PM	0	0	0	0	0	0	0	0	0	49	0	0	0	55	0	0	341	1161
05:25:00 PM	0	0	0	0	0	0	0	0	0	36	0	0	0	57	0	0	313	1191
05:30:00 PM	0	0	0	0	0	0	0	0	0	41	0	0	0	49	0	0	287	1209
05:35:00 PM	0	0	0	0	0	0	0	0	0	41	0	0	0	56	0	0	280	1196
05:40:00 PM	0	0	0	0	0	0	0	0	0	51	0	0	0	43	0	0	281	1230
05:45:00 PM	0	0	0	0	0	0	0	0	0	39	0	0	0	56	0	0	286	1236
05:50:00 PM	0	0	0	0	0	0	0	0	0	37	0	0	0	35	0	0	261	1214
05:55:00 PM	0	0	0	0	0	0	0	0	0	33	0	0	0	32	0	0	232	1185

LOCATION: SW 108th Ave -- SW Tualatin Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768914
DATE: Thu, Aug 16 2018



Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

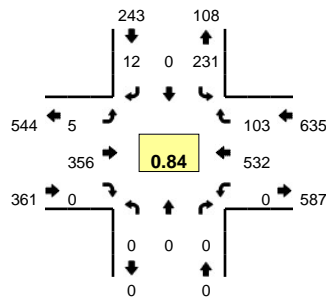


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Tualatin Rd (Eastbound)				SW Tualatin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	8	0	2	0	0	0	0	0	0	33	0	0	0	62	0	0	105	
4:05 PM	6	0	4	0	0	0	0	0	0	45	0	0	2	60	0	0	117	
4:10 PM	2	0	1	0	0	0	0	0	0	24	0	0	0	73	0	0	100	
4:15 PM	0	0	1	0	0	0	0	0	0	19	1	0	1	57	0	0	79	
4:20 PM	1	0	3	0	0	0	0	0	0	32	1	0	0	67	0	0	104	
4:25 PM	0	0	3	0	0	0	0	0	0	35	0	0	0	71	0	0	109	
4:30 PM	3	0	2	0	0	0	0	0	0	36	1	0	1	72	0	0	115	
4:35 PM	3	0	3	0	0	0	0	0	0	29	0	0	0	77	0	0	112	
4:40 PM	5	0	4	0	0	0	0	0	0	32	0	0	2	77	0	0	120	
4:45 PM	3	0	0	0	0	0	0	0	0	40	0	0	1	70	0	0	114	
4:50 PM	1	0	6	0	0	0	0	0	0	40	0	0	1	68	0	0	116	
4:55 PM	2	0	3	0	0	0	0	0	0	42	0	0	2	70	0	0	119	1310
5:00 PM	6	0	4	0	0	0	0	0	0	36	0	0	2	77	0	0	125	1330
5:05 PM	6	0	5	0	0	0	0	0	0	25	1	0	1	63	0	0	101	1314
5:10 PM	2	0	1	0	0	0	0	0	0	38	0	0	0	76	0	0	117	1331
5:15 PM	5	0	5	0	0	0	0	0	0	32	1	0	1	74	0	0	118	1370
5:20 PM	3	0	8	0	0	0	0	0	0	20	0	0	0	61	0	0	92	1358
5:25 PM	1	0	4	0	0	0	0	0	0	24	0	0	1	69	0	0	99	1348
5:30 PM	2	0	4	0	0	0	0	0	0	29	0	0	0	61	0	0	96	1329
5:35 PM	2	0	3	0	0	0	0	0	0	21	1	0	0	70	0	0	97	1314
5:40 PM	1	0	5	1	0	0	0	0	0	34	0	0	0	53	0	0	94	1288
5:45 PM	1	0	3	0	0	0	0	0	0	31	1	0	1	44	0	0	81	1255
5:50 PM	4	0	3	0	0	0	0	0	0	28	3	0	0	50	0	0	88	1227
5:55 PM	1	0	4	0	0	0	0	0	0	28	1	0	1	62	0	0	97	1205
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	36	0	52	0	0	0	0	0	0	472	0	0	20	860	0	0	1440	
Heavy Trucks	4	0	4	0	0	0	0	0	0	8	0	0	0	8	0	0	24	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

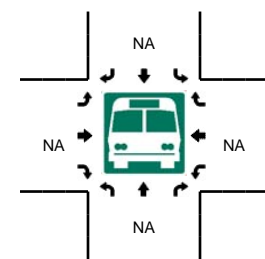
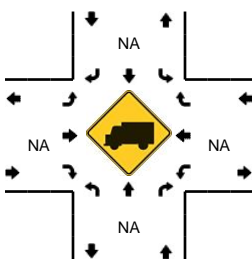
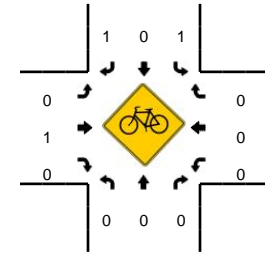
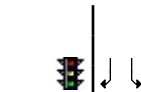
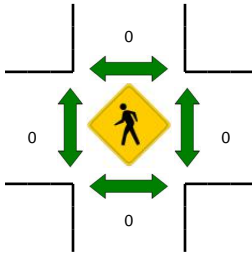
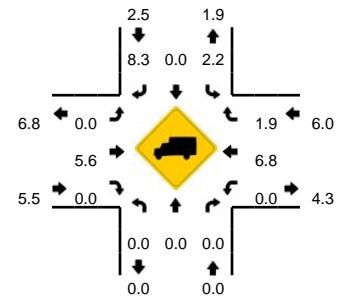
Comments:

LOCATION: SW 108th Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768926
DATE: Thu, Aug 16 2018



Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

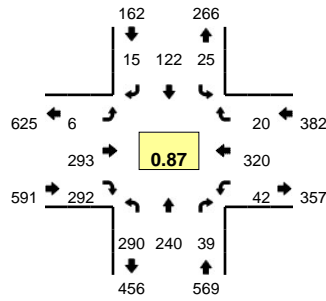


5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	9	0	2	0	0	38	0	0	0	32	8	0	89	
4:05 PM	0	0	0	0	12	0	0	0	1	37	0	0	0	35	10	0	95	
4:10 PM	0	0	0	0	15	0	2	0	0	32	0	0	0	53	6	0	108	
4:15 PM	0	0	0	0	10	0	4	0	0	29	0	0	0	37	8	0	88	
4:20 PM	0	0	0	0	5	0	1	0	1	23	0	0	0	42	9	0	81	
4:25 PM	0	0	0	0	21	0	0	0	0	30	0	0	0	31	5	0	87	
4:30 PM	0	0	0	0	19	0	1	0	1	39	0	0	0	54	10	0	124	
4:35 PM	0	0	0	0	19	0	2	0	0	30	0	0	0	58	12	0	121	
4:40 PM	0	0	0	0	34	0	1	0	1	28	0	0	0	51	8	0	123	
4:45 PM	0	0	0	0	13	0	0	0	1	25	0	0	0	24	9	0	72	
4:50 PM	0	0	0	0	8	0	1	0	0	19	0	0	0	52	14	0	94	
4:55 PM	0	0	0	0	15	0	1	0	0	32	0	0	0	47	8	0	103	1185
5:00 PM	0	0	0	0	21	0	1	0	1	26	0	0	0	44	11	0	104	1200
5:05 PM	0	0	0	0	18	0	0	0	0	37	0	0	0	48	8	0	111	1216
5:10 PM	0	0	0	0	14	0	0	0	0	28	0	0	0	46	5	0	93	1201
5:15 PM	0	0	0	0	20	0	3	0	0	35	0	0	0	47	9	0	114	1227
5:20 PM	0	0	0	0	29	0	2	0	1	27	0	0	0	30	4	0	93	1239
5:25 PM	0	0	0	0	19	0	3	0	0	16	0	0	0	38	3	0	79	1231
5:30 PM	0	0	0	0	31	0	2	0	0	17	0	0	0	39	1	0	90	1197
5:35 PM	0	0	0	0	20	0	0	0	0	18	0	0	0	34	1	0	73	1149
5:40 PM	0	0	0	0	23	0	2	0	0	20	0	0	0	32	4	0	81	1107
5:45 PM	0	0	0	0	24	0	2	0	0	18	0	0	0	22	2	0	68	1103
5:50 PM	0	0	0	0	16	0	1	0	0	19	0	0	0	22	5	0	63	1072
5:55 PM	0	0	0	0	17	0	2	0	0	16	0	0	0	29	8	0	72	1041
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	288	0	16	0	8	388	0	0	0	652	120	0	1472	
Heavy Trucks	0	0	0	0	0	0	4	0	0	16	0	0	0	44	0	0	64	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

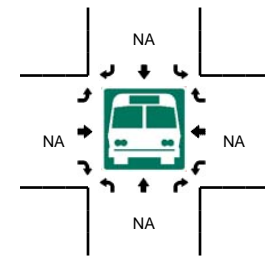
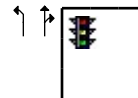
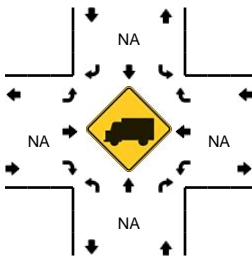
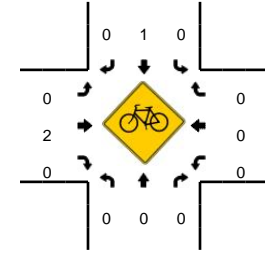
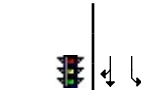
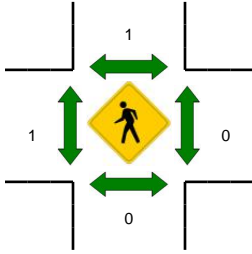
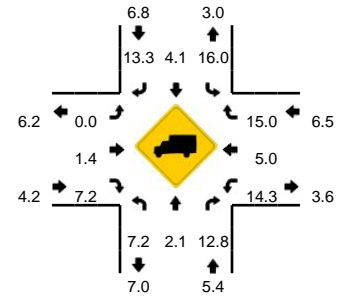
Comments:

LOCATION: SW Teton Ave -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768932
DATE: Thu, Aug 16 2018



Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

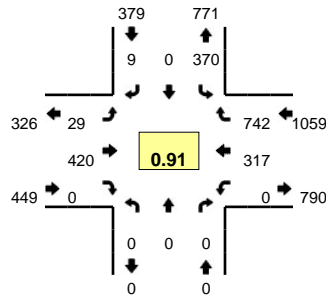


5-Min Count Period Beginning At	SW Teton Ave (Northbound)				SW Teton Ave (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	18	16	3	0	3	7	2	0	0	28	19	0	1	16	1	0	114	
4:05 PM	17	15	1	0	1	16	1	0	2	30	21	0	3	19	0	0	126	
4:10 PM	35	25	3	0	3	9	0	0	1	29	23	0	1	29	6	0	164	
4:15 PM	23	16	3	0	1	2	0	0	0	22	19	0	2	20	0	0	108	
4:20 PM	17	12	5	0	0	4	2	0	1	16	13	0	5	23	1	0	99	
4:25 PM	19	13	5	0	0	7	0	0	0	14	28	0	2	28	0	0	116	
4:30 PM	19	13	2	0	2	6	1	0	0	36	23	0	2	40	2	0	146	
4:35 PM	37	31	8	0	0	17	2	0	1	24	24	0	6	24	6	0	180	
4:40 PM	22	12	3	0	1	9	2	0	2	35	30	0	8	37	1	0	162	
4:45 PM	17	24	1	0	6	15	2	0	0	12	23	0	5	14	1	0	120	
4:50 PM	33	19	6	0	1	10	2	0	1	17	15	0	3	31	1	0	139	
4:55 PM	18	19	5	0	1	13	0	0	1	24	20	0	2	38	0	0	141	1615
5:00 PM	31	22	2	0	5	10	1	0	0	16	23	0	0	23	2	0	135	1636
5:05 PM	31	18	2	0	3	12	4	0	0	30	25	0	5	15	1	0	146	1656
5:10 PM	26	24	2	0	1	6	0	0	0	31	25	0	5	25	1	0	146	1638
5:15 PM	19	23	2	0	3	10	0	0	1	22	27	0	2	32	2	0	143	1673
5:20 PM	18	22	1	0	2	7	1	0	0	32	29	0	2	13	3	0	130	1704
5:25 PM	12	8	2	0	2	4	0	0	0	14	23	0	2	23	0	0	90	1678
5:30 PM	15	20	1	0	1	7	3	0	0	25	22	0	4	20	0	0	118	1650
5:35 PM	14	14	3	0	1	5	3	0	1	23	15	0	0	23	0	0	102	1572
5:40 PM	15	7	5	0	2	9	0	0	1	20	17	0	4	16	0	0	96	1506
5:45 PM	9	13	2	0	2	12	0	0	0	19	23	0	6	19	1	0	106	1492
5:50 PM	9	16	3	0	0	10	0	0	0	17	23	0	2	15	3	0	98	1451
5:55 PM	12	16	1	0	0	3	1	0	0	15	16	0	1	20	1	0	86	1396
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	312	224	52	0	12	128	20	0	12	380	308	0	64	404	36	0	1952	
Heavy Trucks	24	12	12		8	8	4		0	4	8		8	20	4		112	
Pedestrians		0				4				4				0			8	
Bicycles		0	0			0	0			0	0			0	0		0	
Railroad																		
Stopped Buses																		

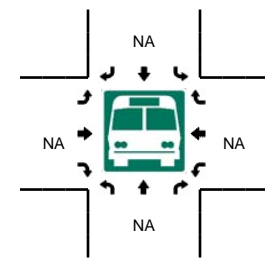
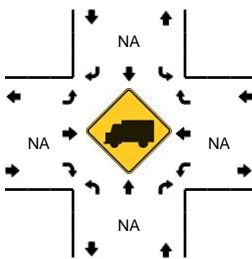
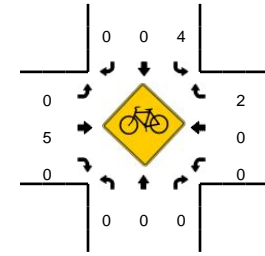
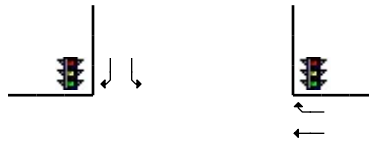
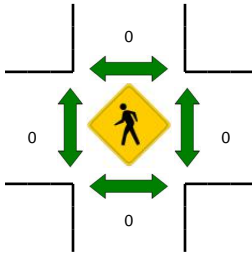
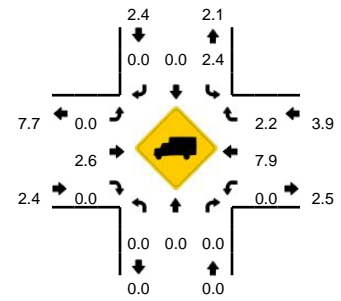
Comments:

LOCATION: SW Tualatin Rd -- SW Herman Rd
CITY/STATE: Tualatin, OR

QC JOB #: 14768938
DATE: Thu, Aug 16 2018



Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:30 PM -- 4:45 PM



5-Min Count Period Beginning At	SW Tualatin Rd (Northbound)				SW Tualatin Rd (Southbound)				SW Herman Rd (Eastbound)				SW Herman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	26	0	0	0	2	42	0	0	0	22	60	0	152	
4:05 PM	0	0	0	0	44	0	0	0	0	32	0	0	0	18	39	0	133	
4:10 PM	0	0	0	0	21	0	0	0	2	39	0	0	0	33	57	0	152	
4:15 PM	0	0	0	0	24	0	1	0	2	29	0	0	0	20	43	0	119	
4:20 PM	0	0	0	0	30	0	1	0	1	27	0	0	0	19	64	0	142	
4:25 PM	0	0	0	0	31	0	1	0	2	22	0	0	0	32	63	0	151	
4:30 PM	0	0	0	0	29	0	1	0	4	53	0	0	0	33	63	0	183	
4:35 PM	0	0	0	0	24	0	0	0	6	54	0	0	0	30	56	0	170	
4:40 PM	0	0	0	0	24	0	3	0	3	43	0	0	0	25	68	0	166	
4:45 PM	0	0	0	0	31	0	1	0	4	32	0	0	0	17	59	0	144	
4:50 PM	0	0	0	0	29	0	0	0	2	33	0	0	0	31	58	0	153	
4:55 PM	0	0	0	0	37	0	0	0	1	33	0	0	0	38	58	0	167	1832
5:00 PM	0	0	0	0	39	0	0	0	1	22	0	0	0	19	66	0	147	1827
5:05 PM	0	0	0	0	36	0	0	0	3	40	0	0	0	21	58	0	158	1852
5:10 PM	0	0	0	0	24	0	1	0	2	29	0	0	0	27	73	0	156	1856
5:15 PM	0	0	0	0	36	0	1	0	0	32	0	0	0	25	56	0	150	1887
5:20 PM	0	0	0	0	24	0	0	0	2	37	0	0	0	20	54	0	137	1882
5:25 PM	0	0	0	0	29	0	0	0	0	21	0	0	0	19	61	0	130	1861
5:30 PM	0	0	0	0	30	0	0	0	0	26	0	0	0	24	62	0	142	1820
5:35 PM	0	0	0	0	33	0	0	0	1	28	0	0	0	22	66	0	150	1800
5:40 PM	0	0	0	0	20	0	1	0	0	25	0	0	0	18	50	0	114	1748
5:45 PM	0	0	0	0	35	0	0	0	0	26	0	0	0	23	50	0	134	1738
5:50 PM	0	0	0	0	24	0	0	0	0	20	0	0	0	18	44	0	106	1691
5:55 PM	0	0	0	0	28	0	1	0	0	19	0	0	0	22	52	0	122	1646
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	308	0	16	0	52	600	0	0	0	352	748	0	2076	
Heavy Trucks	0	0	0	0	4	0	0	0	0	12	0	0	0	32	28	0	76	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	
Railroad																		
Stopped Buses																		

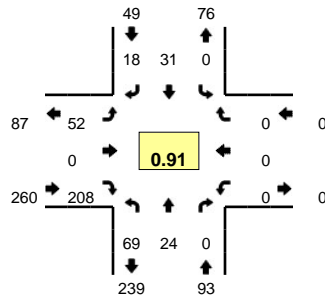
Comments:

Type of peak hour being reported: Intersection Peak

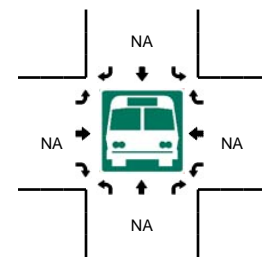
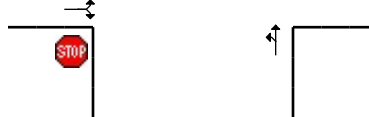
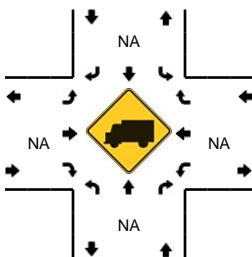
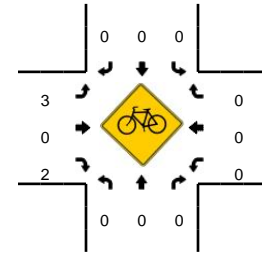
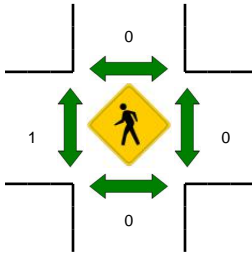
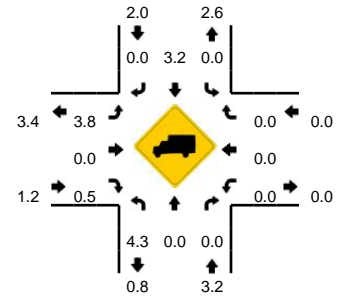
Method for determining peak hour: Total Entering Volume

LOCATION: SW 108th Ave -- Leveton Dr
CITY/STATE: Tualatin, OR

QC JOB #: 14768948
DATE: Tue, Sep 11 2018



Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:25 PM -- 5:40 PM



5-Min Count Period Beginning At	SW 108th Ave (Northbound)				SW 108th Ave (Southbound)				Leveton Dr (Eastbound)				Leveton Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	3	0	0	0	2	1	0	8	0	14	0	0	0	0	0	38	
4:05 PM	6	3	0	0	0	4	0	0	3	0	10	0	0	0	0	0	26	
4:10 PM	3	1	0	0	0	4	0	0	3	0	8	0	0	0	0	0	19	
4:15 PM	4	3	0	0	0	1	0	0	0	0	9	0	0	0	0	0	17	
4:20 PM	8	2	0	0	0	3	0	0	5	0	8	0	0	0	0	0	26	
4:25 PM	10	2	0	0	0	3	1	0	2	0	5	0	0	0	0	0	23	
4:30 PM	8	4	0	0	0	4	1	0	1	0	12	0	0	0	0	0	30	
4:35 PM	9	2	0	0	0	5	2	0	3	0	12	0	0	0	0	0	33	
4:40 PM	9	5	0	0	0	4	4	0	7	0	11	0	0	0	0	0	40	
4:45 PM	8	1	0	0	0	6	0	0	2	0	8	0	0	0	0	0	25	
4:50 PM	13	1	0	0	0	0	0	0	3	0	8	0	0	0	0	0	25	
4:55 PM	7	1	0	0	0	3	0	0	4	0	17	0	0	0	0	0	32	334
5:00 PM	13	0	0	0	0	3	2	0	3	0	15	0	0	0	0	0	36	332
5:05 PM	3	2	0	0	0	2	2	0	4	0	19	0	0	0	0	0	32	338
5:10 PM	4	2	0	0	0	2	3	0	3	0	18	0	0	0	0	0	32	351
5:15 PM	2	6	0	0	0	4	3	0	7	0	19	0	0	0	0	0	41	375
5:20 PM	5	1	0	0	0	4	0	0	2	0	16	0	0	0	0	0	28	377
5:25 PM	1	1	0	0	0	0	1	0	8	0	21	0	0	0	0	0	32	386
5:30 PM	2	4	0	0	0	2	0	0	3	0	31	0	0	0	0	0	42	398
5:35 PM	2	0	0	0	0	1	3	0	6	0	25	0	0	0	0	0	37	402
5:40 PM	2	0	0	0	0	1	0	0	3	0	18	0	0	0	0	0	24	386
5:45 PM	4	3	0	0	0	1	2	0	3	0	15	0	0	0	0	0	28	389
5:50 PM	4	1	0	0	0	2	1	0	3	0	15	0	0	0	0	0	26	390
5:55 PM	1	0	0	0	0	2	1	0	5	0	15	0	0	0	0	0	24	382
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	20	20	0	0	0	12	16	0	68	0	308	0	0	0	0	0	444	
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4	
Pedestrians		0				0					0			0			0	
Bicycles	0	0	0		0	0	0		2	0	1		0	0	0		3	
Railroad																		
Stopped Buses																		

Comments:

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	813	35	82	321	5	7
Future Vol, veh/h	813	35	82	321	5	7
Conflicting Peds, #/hr	0	2	2	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	5	5	33	33
Mvmt Flow	934	40	94	369	6	8

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	976	0	1514
Stage 1	-	-	-	-	956
Stage 2	-	-	-	-	558
Critical Hdwy	-	-	4.15	-	6.73
Critical Hdwy Stg 1	-	-	-	-	5.73
Critical Hdwy Stg 2	-	-	-	-	5.73
Follow-up Hdwy	-	-	2.245	-	3.797
Pot Cap-1 Maneuver	-	-	695	-	112
Stage 1	-	-	-	-	329
Stage 2	-	-	-	-	516
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	693	-	96
Mov Cap-2 Maneuver	-	-	-	-	96
Stage 1	-	-	-	-	328
Stage 2	-	-	-	-	445

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	30.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	154	-	-	693	-
HCM Lane V/C Ratio	0.09	-	-	0.136	-
HCM Control Delay (s)	30.7	-	-	11	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	13	59	198	40	21	79
Future Vol, veh/h	13	59	198	40	21	79
Conflicting Peds, #/hr	0	0	1	0	0	1
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	89	89	89	89	89	89
Heavy Vehicles, %	8	8	2	2	4	4
Mvmt Flow	15	66	222	45	24	89

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	559	70	114	0	0
Stage 1	70	-	-	-	-
Stage 2	489	-	-	-	-
Critical Hdwy	6.48	6.28	4.12	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.218	-	-
Pot Cap-1 Maneuver	480	976	1475	-	-
Stage 1	938	-	-	-	-
Stage 2	604	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	405	975	1474	-	-
Mov Cap-2 Maneuver	405	-	-	-	-
Stage 1	793	-	-	-	-
Stage 2	603	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	6.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1474	-	777	-	-
HCM Lane V/C Ratio	0.151	-	0.104	-	-
HCM Control Delay (s)	7.9	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.3	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	11	551	297	227	70	10
Future Volume (vph)	11	551	297	227	70	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1702	1792	1566		1597	1429
Flt Permitted	0.38	1.00	1.00		0.95	1.00
Satd. Flow (perm)	675	1792	1566		1597	1429
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	12	592	319	244	75	11
RTOR Reduction (vph)	0	0	22	0	0	10
Lane Group Flow (vph)	12	592	541	0	75	1
Confl. Peds. (#/hr)	2			2		
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	6%	6%	13%	13%	13%	13%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	35.1	35.1	29.0		6.6	6.6
Effective Green, g (s)	35.1	35.1	29.0		6.6	6.6
Actuated g/C Ratio	0.65	0.65	0.54		0.12	0.12
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	455	1173	847		196	175
v/s Ratio Prot	0.00	c0.33	c0.35		c0.05	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.50	0.64		0.38	0.01
Uniform Delay, d1	5.6	4.8	8.6		21.6	20.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.4	1.6		1.0	0.0
Delay (s)	5.6	5.1	10.2		22.6	20.6
Level of Service	A	A	B		C	C
Approach Delay (s)		5.1	10.2		22.4	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	17.3
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	8	306	307	66	260	25	257	135	31	18	213	7
Future Volume (vph)	8	306	307	66	260	25	257	135	31	18	213	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.92		1.00	0.99		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1533		1687	1749		1655	1694		1770	1852	
Flt Permitted	0.53	1.00		0.08	1.00		0.30	1.00		0.64	1.00	
Satd. Flow (perm)	887	1533		151	1749		531	1694		1187	1852	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	9	352	353	76	299	29	295	155	36	21	245	8
RTOR Reduction (vph)	0	22	0	0	2	0	0	5	0	0	1	0
Lane Group Flow (vph)	9	683	0	76	326	0	295	186	0	21	252	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.2	43.1		52.9	47.8		42.1	36.0		23.8	21.7	
Effective Green, g (s)	44.2	43.1		52.9	47.8		42.1	36.0		23.8	21.7	
Actuated g/C Ratio	0.42	0.41		0.50	0.45		0.40	0.34		0.23	0.21	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	379	626		160	792		386	578		279	380	
v/s Ratio Prot	0.00	c0.45		c0.03	0.19		c0.12	0.11		0.00	0.14	
v/s Ratio Perm	0.01			0.21			c0.19			0.02		
v/c Ratio	0.02	1.09		0.47	0.41		0.76	0.32		0.08	0.66	
Uniform Delay, d1	17.9	31.2		21.5	19.4		24.2	25.7		32.0	38.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	63.3		0.8	0.4		7.9	0.3		0.0	4.4	
Delay (s)	18.0	94.5		22.3	19.8		32.1	26.1		32.1	42.9	
Level of Service	B	F		C	B		C	C		C	D	
Approach Delay (s)		93.6			20.3			29.7			42.1	
Approach LOS		F			C			C			D	

Intersection Summary

HCM 2000 Control Delay	53.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	105.5	Sum of lost time (s)	18.5
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	4	291	364	350	648	16
Future Volume (vph)	4	291	364	350	648	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1696	1845	1532	1736	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1612	1696	1845	1532	1736	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	338	423	407	753	19
RTOR Reduction (vph)	0	0	0	285	0	10
Lane Group Flow (vph)	5	338	423	122	753	9
Confl. Peds. (#/hr)	1			1		
Confl. Bikes (#/hr)				1		1
Heavy Vehicles (%)	12%	12%	3%	3%	4%	4%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	1.1	28.1	22.0	22.0	35.2	35.2
Effective Green, g (s)	1.1	28.1	22.0	22.0	35.2	35.2
Actuated g/C Ratio	0.02	0.38	0.30	0.30	0.48	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	24	650	553	459	833	745
v/s Ratio Prot	0.00	c0.20	c0.23		c0.43	0.01
v/s Ratio Perm				0.08		
v/c Ratio	0.21	0.52	0.76	0.27	0.90	0.01
Uniform Delay, d1	35.7	17.4	23.3	19.5	17.5	10.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	0.8	6.2	0.3	13.1	0.0
Delay (s)	40.0	18.2	29.5	19.8	30.6	10.0
Level of Service	D	B	C	B	C	A
Approach Delay (s)		18.5	24.8		30.1	
Approach LOS		B	C		C	

Intersection Summary

HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	73.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 0.3

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations	↙	↑	↘		↙	
Traffic Vol, veh/h	6	615	516	8	6	8
Future Vol, veh/h	6	615	516	8	6	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	668	561	9	7	9

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	570	0	-	0	1248	566
Stage 1	-	-	-	-	566	-
Stage 2	-	-	-	-	682	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1002	-	-	-	191	524
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	502	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1002	-	-	-	190	524
Mov Cap-2 Maneuver	-	-	-	-	190	-
Stage 1	-	-	-	-	564	-
Stage 2	-	-	-	-	502	-

Approach EB WB SB

HCM Control Delay, s	0.1	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1002	-	-	-	299
HCM Lane V/C Ratio	0.007	-	-	-	0.051
HCM Control Delay (s)	8.6	-	-	-	17.7
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	417	4	11	862	37	39
Future Vol, veh/h	417	4	11	862	37	39
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	439	4	12	907	39	41

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	443	0	1373
Stage 1	-	-	-	-	441
Stage 2	-	-	-	-	932
Critical Hdwy	-	-	4.11	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	-	-	2.209	-	3.536
Pot Cap-1 Maneuver	-	-	1122	-	159
Stage 1	-	-	-	-	644
Stage 2	-	-	-	-	380
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1122	-	157
Mov Cap-2 Maneuver	-	-	-	-	157
Stage 1	-	-	-	-	644
Stage 2	-	-	-	-	375

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	25.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	254	-	-	1122	-
HCM Lane V/C Ratio	0.315	-	-	0.01	-
HCM Control Delay (s)	25.6	-	-	8.2	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.3	-	-	0	-

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	52	211	80	28	32	18
Future Vol, veh/h	52	211	80	28	32	18
Conflicting Peds, #/hr	0	0	0	0	0	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	3	3	2	2
Mvmt Flow	57	232	88	31	35	20

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	253	46	56	0	0
Stage 1	46	-	-	-	-
Stage 2	207	-	-	-	-
Critical Hdwy	6.41	6.21	4.13	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.227	-	-
Pot Cap-1 Maneuver	738	1026	1542	-	-
Stage 1	979	-	-	-	-
Stage 2	830	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	694	1025	1541	-	-
Mov Cap-2 Maneuver	694	-	-	-	-
Stage 1	921	-	-	-	-
Stage 2	829	-	-	-	-

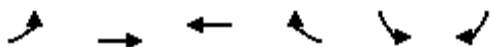
Approach	EB	NB	SB
HCM Control Delay, s	10.5	5.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1541	-	937	-	-
HCM Lane V/C Ratio	0.057	-	0.308	-	-
HCM Control Delay (s)	7.5	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.3	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	350	532	103	231	12
Future Volume (vph)	5	350	532	103	231	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1703	1792	1753		1752	1534
Flt Permitted	0.21	1.00	1.00		0.95	1.00
Satd. Flow (perm)	376	1792	1753		1752	1534
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	417	633	123	275	14
RTOR Reduction (vph)	0	0	6	0	0	11
Lane Group Flow (vph)	6	417	750	0	275	3
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	6%	6%	6%	3%	3%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	44.7	44.7	38.6		16.6	16.6
Effective Green, g (s)	44.7	44.7	38.6		16.6	16.6
Actuated g/C Ratio	0.61	0.61	0.53		0.23	0.23
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	242	1094	924		397	347
v/s Ratio Prot	0.00	c0.23	c0.43		c0.16	
v/s Ratio Perm	0.01					0.00
v/c Ratio	0.02	0.38	0.81		0.69	0.01
Uniform Delay, d1	16.0	7.2	14.3		26.0	21.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	5.5		4.8	0.0
Delay (s)	16.0	7.5	19.8		30.8	21.9
Level of Service	B	A	B		C	C
Approach Delay (s)		7.6	19.8		30.4	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	298	297	42	320	20	295	240	40	30	122	15
Future Volume (vph)	6	298	297	42	320	20	295	240	40	30	122	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1672		1687	1758		1719	1771		1687	1742	
Flt Permitted	0.46	1.00		0.12	1.00		0.43	1.00		0.57	1.00	
Satd. Flow (perm)	847	1672		212	1758		772	1771		1004	1742	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	7	343	341	48	368	23	339	276	46	34	140	17
RTOR Reduction (vph)	0	20	0	0	1	0	0	4	0	0	3	0
Lane Group Flow (vph)	7	664	0	48	390	0	339	318	0	34	154	0
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)			2									1
Heavy Vehicles (%)	4%	4%	4%	7%	7%	7%	5%	5%	5%	7%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.0	42.9		51.4	46.6		37.2	29.6		19.5	15.9	
Effective Green, g (s)	44.0	42.9		51.4	46.6		37.2	29.6		19.5	15.9	
Actuated g/C Ratio	0.44	0.43		0.52	0.47		0.37	0.30		0.20	0.16	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	384	721		180	824		453	527		221	278	
v/s Ratio Prot	0.00	c0.40		c0.01	0.22		c0.13	0.18		0.01	0.09	
v/s Ratio Perm	0.01			0.12			c0.15			0.02		
v/c Ratio	0.02	0.92		0.27	0.47		0.75	0.60		0.15	0.55	
Uniform Delay, d1	15.7	26.6		17.7	18.0		24.6	29.9		32.8	38.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	17.1		0.3	0.5		5.8	2.0		0.1	2.5	
Delay (s)	15.7	43.8		18.0	18.5		30.4	31.9		32.9	40.9	
Level of Service	B	D		B	B		C	C		C	D	
Approach Delay (s)		43.5			18.4			31.1			39.5	
Approach LOS		D			B			C			D	

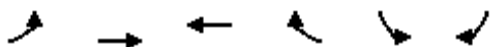
Intersection Summary

HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	99.4	Sum of lost time (s)	18.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	420	317	742	370	10
Future Volume (vph)	30	420	317	742	370	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1827	1553	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1827	1553	1770	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.92
Adj. Flow (vph)	33	462	348	815	407	11
RTOR Reduction (vph)	0	0	0	530	0	7
Lane Group Flow (vph)	33	462	348	285	407	4
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	2.4	26.7	19.3	19.3	18.5	18.5
Effective Green, g (s)	2.4	26.7	19.3	19.3	18.5	18.5
Actuated g/C Ratio	0.04	0.48	0.35	0.35	0.34	0.34
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	76	901	638	542	593	530
v/s Ratio Prot	0.02	c0.25	0.19		c0.23	0.00
v/s Ratio Perm				0.18		
v/c Ratio	0.43	0.51	0.55	0.53	0.69	0.01
Uniform Delay, d1	25.7	9.8	14.4	14.3	15.8	12.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9	0.5	1.0	0.9	3.3	0.0
Delay (s)	29.7	10.3	15.4	15.2	19.1	12.2
Level of Service	C	B	B	B	B	B
Approach Delay (s)		11.6	15.3		19.0	
Approach LOS		B	B		B	

Intersection Summary

HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 0.8

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations						
Traffic Vol, veh/h	5	576	620	10	25	15
Future Vol, veh/h	5	576	620	10	25	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	626	674	11	27	16

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	685	0	-	0	1316	680
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	636	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	908	-	-	-	174	451
Stage 1	-	-	-	-	503	-
Stage 2	-	-	-	-	527	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	908	-	-	-	173	451
Mov Cap-2 Maneuver	-	-	-	-	173	-
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	527	-

Approach EB WB SB

HCM Control Delay, s	0.1	0	24.8
HCM LOS			C

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	908	-	-	-	225
HCM Lane V/C Ratio	0.006	-	-	-	0.193
HCM Control Delay (s)	9	-	-	-	24.8
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.7

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	860	35	85	340	5	5
Future Vol, veh/h	860	35	85	340	5	5
Conflicting Peds, #/hr	0	2	2	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	5	5	33	33
Mvmt Flow	989	40	98	391	6	6

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1031	0	1599
Stage 1	-	-	-	-	1011
Stage 2	-	-	-	-	588
Critical Hdwy	-	-	4.15	-	6.73
Critical Hdwy Stg 1	-	-	-	-	5.73
Critical Hdwy Stg 2	-	-	-	-	5.73
Follow-up Hdwy	-	-	2.245	-	3.797
Pot Cap-1 Maneuver	-	-	662	-	99
Stage 1	-	-	-	-	308
Stage 2	-	-	-	-	499
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	660	-	84
Mov Cap-2 Maneuver	-	-	-	-	84
Stage 1	-	-	-	-	307
Stage 2	-	-	-	-	425

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	36.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	126	-	-	660	-
HCM Lane V/C Ratio	0.091	-	-	0.148	-
HCM Control Delay (s)	36.4	-	-	11.4	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	0.3	-	-	0.5	-

Intersection						
Int Delay, s/veh	5.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	15	65	210	40	20	85
Future Vol, veh/h	15	65	210	40	20	85
Conflicting Peds, #/hr	0	0	1	0	0	1
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	89	89	89	89	89	89
Heavy Vehicles, %	8	8	2	2	4	4
Mvmt Flow	17	73	236	45	22	96

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	588	71	119	0	0
Stage 1	71	-	-	-	-
Stage 2	517	-	-	-	-
Critical Hdwy	6.48	6.28	4.12	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.218	-	-
Pot Cap-1 Maneuver	462	975	1469	-	-
Stage 1	937	-	-	-	-
Stage 2	586	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	385	974	1468	-	-
Mov Cap-2 Maneuver	385	-	-	-	-
Stage 1	781	-	-	-	-
Stage 2	585	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	6.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1468	-	757	-	-
HCM Lane V/C Ratio	0.161	-	0.119	-	-
HCM Control Delay (s)	7.9	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.6	-	0.4	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷		↶	↷
Traffic Volume (vph)	10	585	315	240	75	10
Future Volume (vph)	10	585	315	240	75	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1702	1792	1567		1597	1429
Flt Permitted	0.36	1.00	1.00		0.95	1.00
Satd. Flow (perm)	638	1792	1567		1597	1429
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	629	339	258	81	11
RTOR Reduction (vph)	0	0	21	0	0	10
Lane Group Flow (vph)	11	629	576	0	81	1
Confl. Peds. (#/hr)	2			2		
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	6%	6%	13%	13%	13%	13%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	37.2	37.2	31.1		6.8	6.8
Effective Green, g (s)	37.2	37.2	31.1		6.8	6.8
Actuated g/C Ratio	0.67	0.67	0.56		0.12	0.12
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	437	1192	871		194	173
v/s Ratio Prot	0.00	c0.35	c0.37		c0.05	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.53	0.66		0.42	0.01
Uniform Delay, d1	5.9	4.8	8.7		22.7	21.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.4	1.9		1.1	0.0
Delay (s)	6.0	5.3	10.6		23.9	21.6
Level of Service	A	A	B		C	C
Approach Delay (s)		5.3	10.6		23.6	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	17.3
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Future Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1533		1687	1750		1655	1693		1770	1849	
Flt Permitted	0.50	1.00		0.08	1.00		0.29	1.00		0.63	1.00	
Satd. Flow (perm)	848	1533		151	1750		503	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	374	374	80	316	29	310	167	40	23	259	11
RTOR Reduction (vph)	0	60	0	0	2	0	0	6	0	0	2	0
Lane Group Flow (vph)	11	688	0	80	343	0	310	201	0	23	268	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.3	43.1		53.1	47.9		44.0	37.8		25.3	23.1	
Effective Green, g (s)	44.3	43.1		53.1	47.9		44.0	37.8		25.3	23.1	
Actuated g/C Ratio	0.41	0.40		0.49	0.45		0.41	0.35		0.24	0.21	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	357	614		160	779		386	594		287	396	
v/s Ratio Prot	0.00	c0.45		c0.03	0.20		c0.13	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.22			c0.20			0.02		
v/c Ratio	0.03	1.12		0.50	0.44		0.80	0.34		0.08	0.68	
Uniform Delay, d1	18.8	32.2		23.5	20.6		24.4	25.7		31.9	38.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	74.2		0.9	0.4		10.8	0.4		0.0	4.6	
Delay (s)	18.9	106.4		24.4	21.0		35.3	26.1		31.9	43.5	
Level of Service	B	F		C	C		D	C		C	D	
Approach Delay (s)		105.2			21.7			31.6			42.6	
Approach LOS		F			C			C			D	

Intersection Summary

HCM 2000 Control Delay	59.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	107.6	Sum of lost time (s)	18.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	310	385	370	685	15
Future Volume (vph)	5	310	385	370	685	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1696	1845	1532	1736	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1612	1696	1845	1532	1736	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	6	360	448	430	797	17
RTOR Reduction (vph)	0	0	0	307	0	8
Lane Group Flow (vph)	6	360	448	123	797	9
Confl. Peds. (#/hr)	1			1		
Confl. Bikes (#/hr)				1		1
Heavy Vehicles (%)	12%	12%	3%	3%	4%	4%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	1.1	28.2	22.1	22.1	38.9	38.9
Effective Green, g (s)	1.1	28.2	22.1	22.1	38.9	38.9
Actuated g/C Ratio	0.01	0.37	0.29	0.29	0.50	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	22	620	528	439	875	783
v/s Ratio Prot	0.00	c0.21	c0.24		c0.46	0.01
v/s Ratio Perm				0.08		
v/c Ratio	0.27	0.58	0.85	0.28	0.91	0.01
Uniform Delay, d1	37.6	19.7	25.9	21.3	17.5	9.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.4	12.1	0.4	13.5	0.0
Delay (s)	44.2	21.1	38.0	21.7	31.0	9.5
Level of Service	D	C	D	C	C	A
Approach Delay (s)		21.5	30.0		30.5	
Approach LOS		C	C		C	

Intersection Summary

HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	650	545	10	10	10
Future Vol, veh/h	10	650	545	10	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	707	592	11	11	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	603	0	-	0	1327 598
Stage 1	-	-	-	-	598 -
Stage 2	-	-	-	-	729 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	975	-	-	-	171 502
Stage 1	-	-	-	-	549 -
Stage 2	-	-	-	-	477 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	975	-	-	-	169 502
Mov Cap-2 Maneuver	-	-	-	-	169 -
Stage 1	-	-	-	-	543 -
Stage 2	-	-	-	-	477 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	20.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	975	-	-	-	253
HCM Lane V/C Ratio	0.011	-	-	-	0.086
HCM Control Delay (s)	8.7	-	-	-	20.6
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

11/10/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Future Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.98		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1532		1687	1750		1656	1693		1770	1849	
Flt Permitted	0.51	1.00		0.07	1.00		0.25	1.00		0.63	1.00	
Satd. Flow (perm)	852	1532		123	1750		437	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	374	374	80	316	29	310	167	40	23	259	11
RTOR Reduction (vph)	0	56	0	0	2	0	0	5	0	0	1	0
Lane Group Flow (vph)	11	692	0	80	343	0	310	202	0	23	269	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Effective Green, g (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Actuated g/C Ratio	0.45	0.44		0.52	0.48		0.39	0.33		0.23	0.20	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	389	672		143	839		366	560		281	366	
v/s Ratio Prot	0.00	c0.45		c0.03	0.20		c0.14	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.26			c0.20			0.02		
v/c Ratio	0.03	1.03		0.56	0.41		0.85	0.36		0.08	0.74	
Uniform Delay, d1	18.8	34.2		24.9	20.5		29.4	31.0		37.1	45.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	42.5		2.7	0.3		15.8	0.4		0.0	7.6	
Delay (s)	18.8	76.8		27.6	20.9		45.1	31.5		37.1	53.5	
Level of Service	B	E		C	C		D	C		D	D	
Approach Delay (s)		75.9			22.2			39.7			52.2	
Approach LOS		E			C			D			D	

Intersection Summary

HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	122.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	440	5	10	915	40	40
Future Vol, veh/h	440	5	10	915	40	40
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	463	5	11	963	42	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	468
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.11
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.209
Pot Cap-1 Maneuver	-	-	1099
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1099
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	30.1
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	226	-	-	1099	-
HCM Lane V/C Ratio	0.373	-	-	0.01	-
HCM Control Delay (s)	30.1	-	-	8.3	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.6	-	-	0	-

Intersection						
Int Delay, s/veh	8.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	55	225	85	30	35	20
Future Vol, veh/h	55	225	85	30	35	20
Conflicting Peds, #/hr	0	0	0	0	0	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	3	3	2	2
Mvmt Flow	60	247	93	33	38	22

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	269	50	61	0	0
Stage 1	50	-	-	-	-
Stage 2	219	-	-	-	-
Critical Hdwy	6.41	6.21	4.13	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.227	-	-
Pot Cap-1 Maneuver	722	1021	1536	-	-
Stage 1	975	-	-	-	-
Stage 2	820	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	676	1020	1535	-	-
Mov Cap-2 Maneuver	676	-	-	-	-
Stage 1	914	-	-	-	-
Stage 2	819	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	5.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1535	-	927	-	-
HCM Lane V/C Ratio	0.061	-	0.332	-	-
HCM Control Delay (s)	7.5	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.5	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd & SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	370	565	110	245	15
Future Volume (vph)	5	370	565	110	245	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1703	1792	1753		1752	1534
Flt Permitted	0.20	1.00	1.00		0.95	1.00
Satd. Flow (perm)	352	1792	1753		1752	1534
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	440	673	131	292	18
RTOR Reduction (vph)	0	0	5	0	0	14
Lane Group Flow (vph)	6	440	799	0	292	4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	6%	6%	6%	3%	3%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	51.8	51.8	45.6		17.5	17.5
Effective Green, g (s)	51.8	51.8	45.6		17.5	17.5
Actuated g/C Ratio	0.64	0.64	0.56		0.22	0.22
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	237	1143	984		377	330
v/s Ratio Prot	0.00	c0.25	c0.46		c0.17	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.38	0.81		0.77	0.01
Uniform Delay, d1	17.3	7.1	14.3		30.0	25.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	5.2		9.3	0.0
Delay (s)	17.3	7.3	19.5		39.3	25.1
Level of Service	B	A	B		D	C
Approach Delay (s)		7.4	19.5		38.4	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	5	315	315	45	340	20	315	255	40	30	130	15
Future Volume (vph)	5	315	315	45	340	20	315	255	40	30	130	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1672		1687	1759		1719	1773		1687	1744	
Flt Permitted	0.44	1.00		0.09	1.00		0.41	1.00		0.56	1.00	
Satd. Flow (perm)	801	1672		152	1759		745	1773		989	1744	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	6	362	362	52	391	23	362	293	46	34	149	17
RTOR Reduction (vph)	0	21	0	0	1	0	0	4	0	0	3	0
Lane Group Flow (vph)	6	703	0	52	413	0	362	335	0	34	163	0
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)			2									1
Heavy Vehicles (%)	4%	4%	4%	7%	7%	7%	5%	5%	5%	7%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.0	42.9		51.8	46.8		38.3	30.7		20.1	16.5	
Effective Green, g (s)	44.0	42.9		51.8	46.8		38.3	30.7		20.1	16.5	
Actuated g/C Ratio	0.44	0.43		0.51	0.46		0.38	0.30		0.20	0.16	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	360	712		154	817		455	540		222	285	
v/s Ratio Prot	0.00	c0.42		c0.02	0.23		c0.14	0.19		0.01	0.09	
v/s Ratio Perm	0.01			0.16			c0.16			0.03		
v/c Ratio	0.02	0.99		0.34	0.51		0.80	0.62		0.15	0.57	
Uniform Delay, d1	16.2	28.6		19.7	18.9		24.9	30.0		32.9	38.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	30.2		0.5	0.5		8.7	2.3		0.1	2.8	
Delay (s)	16.3	58.8		20.1	19.4		33.6	32.3		33.0	41.7	
Level of Service	B	E		C	B		C	C		C	D	
Approach Delay (s)		58.5			19.5			33.0			40.2	
Approach LOS		E			B			C			D	

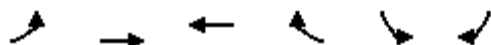
Intersection Summary

HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	100.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	445	335	785	390	10
Future Volume (vph)	30	445	335	785	390	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1827	1553	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1827	1553	1770	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.92
Adj. Flow (vph)	33	489	368	863	429	11
RTOR Reduction (vph)	0	0	0	562	0	7
Lane Group Flow (vph)	33	489	368	301	429	4
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	2.5	27.4	19.9	19.9	19.6	19.6
Effective Green, g (s)	2.5	27.4	19.9	19.9	19.6	19.6
Actuated g/C Ratio	0.04	0.48	0.35	0.35	0.34	0.34
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	77	895	637	542	608	544
v/s Ratio Prot	0.02	c0.26	0.20		c0.24	0.00
v/s Ratio Perm				0.19		
v/c Ratio	0.43	0.55	0.58	0.56	0.71	0.01
Uniform Delay, d1	26.6	10.4	15.1	15.0	16.2	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.7	1.3	1.2	3.7	0.0
Delay (s)	30.4	11.1	16.4	16.2	19.9	12.3
Level of Service	C	B	B	B	B	B
Approach Delay (s)		12.3	16.3		19.7	
Approach LOS		B	B		B	

Intersection Summary

HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	
Traffic Vol, veh/h	5	610	660	10	25	15
Future Vol, veh/h	5	610	660	10	25	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	663	717	11	27	16

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	728	0	-	0	1396 723
Stage 1	-	-	-	-	723 -
Stage 2	-	-	-	-	673 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	876	-	-	-	156 426
Stage 1	-	-	-	-	481 -
Stage 2	-	-	-	-	507 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	876	-	-	-	155 426
Mov Cap-2 Maneuver	-	-	-	-	155 -
Stage 1	-	-	-	-	478 -
Stage 2	-	-	-	-	507 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	27.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	876	-	-	-	204
HCM Lane V/C Ratio	0.006	-	-	-	0.213
HCM Control Delay (s)	9.1	-	-	-	27.4
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Intersection

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	860	40	88	340	7	6
Future Vol, veh/h	860	40	88	340	7	6
Conflicting Peds, #/hr	0	2	2	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	2	2	5	5	33	33
Mvmt Flow	989	46	101	391	8	7

Major/Minor

	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1037	0	1608 1014
Stage 1	-	-	-	-	1014 -
Stage 2	-	-	-	-	594 -
Critical Hdwy	-	-	4.15	-	6.73 6.53
Critical Hdwy Stg 1	-	-	-	-	5.73 -
Critical Hdwy Stg 2	-	-	-	-	5.73 -
Follow-up Hdwy	-	-	2.245	-	3.797 3.597
Pot Cap-1 Maneuver	-	-	659	-	97 253
Stage 1	-	-	-	-	307 -
Stage 2	-	-	-	-	496 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	657	-	82 252
Mov Cap-2 Maneuver	-	-	-	-	82 -
Stage 1	-	-	-	-	306 -
Stage 2	-	-	-	-	419 -

Approach

	EB	WB	NB
HCM Control Delay, s	0	2.4	39.5
HCM LOS			E

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	119	-	-	657	-
HCM Lane V/C Ratio	0.126	-	-	0.154	-
HCM Control Delay (s)	39.5	-	-	11.5	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	0.4	-	-	0.5	-

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	15	65	210	43	28	85
Future Vol, veh/h	15	65	210	43	28	85
Conflicting Peds, #/hr	0	0	1	0	0	1
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	89	89	89	89	89	89
Heavy Vehicles, %	8	8	2	2	4	4
Mvmt Flow	17	73	236	48	31	96

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	600	80	128	0	0
Stage 1	80	-	-	-	-
Stage 2	520	-	-	-	-
Critical Hdwy	6.48	6.28	4.12	-	-
Critical Hdwy Stg 1	5.48	-	-	-	-
Critical Hdwy Stg 2	5.48	-	-	-	-
Follow-up Hdwy	3.572	3.372	2.218	-	-
Pot Cap-1 Maneuver	454	964	1458	-	-
Stage 1	928	-	-	-	-
Stage 2	585	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	378	963	1457	-	-
Mov Cap-2 Maneuver	378	-	-	-	-
Stage 1	773	-	-	-	-
Stage 2	584	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	6.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1457	-	746	-	-
HCM Lane V/C Ratio	0.162	-	0.12	-	-
HCM Control Delay (s)	7.9	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.6	-	0.4	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd/SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	588	315	240	75	11
Future Volume (vph)	10	588	315	240	75	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1702	1792	1567		1597	1429
Flt Permitted	0.36	1.00	1.00		0.95	1.00
Satd. Flow (perm)	637	1792	1567		1597	1429
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	632	339	258	81	12
RTOR Reduction (vph)	0	0	21	0	0	11
Lane Group Flow (vph)	11	632	576	0	81	1
Confl. Peds. (#/hr)	2			2		
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	6%	6%	13%	13%	13%	13%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	37.1	37.1	31.0		6.8	6.8
Effective Green, g (s)	37.1	37.1	31.0		6.8	6.8
Actuated g/C Ratio	0.66	0.66	0.56		0.12	0.12
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	436	1191	870		194	174
v/s Ratio Prot	0.00	c0.35	c0.37		c0.05	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.53	0.66		0.42	0.01
Uniform Delay, d1	6.0	4.8	8.7		22.7	21.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.5	1.9		1.1	0.0
Delay (s)	6.0	5.3	10.6		23.8	21.6
Level of Service	A	A	B		C	C
Approach Delay (s)		5.3	10.6		23.5	
Approach LOS		A	B		C	

Intersection Summary

HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	17.3
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	333	331	70	297	25	287	145	35	20	225	10
Future Volume (vph)	10	333	331	70	297	25	287	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1533		1687	1752		1655	1693		1770	1849	
Flt Permitted	0.47	1.00		0.08	1.00		0.29	1.00		0.63	1.00	
Satd. Flow (perm)	798	1533		151	1752		501	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	383	380	80	341	29	330	167	40	23	259	11
RTOR Reduction (vph)	0	90	0	0	2	0	0	6	0	0	2	0
Lane Group Flow (vph)	11	673	0	80	368	0	330	201	0	23	268	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	44.3	43.1		53.1	47.9		44.6	38.4		25.4	23.2	
Effective Green, g (s)	44.3	43.1		53.1	47.9		44.6	38.4		25.4	23.2	
Actuated g/C Ratio	0.41	0.40		0.49	0.44		0.41	0.35		0.23	0.21	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	335	610		159	775		392	600		286	396	
v/s Ratio Prot	0.00	c0.44		c0.03	0.21		c0.14	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.22			c0.21			0.02		
v/c Ratio	0.03	1.10		0.50	0.48		0.84	0.34		0.08	0.68	
Uniform Delay, d1	19.1	32.5		23.7	21.3		24.7	25.6		32.1	39.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	67.9		0.9	0.5		14.5	0.4		0.0	4.6	
Delay (s)	19.2	100.4		24.6	21.8		39.1	25.9		32.1	43.7	
Level of Service	B	F		C	C		D	C		C	D	
Approach Delay (s)		99.3			22.3			34.0			42.8	
Approach LOS		F			C			C			D	

Intersection Summary

HCM 2000 Control Delay	57.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	108.2	Sum of lost time (s)	18.5
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	318	407	370	685	15
Future Volume (vph)	5	318	407	370	685	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1612	1696	1845	1532	1736	1553
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1612	1696	1845	1532	1736	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	6	370	473	430	797	17
RTOR Reduction (vph)	0	0	0	306	0	8
Lane Group Flow (vph)	6	370	473	124	797	9
Confl. Peds. (#/hr)	1			1		
Confl. Bikes (#/hr)				1		1
Heavy Vehicles (%)	12%	12%	3%	3%	4%	4%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	1.1	28.4	22.3	22.3	39.0	39.0
Effective Green, g (s)	1.1	28.4	22.3	22.3	39.0	39.0
Actuated g/C Ratio	0.01	0.37	0.29	0.29	0.50	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	22	622	531	441	874	782
v/s Ratio Prot	0.00	c0.22	c0.26		c0.46	0.01
v/s Ratio Perm				0.08		
v/c Ratio	0.27	0.59	0.89	0.28	0.91	0.01
Uniform Delay, d1	37.8	19.8	26.4	21.3	17.6	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	1.5	16.9	0.4	13.6	0.0
Delay (s)	44.4	21.4	43.3	21.7	31.2	9.6
Level of Service	D	C	D	C	C	A
Approach Delay (s)		21.7	33.0		30.8	
Approach LOS		C	C		C	

Intersection Summary

HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	77.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	650	545	49	24	10
Future Vol, veh/h	13	650	545	49	24	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	707	592	53	26	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	645	0	-	0	1354 619
Stage 1	-	-	-	-	619 -
Stage 2	-	-	-	-	735 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	940	-	-	-	165 489
Stage 1	-	-	-	-	537 -
Stage 2	-	-	-	-	474 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	940	-	-	-	163 489
Mov Cap-2 Maneuver	-	-	-	-	163 -
Stage 1	-	-	-	-	529 -
Stage 2	-	-	-	-	474 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	26.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	940	-	-	-	203
HCM Lane V/C Ratio	0.015	-	-	-	0.182
HCM Control Delay (s)	8.9	-	-	-	26.6
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	3	250	0	8	85
Future Vol, veh/h	1	3	250	0	8	85
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	3	272	0	9	92

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	382	272	0	0	272	0
Stage 1	272	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	620	767	-	-	1291	-
Stage 1	774	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	616	767	-	-	1291	-
Mov Cap-2 Maneuver	616	-	-	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	909	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	723	1291
HCM Lane V/C Ratio	-	-	0.006	0.007
HCM Control Delay (s)	-	-	10	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

11/10/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Future Volume (vph)	10	325	325	70	275	25	270	145	35	20	225	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.98		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	1532		1687	1750		1656	1693		1770	1849	
Flt Permitted	0.51	1.00		0.07	1.00		0.25	1.00		0.63	1.00	
Satd. Flow (perm)	852	1532		123	1750		437	1693		1170	1849	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	11	374	374	80	316	29	310	167	40	23	259	11
RTOR Reduction (vph)	0	56	0	0	2	0	0	5	0	0	1	0
Lane Group Flow (vph)	11	692	0	80	343	0	310	202	0	23	269	0
Confl. Peds. (#/hr)			2	2			2					2
Confl. Bikes (#/hr)			1			2						
Heavy Vehicles (%)	13%	13%	13%	7%	7%	7%	9%	9%	9%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Effective Green, g (s)	54.8	53.6		63.8	58.6		47.8	40.4		27.6	24.2	
Actuated g/C Ratio	0.45	0.44		0.52	0.48		0.39	0.33		0.23	0.20	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	389	672		143	839		366	560		281	366	
v/s Ratio Prot	0.00	c0.45		c0.03	0.20		c0.14	0.12		0.00	0.15	
v/s Ratio Perm	0.01			0.26			c0.20			0.02		
v/c Ratio	0.03	1.03		0.56	0.41		0.85	0.36		0.08	0.74	
Uniform Delay, d1	18.8	34.2		24.9	20.5		29.4	31.0		37.1	45.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	42.5		2.7	0.3		15.8	0.4		0.0	7.6	
Delay (s)	18.8	76.8		27.6	20.9		45.1	31.5		37.1	53.5	
Level of Service	B	E		C	C		D	C		D	D	
Approach Delay (s)		75.9			22.2			39.7			52.2	
Approach LOS		E			C			D			D	

Intersection Summary

HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	122.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	1.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	440	7	11	915	44	42
Future Vol, veh/h	440	7	11	915	44	42
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	300	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	463	7	12	963	46	44

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	470	0	1455
Stage 1	-	-	-	-	467
Stage 2	-	-	-	-	988
Critical Hdwy	-	-	4.11	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	-	-	2.209	-	3.536
Pot Cap-1 Maneuver	-	-	1097	-	142
Stage 1	-	-	-	-	627
Stage 2	-	-	-	-	357
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1097	-	140
Mov Cap-2 Maneuver	-	-	-	-	140
Stage 1	-	-	-	-	627
Stage 2	-	-	-	-	353

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	31.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	223	-	-	1097	-
HCM Lane V/C Ratio	0.406	-	-	0.011	-
HCM Control Delay (s)	31.8	-	-	8.3	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	1.8	-	-	0	-

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	55	225	85	36	38	20
Future Vol, veh/h	55	225	85	36	38	20
Conflicting Peds, #/hr	0	0	0	0	0	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	3	3	2	2
Mvmt Flow	60	247	93	40	42	22

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	280	54	65	0	0
Stage 1	54	-	-	-	-
Stage 2	226	-	-	-	-
Critical Hdwy	6.41	6.21	4.13	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.227	-	-
Pot Cap-1 Maneuver	712	1016	1531	-	-
Stage 1	971	-	-	-	-
Stage 2	814	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	666	1015	1530	-	-
Mov Cap-2 Maneuver	666	-	-	-	-
Stage 1	910	-	-	-	-
Stage 2	813	-	-	-	-

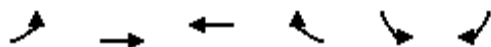
Approach	EB	NB	SB
HCM Control Delay, s	10.9	5.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1530	-	920	-	-
HCM Lane V/C Ratio	0.061	-	0.334	-	-
HCM Control Delay (s)	7.5	0	10.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.5	-	-

HCM Signalized Intersection Capacity Analysis

3: SW Herman Rd/SW 108th Ave

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙	↑	↘		↙	↘
Traffic Volume (vph)	5	371	566	110	245	16
Future Volume (vph)	5	371	566	110	245	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.4	5.4	5.4		6.5	6.5
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1703	1792	1753		1752	1534
Flt Permitted	0.20	1.00	1.00		0.95	1.00
Satd. Flow (perm)	351	1792	1753		1752	1534
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	6	442	674	131	292	19
RTOR Reduction (vph)	0	0	5	0	0	15
Lane Group Flow (vph)	6	442	800	0	292	4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	6%	6%	6%	6%	3%	3%
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	51.8	51.8	45.6		17.5	17.5
Effective Green, g (s)	51.8	51.8	45.6		17.5	17.5
Actuated g/C Ratio	0.64	0.64	0.56		0.22	0.22
Clearance Time (s)	5.4	5.4	5.4		6.5	6.5
Vehicle Extension (s)	2.0	3.1	3.1		2.6	2.6
Lane Grp Cap (vph)	237	1143	984		377	330
v/s Ratio Prot	0.00	c0.25	c0.46		c0.17	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.39	0.81		0.77	0.01
Uniform Delay, d1	17.3	7.1	14.4		30.0	25.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.2	5.2		9.3	0.0
Delay (s)	17.3	7.3	19.6		39.3	25.1
Level of Service	B	A	B		D	C
Approach Delay (s)		7.4	19.6		38.4	
Approach LOS		A	B		D	

Intersection Summary

HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: SW Teton Ave & SW Herman Rd

10/19/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	332	328	45	350	20	322	255	40	30	130	15
Future Volume (vph)	5	332	328	45	350	20	322	255	40	30	130	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		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		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1673		1687	1759		1719	1773		1687	1744	
Flt Permitted	0.43	1.00		0.09	1.00		0.41	1.00		0.56	1.00	
Satd. Flow (perm)	780	1673		152	1759		742	1773		989	1744	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	6	382	377	52	402	23	370	293	46	34	149	17
RTOR Reduction (vph)	0	21	0	0	1	0	0	4	0	0	3	0
Lane Group Flow (vph)	6	738	0	52	424	0	370	335	0	34	163	0
Confl. Peds. (#/hr)						1						1
Confl. Bikes (#/hr)			2									1
Heavy Vehicles (%)	4%	4%	4%	7%	7%	7%	5%	5%	5%	7%	7%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	43.9	42.8		51.7	46.7		38.4	30.8		20.0	16.4	
Effective Green, g (s)	43.9	42.8		51.7	46.7		38.4	30.8		20.0	16.4	
Actuated g/C Ratio	0.44	0.43		0.51	0.46		0.38	0.31		0.20	0.16	
Clearance Time (s)	4.0	5.5		4.0	5.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.2		2.0	3.2		2.0	3.2		2.0	3.2	
Lane Grp Cap (vph)	350	711		154	815		457	542		221	284	
v/s Ratio Prot	0.00	c0.44		c0.02	0.24		c0.14	0.19		0.01	0.09	
v/s Ratio Perm	0.01			0.16			c0.16			0.03		
v/c Ratio	0.02	1.04		0.34	0.52		0.81	0.62		0.15	0.57	
Uniform Delay, d1	16.3	29.0		20.9	19.1		25.0	29.9		33.0	38.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	44.1		0.5	0.6		9.6	2.1		0.1	2.9	
Delay (s)	16.4	73.1		21.3	19.7		34.6	32.1		33.1	41.8	
Level of Service	B	E		C	B		C	C		C	D	
Approach Delay (s)		72.6			19.9			33.4			40.3	
Approach LOS		E			B			C			D	

Intersection Summary

HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: SW Herman Rd & SW Tualatin Rd

10/19/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	462	345	785	390	10
Future Volume (vph)	30	462	345	785	390	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1863	1827	1553	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1863	1827	1553	1770	1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.92
Adj. Flow (vph)	33	508	379	863	429	11
RTOR Reduction (vph)	0	0	0	558	0	7
Lane Group Flow (vph)	33	508	379	305	429	4
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Turn Type	Prot	NA	NA	Perm	Prot	Prot
Protected Phases	5	2	6		4	4
Permitted Phases				6		
Actuated Green, G (s)	2.5	27.8	20.3	20.3	19.6	19.6
Effective Green, g (s)	2.5	27.8	20.3	20.3	19.6	19.6
Actuated g/C Ratio	0.04	0.48	0.35	0.35	0.34	0.34
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	77	902	646	549	604	540
v/s Ratio Prot	0.02	c0.27	0.21		c0.24	0.00
v/s Ratio Perm				0.20		
v/c Ratio	0.43	0.56	0.59	0.56	0.71	0.01
Uniform Delay, d1	26.8	10.5	15.1	14.9	16.4	12.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.8	1.4	1.2	3.9	0.0
Delay (s)	30.6	11.3	16.5	16.1	20.4	12.5
Level of Service	C	B	B	B	C	B
Approach Delay (s)		12.5	16.3		20.2	
Approach LOS		B	B		C	

Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	610	660	27	55	16
Future Vol, veh/h	6	610	660	27	55	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	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	663	717	29	60	17

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	746	0	-	0	1409 732
Stage 1	-	-	-	-	732 -
Stage 2	-	-	-	-	677 -
Critical Hdwy	4.12	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	862	-	-	-	153 421
Stage 1	-	-	-	-	476 -
Stage 2	-	-	-	-	505 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	862	-	-	-	152 421
Mov Cap-2 Maneuver	-	-	-	-	152 -
Stage 1	-	-	-	-	472 -
Stage 2	-	-	-	-	505 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	39.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	862	-	-	-	178
HCM Lane V/C Ratio	0.008	-	-	-	0.434
HCM Control Delay (s)	9.2	-	-	-	39.9
HCM Lane LOS	A	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	2

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		T			T
Traffic Vol, veh/h	1	6	115	0	3	260
Future Vol, veh/h	1	6	115	0	3	260
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	7	125	0	3	283

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	414	125	0	0	125	0
Stage 1	125	-	-	-	-	-
Stage 2	289	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	595	926	-	-	1462	-
Stage 1	901	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	594	926	-	-	1462	-
Mov Cap-2 Maneuver	594	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	758	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	858	1462
HCM Lane V/C Ratio	-	-	0.009	0.002
HCM Control Delay (s)	-	-	9.2	7.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	22	94	72
Average Queue (ft)	1	36	13
95th Queue (ft)	13	74	49
Link Distance (ft)	3156		588
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		300	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	86	69	5
Average Queue (ft)	38	21	0
95th Queue (ft)	68	56	4
Link Distance (ft)	1898	746	658
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	57	277	240	102	28
Average Queue (ft)	9	86	91	33	4
95th Queue (ft)	39	231	191	73	18
Link Distance (ft)		4736	432		746
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)		4		0	
Queuing Penalty (veh)		0		0	

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	131	531	211	357	268	308	51	257
Average Queue (ft)	10	393	51	154	144	84	13	128
95th Queue (ft)	82	619	137	294	246	221	38	226
Link Distance (ft)		517		996		1985		846
Upstream Blk Time (%)	0	8						
Queuing Penalty (veh)	0	50						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		18	0	13	7	0		4
Queuing Penalty (veh)		2	1	9	11	0		1

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	104	327	526	314	427	52
Average Queue (ft)	7	156	195	30	223	9
95th Queue (ft)	44	274	382	191	379	35
Link Distance (ft)		896	1377			1084
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)		19	5			
Queuing Penalty (veh)		1	21			

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	SB
Directions Served	L	T	LR
Maximum Queue (ft)	60	363	54
Average Queue (ft)	4	72	16
95th Queue (ft)	36	272	47
Link Distance (ft)		432	180
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		4	
Storage Bay Dist (ft)	200		
Storage Blk Time (%)		4	
Queuing Penalty (veh)		0	

Zone Summary

Zone wide Queuing Penalty: 101

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	6	35	12	99
Average Queue (ft)	0	4	1	39
95th Queue (ft)	5	23	8	73
Link Distance (ft)	3152		1572	584
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	105	56	2
Average Queue (ft)	59	6	0
95th Queue (ft)	89	31	2
Link Distance (ft)	1894	737	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	38	200	344	166	140
Average Queue (ft)	4	80	160	91	12
95th Queue (ft)	22	159	292	156	89
Link Distance (ft)		4732	424		737
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			1		
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)		3		2	0
Queuing Penalty (veh)		0		0	0

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	77	518	152	424	268	356	91	186
Average Queue (ft)	7	330	32	166	143	135	22	83
95th Queue (ft)	78	571	99	320	244	265	60	159
Link Distance (ft)		508		991		1981		842
Upstream Blk Time (%)	0	5						
Queuing Penalty (veh)	0	30						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		11		14	5	2	0	1
Queuing Penalty (veh)		1		6	15	8	0	0

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	134	288	281	180	252	34
Average Queue (ft)	31	143	125	12	130	6
95th Queue (ft)	89	249	223	96	211	27
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	12	1	0		
Queuing Penalty (veh)	0	4	5	0		

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	50	289	25	145
Average Queue (ft)	4	45	1	45
95th Queue (ft)	37	227	19	122
Link Distance (ft)		424	508	216
Upstream Blk Time (%)		1		2
Queuing Penalty (veh)		4		0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)	0	4		
Queuing Penalty (veh)	0	0		

Zone Summary

Zone wide Queuing Penalty: 74

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	31	90	16	77
Average Queue (ft)	1	36	1	12
95th Queue (ft)	15	73	9	48
Link Distance (ft)	3156		1576	592
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	80	72	3
Average Queue (ft)	39	23	0
95th Queue (ft)	65	60	4
Link Distance (ft)	1898	746	662
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	96	589	288	98	28
Average Queue (ft)	11	189	101	40	4
95th Queue (ft)	57	570	223	81	16
Link Distance (ft)		4736	430		746
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	16			
Queuing Penalty (veh)	0	2			

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	87	535	186	375	272	335	48	296
Average Queue (ft)	9	509	53	149	154	109	14	149
95th Queue (ft)	62	575	136	290	253	255	40	251
Link Distance (ft)		519		1000		1986		846
Upstream Blk Time (%)		20						
Queuing Penalty (veh)		136						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		39	1	15	8	1		7
Queuing Penalty (veh)		4	2	11	15	2		1

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	95	368	514	279	472	47
Average Queue (ft)	10	169	202	31	234	8
95th Queue (ft)	60	300	397	196	389	34
Link Distance (ft)		900	1377			1084
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	19	6			
Queuing Penalty (veh)	0	1	23			

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	SB
Directions Served	L	T	LR
Maximum Queue (ft)	193	444	128
Average Queue (ft)	12	216	47
95th Queue (ft)	94	502	147
Link Distance (ft)		430	236
Upstream Blk Time (%)		5	4
Queuing Penalty (veh)		36	0
Storage Bay Dist (ft)	200		
Storage Blk Time (%)		20	
Queuing Penalty (veh)		2	

Zone Summary

Zone wide Queuing Penalty: 237

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	12	31	16	140
Average Queue (ft)	0	3	1	49
95th Queue (ft)	8	20	9	101
Link Distance (ft)	3152		1572	584
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	114	54	5
Average Queue (ft)	64	7	0
95th Queue (ft)	96	34	3
Link Distance (ft)	1894	737	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd & SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	61	406	430	174	345
Average Queue (ft)	5	127	229	108	52
95th Queue (ft)	30	347	427	179	250
Link Distance (ft)		4732	424		737
Upstream Blk Time (%)			2		
Queuing Penalty (veh)			16		
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	12		11	0
Queuing Penalty (veh)	0	1		2	0

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	78	523	167	472	269	476	82	215
Average Queue (ft)	6	464	34	172	175	173	22	97
95th Queue (ft)	56	640	106	341	281	365	59	174
Link Distance (ft)		508		991		1981		842
Upstream Blk Time (%)		19						
Queuing Penalty (veh)		123						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		38	0	15	12	4		1
Queuing Penalty (veh)		2	0	7	37	12		0

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	116	367	296	160	265	44
Average Queue (ft)	30	159	138	9	142	7
95th Queue (ft)	79	287	240	89	230	30
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	14	1	0		
Queuing Penalty (veh)	0	4	7	0		

Intersection: 6: SW Herman Rd/SW 108th Ave & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	112	432	225	240
Average Queue (ft)	6	191	24	127
95th Queue (ft)	55	474	145	285
Link Distance (ft)		424	508	237
Upstream Blk Time (%)		4	0	26
Queuing Penalty (veh)		28	0	0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)		20		
Queuing Penalty (veh)		1		

Zone Summary

Zone wide Queuing Penalty: 242

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	32	122	12	74
Average Queue (ft)	2	41	0	15
95th Queue (ft)	17	90	9	50
Link Distance (ft)	3152		1572	584
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	86	66	26
Average Queue (ft)	39	25	1
95th Queue (ft)	69	61	11
Link Distance (ft)	1896	327	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd/SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	115	1347	346	145	83
Average Queue (ft)	15	595	139	54	7
95th Queue (ft)	71	1339	297	117	50
Link Distance (ft)		4732	421		352
Upstream Blk Time (%)			0		
Queuing Penalty (veh)			0		
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	48		1	
Queuing Penalty (veh)	0	5		0	

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	222	526	174	370	268	359	114	316
Average Queue (ft)	23	516	56	168	168	122	15	156
95th Queue (ft)	174	531	139	317	269	274	65	274
Link Distance (ft)		511		991		1982		842
Upstream Blk Time (%)	0	37						
Queuing Penalty (veh)	0	250						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		61	0	16	11	1		7
Queuing Penalty (veh)		6	1	12	20	4		2

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	79	304	662	336	504	46
Average Queue (ft)	6	160	249	38	249	7
95th Queue (ft)	43	274	576	235	418	30
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)			1			
Queuing Penalty (veh)			0			
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)		19	11			
Queuing Penalty (veh)		1	46			

Intersection: 6: SW Herman Rd & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	224	437	20	176
Average Queue (ft)	28	380	1	138
95th Queue (ft)	140	555	18	213
Link Distance (ft)		421	511	156
Upstream Blk Time (%)		21		72
Queuing Penalty (veh)		137		0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)	0	55		
Queuing Penalty (veh)	0	7		

Intersection: 7: Site Driveway & SW 108th Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	31	31
Average Queue (ft)	4	2
95th Queue (ft)	21	17
Link Distance (ft)	241	327
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 490

Intersection: 1: SW 108th Ave & SW Tualatin Rd

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	7	37	108
Average Queue (ft)	0	4	47
95th Queue (ft)	5	24	86
Link Distance (ft)	3152		584
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		300	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: SW 108th Ave & SW Leveton Dr

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	114	48	3
Average Queue (ft)	64	7	0
95th Queue (ft)	97	32	3
Link Distance (ft)	1897	327	654
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SW Herman Rd/SW 108th Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	84	569	425	171	303
Average Queue (ft)	9	187	235	117	75
95th Queue (ft)	50	474	425	193	286
Link Distance (ft)		4732	421		352
Upstream Blk Time (%)			2		2
Queuing Penalty (veh)			11		6
Storage Bay Dist (ft)	100			150	
Storage Blk Time (%)	0	25		17	0
Queuing Penalty (veh)	0	1		3	1

Intersection: 4: SW Teton Ave & SW Herman Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	123	526	174	423	269	468	93	221
Average Queue (ft)	6	506	34	183	177	181	20	94
95th Queue (ft)	77	575	100	349	282	386	61	180
Link Distance (ft)		511		991		1982		842
Upstream Blk Time (%)	0	26						
Queuing Penalty (veh)	0	176						
Storage Bay Dist (ft)	450		125		180		170	
Storage Blk Time (%)		49		17	12	4		1
Queuing Penalty (veh)		3		8	36	14		0

Intersection: 5: SW Herman Rd & SW Tualatin Rd

Movement	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (ft)	134	344	296	217	292	36
Average Queue (ft)	31	155	137	14	138	5
95th Queue (ft)	86	281	232	111	233	25
Link Distance (ft)		892	1373			1080
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100			250	800	
Storage Blk Time (%)	0	13	1	0		
Queuing Penalty (veh)	0	4	6	1		

Intersection: 6: SW Herman Rd & Site Driveway

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	186	437	190	194
Average Queue (ft)	12	271	18	160
95th Queue (ft)	87	546	116	207
Link Distance (ft)		421	511	156
Upstream Blk Time (%)		10		91
Queuing Penalty (veh)		61		0
Storage Bay Dist (ft)	200			
Storage Blk Time (%)	0	34		
Queuing Penalty (veh)	0	2		

Intersection: 7: Site Driveway & SW 108th Ave

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	35	64
Average Queue (ft)	8	6
95th Queue (ft)	31	49
Link Distance (ft)	241	327
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 333



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MEMORANDUM

DATE: April 26, 2019
TO: Gary Danielson, SRG Partnership, Inc
FROM: Garth Appanaitis, PE
SUBJECT: Tualatin Ops Site Transportation Planning Rule Analysis

The purpose of this memorandum is to address Oregon Administrative Rule (OAR) 660-012-0060, Transportation Planning Rule (TPR), requirements for a map change amendment to rezone two parcels near SW 108th Ave/SW Herman Rd in Tualatin. The change in zoning may be pursued to support additional development on the site. Prior traffic analysis conducted for the site¹ addressed the additional traffic that would be added with the actual proposed development use but did not address TPR requirements.

TPR OVERVIEW

The TPR provides a means for ensuring that future land use and traffic growth is consistent with transportation system planning. The TPR requires that a change of allowable land uses do not create a significant impact on the transportation system beyond currently allowed (planned) uses. The TPR can be addressed through a variety of means, but typically compares the change in trip potential (simply trip generation or traffic impacts) between the allowed use (existing zoning) and proposed use (proposed zoning). In many cases the reasonable worst-case use (for either the existing or propose zoning) will not reflect the actual existing use for a site or the specific use that may ultimately be developed on a site. Rather, the reasonable worst case considers the allowed trip potential for either zoning condition and is rarely development specific (e.g., no site plan, nor intent to use the site for that purpose). In some cases, a "trip cap" or limit to the maximum trips generated by a site will be imposed with a change in zoning in order to limit the future trip potential while still allowing for the intended development.

SITE TRAFFIC POTENTIAL

The City of Tualatin Public Works Department is located in the northeast quadrant of SW 108th Ave/SW Herman Rd. The site is currently zoned as Light Manufacturing (ML) and composed of two parcels:

- 2S122AD00200 (approximately 5.18 acres)
- 2S122AD00300 (approximately 3.54 acres)

¹ Tualatin City Operation Site Traffic Impact Analysis, prepared by DKS Associates, December 2018.



For purposes of the TPR analysis, the existing uses on the site are ignored and redevelopment options allowed within zoning designations are considered. Applying typical industrial development assumptions, the combined size of the site (8.72 acres) could provide approximately 95,000 feet of floor area² based on overall size and not considering other site-specific limitations (topography, etc.) that may be identified through a site design process. This development potential of 95 ksf is considered for both the existing and proposed zoning designations.

Existing Zoning (ML) Traffic Potential

The existing ML zoning³ allows several industrial uses, including manufacturing and warehousing. Some components of commercial uses are allowed as ancillary components of the site. *ITE Trip Generation, 10th Edition* was used to determine traffic potential for allowed uses. The allowed industrial use with the highest trip generation rate for the p.m. peak hour is 155 High-Cube Fulfillment Center Warehouse (1.37 trips/ksf). However, data in the ITE manual indicates that these uses typically exceed 500 ksf and would not be reasonable for the site given the size.

Under the existing ML zoning, the reasonable worst-case trip potential (that would scale to the size of the site) would fall under ITE Category 140 – Manufacturing, which generates approximately 0.67 trips/ksf during the p.m. peak hour. Therefore, the reasonable worst-case trip potential for a 95 ksf building would generate approximately 64 p.m. peak hour trips. Further, this trip potential is approximately the same as the government office building documented and analyzed in the related TIA (59 p.m. peak hour trips)⁴.

Proposed Zoning (IN) Traffic Potential

The proposed Institutional (IN) zoning allows uses that serve the community, such as educational, religious, recreational, and government uses. The Community Services category within IN includes community recreation building, which is the reasonable worst-case use from a trip potential standpoint. ITE category 495 Recreational Community Center would generate approximately 2.31 p.m. peak hour vehicle trips/ksf. Therefore, a 95 ksf building would generate approximately 219 p.m. peak hour trips.

TEXT AMENDMENT IMPACTS

While the government office building analyzed in the prior TIA would fit within the general intent of the IN zone, it is not currently listed as an allowed use. A text amendment to specifically allow government office buildings in the IN zone may be required in addition to a map amendment for the site.

The potential text amendment action would not create a significant effect for TPR purposes. While a text amendment would affect all locations with IN zone designation, allowing government office uses would not increase the reasonable worst-case trip potential for IN zoning designation. The ITE trip rate for 730 Government Office Building is 1.71 trips/ksf⁵ during the p.m. peak hour, which is less trips than a

² 8.72 acres * 0.25 FAR = 95 ksf

³ <https://www.tualatinoregon.gov/developmentcode/tdc-chapter-60-light-manufacturing-zone-ml>

⁴ TIA Table 5 lists 59 p.m. peak hour trips for the additional government office building.

⁵ A higher effective trip rate of approximately 2.95 trips/ksf (59 trips/20 ksf) was used for the smaller 20 ksf building in the TIA to provide a conservative estimate and account for potential public service counter trips. However, for consideration of larger building sizes and reasonable worst-case trip potential, the overall ITE average rate of 1.71 (which includes building sizes approaching 80 ksf) is appropriate.



recreational community center (2.31 trips/ksf) and would not increase the trip potential for zones designated IN to allow this additional use.

FINDINGS

The TPR analysis addressed two potential actions, which, while related, include separate findings.

Map Amendment (ML to IN)

The trip generation potential for the existing zoning (ML) and proposed zoning (IN) was calculated using site redevelopment assumptions for a reasonable worst-case use and ITE trip generation rates. For the two subject parcels, a map amendment to change the zoning designation from ML to IN has the potential to add an increase of approximately 155 (219-64) p.m. peak hour vehicle trips. This action has the potential to create a significant effect on the transportation system, but can be resolved through either of the following actions:

- 1) Conduct additional traffic analysis to address TPR requirements and determine if additional offsite transportation improvements would be required to offset the impacts of the map amendment. This analysis would identify specific potential impacts related to adding 155 vehicle trips to the transportation system for the p.m. peak hour (during the future year Transportation System Plan horizon). This action would maximize flexibility for future uses allowed for the zoning designation, but would require additional analysis, and (pending the results of the analysis) may lead to unnecessary transportation system investments if the reasonable worst-case use is not developed.

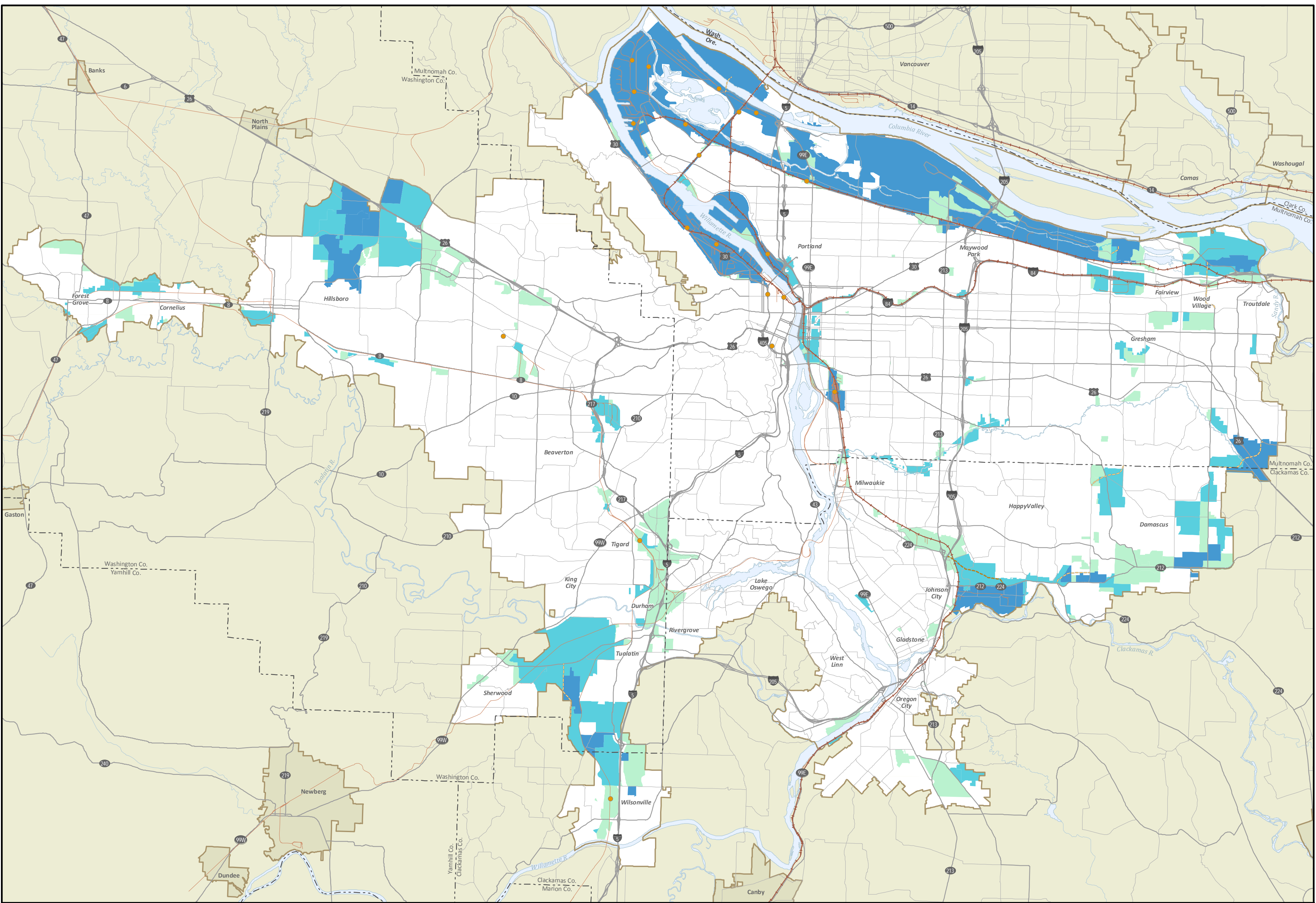
--or--

- 2) Include a trip cap with the map amendment that would limit site trips and not further degrade the transportation system. The analysis indicates that the existing zoning would allow approximately 64 p.m. peak hour trips, which would exceed the number of trips required for the government office building included in the TIA (59 p.m. peak hour trips). A trip cap of 80 p.m. peak hour trips would provide some flexibility for the site design to add a nominal portion of trips, while not creating a significant increase above the reasonable worst-case trip potential of the existing ML zoning.

Text Amendment (Allow Government Office use in IN)

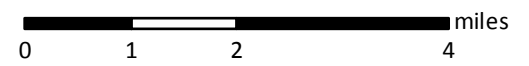
The potential text amendment to allow government office buildings in any IN zone would not increase the reasonable worst-case trip potential for IN zones beyond what is currently allowed for recreational community center. Therefore, such action would meet TPR requirements.

If you have any questions, please call.



Title 4, Industrial and Other Employment Areas

October 2014



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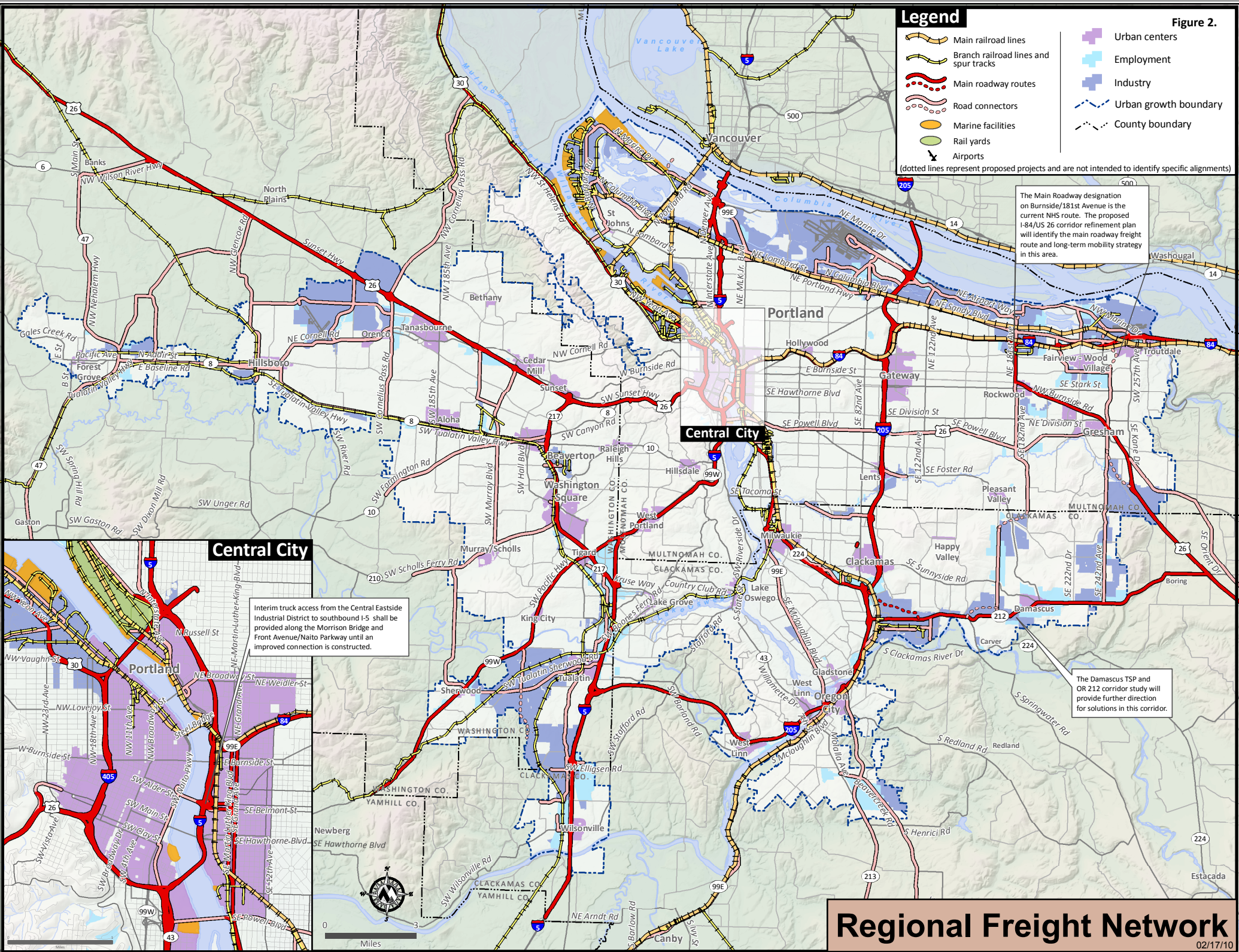
- Employment areas
- Industrial areas
- Regionally significant industrial areas
- Proposed main roadway routes
- Proposed road connectors
- Mainline freight
- Branch line freight
- Rail yards
- County boundaries
- Urban growth boundaries
- Neighbor cities



Figure 2.

Legend

- Main railroad lines
 - Branch railroad lines and spur tracks
 - Main roadway routes
 - Road connectors
 - Marine facilities
 - Rail yards
 - Airports
 - Urban centers
 - Employment
 - Industry
 - Urban growth boundary
 - County boundary
- (dotted lines represent proposed projects and are not intended to identify specific alignments)



The Main Roadway designation on Burnside/181st Avenue is the current NHS route. The proposed I-84/US 26 corridor refinement plan will identify the main roadway freight route and long-term mobility strategy in this area.

Central City

Interim truck access from the Central Eastside Industrial District to southbound I-5 shall be provided along the Morrison Bridge and Front Avenue/Naito Parkway until an improved connection is constructed.

The Damascus TSP and OR 212 corridor study will provide further direction for solutions in this corridor.



Regional Freight Network